FOB Objections Related to the EA for the Forest Plan Amendment for Elk, Old Growth, Coarse Woody Debris, and Snag Forest Plan Components

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Submitted electronically on June 5, 2023, to:
https://cara.fs2c.usda.gov/Public//CommentInput?Project=57302

Mr. Anderson,

On behalf of Friends of the Bitterroot (FOB), Friends of the Clearwater (FOC), WildEarth Guardians (WEG), Alliance for the Wild Rockies (AWR), and Native Ecosystems Council (NEC), we submit the following corrected objection to the Draft Decision for the Programmatic Amendment for Elk Habitat, Old Growth, Snags and Coarse Woody Debris Objectives - Bitterroot Forest Plan on the Bitterroot National Forest (hereafter, Amendment) located within Ravalli County and Missoula County, Montana; Idaho County, Idaho. This objection corrects minor errors and clarifies our compliance with regulations under 36 C.F.R. 219.54(c).

Therefore, these objections incorporate the Draft EA and scoping comments submitted by each organization and all previous submissions (and attachments) to the Forest Service on the Amendment proposal from these organizations.

In addition, all scoping comments, comments, attachments and/or objections provided by FOB, WEG, AWR, FOC, and NEC for the Darby Lumber Lands II Project (2019), the Eastside Forest and Habitat Improvement Project (2023), the Gold Butterfly Project (decision pending), the Bitterroot Front Project (2022), and the Mud Creek Project (2023) are fully incorporated.

Per the requirements under 36 C.F.R. 219.54(c), the lead objector:

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The responsible official for the Amendment is Bitterroot National Forest Supervisor Matthew Anderson. The following enumerated points below represent our statements of the issues and parts of the plan amendment to which the objection applies, and in which we raised in previous comments to which the Forest Service fails to properly address in its analysis or response to comments.

1. For decades, we claimed the Bitterroot National Forest (BNF) ignored the best, most recent, available science during project planning and implementation.
2. We applaud the Agency for declaring a desire to amend the Forest Plan (FP) to align with the best, most recent, available science.
3. However, we stipulate that the Forest Service's (FS) proposed amendment must follow the best, most recent, available scientific research fully analyzed in an EIS.
4. It is improper to continue relying on the outdated and/or outlier studies which support management goals while pretending BNF decisions are based on the best science.
5. The scope and number of amendments and changes to the plan are a plan revision without the proper review process of a revision is in violation of NEPA and NFMA.
6. The amendment removes protections for wildlife so that aspect must be fully analyzed in the revision process.
7. Therefore, we could support FP amendments if, and only if, the amendments are based entirely on the best, most recent, available scientific research fully analyzed in an EIS.

Proposed Amendments

8. Because our previous comments have enumerated our specific arguments with these proposed amendments (most of which have not been addressed by the Agency), we will concentrate these objections on a single section of the EA.
9. The following are our objections related to the "Comments and Response Summary" contained in Appendix A of the BNF Amendment EA.

<u>Environmental Impact Statement and Significance of the Plan Amendment</u>

10. In response to multiple comments insisting that this amendment process should have been conducted using an EIS, the EA (p. 120) proclaims:

    The Forest Service has considered the degree of effects of the components in the amendment. The amendment does not include any ground-disturbing activities, nor does it direct any to be done in the future.

    A plan amendment is only considered a significant change in the forest plan if it "may create a significant environmental effect and thus requires preparation of an environmental impact statement ..." 36 C.F.R. 219.13(b)(3). Effects of the proposed action are disclosed in chapter 3 of the environmental assessment, and the responsible official was able to reach a finding of no significant impact based on this analysis. As a result, the proposed amendment is not considered a significant change to the forest plan.

11. The first point, "The amendment does not include any ground-disturbing activities, nor does it direct any to be done ..." is misleading.
12. While ground-disturbing activities are neither included nor directed, ground-disturbing activities not included in the 1987 Forest Plan are enabled by these proposed

amendments and will occur in multiple locations spread across the entire BNF. In other words, Land Management and Resource Plan are programmatic by nature and rarely authorize ground disturbing activities. Further, the cited reference explains significance depends on the scope and scale of the amendment. As we explain below, the scope and scale is such that an EIS is necessary to comply with NEPA.

13. In other words, Land Management and Resource Plan are programmatic by nature and rarely authorize ground disturbing activities.
14. Further, the cited reference explains significance depends on the scope and scale of the amendment.
15. As we explain below, the scope and scale is such that an EIS is necessary to comply with NEPA.
16. The second point, "A plan amendment is only considered a significant change in the forest plan if it "may create a significant environmental effect…" ignores the fact that new management activities will take place, each of which "may create a significant environmental effect."
17. Removing specific standards related to road densities, among others, across the entire forest constitutes a broad scale scope and scale that itself rises to the level of a significant action. In addition, the "enabling" of new ground-disturbing management activities across the entire forest is also a significant change in the Forest Plan.
18. In addition, the "enabling" of new ground-disturbing management activities across the entire forest is also a significant change in the Forest Plan.
19. The Agency claim that these proposed amendments will have no significant impact is not factual and certainly duplicitous.

Forest Plan Guidelines

20. Each of the proposed amendments remove 1987 Forest Plan "standards" and replace them with "guidelines."
21. The EA (p. 120) declares:

    Guidelines, as defined under the 2012 Planning Rule, are more restrictive than they were in the 1982 Rule.

    Guidelines included in the proposed action are being created under the 2012 Planning Rule and will be subject to the rule's requirements. Although guidelines were considered more discretionary under earlier rules, the 2012 Planning Rule re-defined guidelines in a way that is more constraining. Specifically:

    > A guideline is a constraint on project and activity decision making that allows for departure from its terms, so long as the purpose of the guideline is met. 36 C.F.R. 219.7(e)(1)(iv)

They are similar to standards in the level of resource protection afforded and only allow deviation if their purpose can be met in another equally effective way. As a result, guidelines proposed in the amendment are not discretionary and cannot be easily deviated from.

22. The 36 CFR § 219.7(e) [2012 Planning Rule as amended] states:

(iii) ***Standards.*** A standard is a mandatory constraint on project and activity decisionmaking, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

(iv) ***Guidelines.*** A guideline is a constraint on project and activity decisionmaking that allows for departure from its terms, so long as the purpose of the guideline is met. (§ 219.15(d)(3)). Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

23. Thus, according to the 2012 Planning Rule, the EA's assertion that guidelines "… cannot be easily deviated from" is disingenuous.
24. "Standards" are mandatory while "guidelines" "… allows for departure from its terms, …."
25. Despite Agency claims to the contrary, these proposed amendments remove mandatory requirements from the 1987 Forest Plan and replace them with "guidelines" which are nothing more than "emphatic, operational suggestions."
26. Commenters' contentions that "the proposed guidelines contain loopholes which allow the Forest Service to do whatever it wants" were evaded or directly addressed by the Agency.
27. We do not approve of the replacement of "standards" with "guidelines."
28. The Forest Service should follow rules (standards), not suggestions (guidelines) which allow for differing interpretations by ever-changing Agency management-level officials.

Old Growth

29. Numerous commenters to the Draft EA point out that the adoption of Green et al. 1992 (rev. 2011) would allow the Forest Service to remove large trees from the landscape while retaining old growth status for stands of trees.
30. The Agency's response (EA p. 121) was:

    Green et al. 1992 (rev. 2011) would be adopted and applied in its entirety; therefore, it can't be a perversion. Green et al. has been applied in stand mapping and project planning for two decades. The lawsuit brought against the Gold Butterfly project by Friends of the Bitterroot in 2020 has triggered the need to formally amend the plan to keep using this best available science. The definition of old growth goes well beyond a simple number of trees per acre of a given diameter. The definition allows the identification of many more stands that would be classified as "mature" under the existing forest plan and changes them to a category with much stricter sideboards and considerations if, and when, they may be proposed for vegetation management. The minimum characteristics described in Green et al. are not prescriptive for future vegetation treatment proposals. A functioning old growth stand must remain a functioning old growth stand. The prescription for any stand is based on stand condition, location, and project and resource objectives.

31. Rather than supporting the Forest Services' claims, that response confirms the point made by the commenters, "A functioning old growth stand must remain a functioning old growth stand."
32. By changing the definition of "a functioning old growth stand" to one that is more inclusive (Green et al 1992), the Agency enables the removal of large, old trees from an old growth stand while supposedly retaining "function" with fewer large trees than required by the 1987 Forest Plan.
33. As the Agency readily admits, some form of the proposed old-growth amendment has been used for decades as site-specific amendments.
34. During those projects, the on-the-ground implementation of those old-growth amendments allowed a substantial number of large, old trees to be removed despite Forest Service assertions that Green et al. 1992 would protect those trees. (See attachment A)
35. Based on the decades-long history of misuse of site-specific old growth amendments, current public confidence in the Agency's intentions is virtually nonexistent.
36. We, along with many others, no longer believe Forest Service assertions of retaining large, old trees under Green et al 1992.
37. If the intent of the proposed amendment is to retain as many large, old trees as possible, the wording of the proposed amendment should be revised to not only make that absolutely clear, but to ensure that future management officials would be mandatorily bound by "standards."
38. There must be specific "standards" that prevent logging old growth plus specific "objectives" to retain no less than precise volumes of mature stands so they can develop into old growth.
39. As written, the proposed old growth amendment contains too many loopholes to convince the public that the Forest Service is being truthful.

Carbon and Greenhouse Gas

40. Many commenters suggested the Agency fails to recognize the importance of old growth stands in sequestering carbon.
41. The response offered by the Forest Service is that "Additional scientific references regarding carbon and sequestration were added to the EA." (EA p. 123)
42. Because "adding a reference" does not equate to "following the recommendations of the reference," that response reinforces the public's perception that the Agency is unwilling to follow the latest and best science.

Elk Habitat

43. Among comments on the Draft EA were those "expressing concern regarding the integrated resource management requirements as they pertain to elk habitat conditions under 36 C.F.R. 219.10(a)(5)." (EA p. 123)
44. The Agency's response (EA pp. 123-4) states, in part:

1. The elk population in the analysis area has increased over the past half century despite past and current land management practices;
    - The proposed Amendment language contains guidelines that will enhance elk forage availability and nutritional quality in future site-specific project through vegetation management, prescribed fire, or potential wildfire;
    - The proposed Amendment language may decrease certain cover types in future site-specific projects, which could be detrimental to elk, although research suggests that thermal cover may not influence elk to the extent originally thought when the Forest Plan was implemented; and
    - Road densities, while high in certain places within the analysis area, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area. The proposed Amendment language included guidelines to minimize these effects in future site-specific project planning.

45. The first point that “the elk population in the analysis area has increased over the past half century…” does not provide the public with information required to reach a reasoned decision.
46. It has been suggested that elk populations have increased not because of Forest Service action or inaction but because elk herds each year spend a substantial amount of time on private land.
47. Without knowledge of the exact “analysis area,” it is impossible to understand the meaning of that Agency response.
48. Did the analysis area include only places on the BNF where past site-specific amendments to the Forest Plan were instituted?
49. Was analysis conducted on areas that had not been affected by on-the-ground management actions to act as a control or, did the analysis area include the entirety of the BNF with no control areas?
50. Without making periodic monitoring and analysis results publicly available (regarding elk occurrence on areas which were included in past projects that included site-specific elk amendments to the Forest Plan), it is impossible for the public to have the information needed to reach an informed understanding of the proposed elk amendment.
51. The point that “research suggests that thermal cover may not influence elk to the extent originally thought…” is not supported by the references cited by the EA.
52. Furthermore, most past research into thermal cover has been related to winter seasons.
53. The Forest Service (EA p. 8) suggests:

    By 2100, temperature is projected to increase 6 to 12 °F for the annual mean monthly minimum, and 5 to 11 °F for the annual mean monthly maximum.

54. Such a temperature rise will make thermal cover during summer months extremely important for the health and survival of elk.
55. Since it is universally accepted by climate scientists that substantially warmer temperatures will occur, cherry-picking and/or misinterpreting data to support the pretense that thermal cover is not important is irrational.

56. The point that “road densities …, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area” is not adequately supported.
57. Research cited by the EA reveals that elk are affected by road density, especially in areas with low quality food sources.
58. Again, without providing sufficient monitoring and information about the analysis area, the public is not able to reach reasonable conclusions.

Species of Conservation Concern

59. “Several commenters expressed concerns regarding effects to individual species, and either stated or implied that certain species should be identified as species of conservation concern.” (EA p. 124)
60. The Forest Service responded:

> …, species of conservation concern requirements only apply if the proposed amendment would result in substantially adverse impacts or substantially lessen protections for a specific species.

Each species identified by commenters is discussed in the environmental assessment. See section 3.4.3.5 for wolverine and table 4 for fisher, flammulated owl, and black-headed woodpecker. Since the proposed amendment would neither result in substantial adverse impacts, nor lessen protections, the 2012 Planning Rule does not require the responsible official to evaluate them as potential species of conservation concern or develop species-specific plan components under 36 C.F.R. 219.9(b).

61. We wholly reject the assertion that removing specific, protective road density standards will not “lessen protections” for species of conservation concern. As the Agency freely admits, many projects have been completed over the last two decades that include site-specific amendments similar to those being proposed here as Forest Plan amendments.
62. As the Agency freely admits, many projects have been completed over the last two decades that include site-specific amendments similar to those being proposed here as Forest Plan amendments.
63. Given that history, there have been many opportunities to conduct after-project monitoring and analysis regarding the impact those projects had on species that commenters suggest should be identified as species of conservation concern.
64. The EA includes no record of such monitoring or analysis of data collected to substantiate the assertion that the Forest Plan amendments as proposed, would not enable “substantially adverse impacts or substantially lessen protections for a specific species.”
65. Therefore, the Forest Service claim is an unsupported assumption akin to magical thinking.

Grizzly Bear

66. A response to commenters' concerns (EA, p. 124) states:

> … Since the forest plan was revised under the 1982 Planning Rule, these 2012 Planning Rule requirements only apply to those changes to the plan made by the amendment. 81 Fed. Reg. 90723 at 90725. As a result, new species-specific plan components would only be needed if the proposed elk habitat changes adversely affect the recovery of grizzly bear.

67. That response does not address our concern that the consultation with the United States Fish and Wildlife Service (USFWS) was only done on the Travel Plan and the Elk Habitat Effectiveness (EHE) amendment and did not include the other programmatic amendments to Coarse Woody Debris (CWD), snags, and old growth, each of which affect grizzly habitat and their food sources.
68. For example, Keisker shows grizzly bears are associated with CWD-6 for prey including 5 classes of log decomposition (Attachment B, Keisker, D.G., 2000, p. 52, table 8).
69. This proposed programmatic amendment package does not mandate the retention of larger diameter CWD, nor does it mandate the retention of snags which eventually become large diameter CWD. (i.e., guidelines are suggestions, not mandates.)
70. The cumulative effects of all amendments must be analyzed including the different EHE site-specific amendments for the Mud Creek Project.
71. These proposed guidelines would have restricted new road construction in the Mud Creek Project because the area does not meet elk objectives.
72. For example, the EA response to comments on Elk concerns (EA, p. 124) maintains:

> Road densities, while high in certain places within the analysis area, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area. **The proposed Amendment language included guidelines to minimize these effects in future site-specific project planning,**" (emphasis added).

73. The Mud Creek Project would be restricted according to these proposed guidelines.
74. Thus, the BA fails to disclose the cumulative effects of this amendment package and the Mud Creek Project deviation from these proposed amendment guidelines.
75. The current BNF Travel Plan has a laundry list of specifications for road and trail reductions.
76. The 2021 Consultation with USFWS was for both the Travel Plan and EHE.
77. Documentation included with this proposed Amendment Package does not disclose how the BNF complied with these closures and modifications to conform with the Travel Plan and the USFWS Biological Opinion (BO).
78. The USFW 2021 BO for Travel Plan and Elk Amendment to Forest Plan (Attachment C, p. 7) states:

    1) Decrease by 51 miles (3.5 percent) the miles of roads designated open to highway-legal vehicles, both yearlong and seasonally.
    2) Decrease by 74 miles (67 percent) the miles of double-track trails designated open to vehicles 50 inches or less in width, yearlong, from 110 miles to 36 miles. Increase

by 9 miles (1.5 percent) the miles of double-track trails designated open to vehicles 50 inches or less in width, seasonally.

3) Decrease by 291 miles (88 percent) the miles of single-track trails designated open to motorcycles, yearlong, from 330 miles to 39 miles. Increase by 42 miles (55 percent) the miles open seasonally to motorcycles, from 78 miles to 121 miles.
4) Authorize 30 miles of existing unauthorized routes, including19 miles of double-track trails and 11 miles for use as single-track trails (10 miles seasonally, and 1 mile open yearlong).
5) Decrease the areas designated open to snowmobile use by 205,141 acres (27 percent).
6) Motorized/mechanical transport, including bicycles, is prohibited in the Selway-Bitterroot recommended wilderness area and in the Sapphire and Blue Joint wilderness study areas, for both summer and over-snow use.
7) Game retrieval using motorized means off designated routes is not allowed.

While some of these actions only required administrative changes, and thus we able to be accomplished right away, **other actions require on-the-ground changes as projects are implemented on the Forest.** The Travel Management Plan Record of Decision stated, "The physical treatment of closed routes, through decommissioning or placing in long-term storage, will take future administrative access needs, including fire suppression and timber management, into consideration, and will be analyzed in separate, site-specific NEPA projects and decisions when applicable" (U.S. Forest Service 2016b). The Environmental Baseline for this biological opinion incorporates all on-the-ground changes that have been made to date." (Emphasis added)

79. Some commenters expressed concern that replacing management direction for elk could adversely affect the recovery of grizzly bears. (EA, p.124)
80. The Agency's response (EA, p. 125) was:

Forest Plan direction may occasionally result in adverse effects to individual grizzly bears over the life of the plan, particularly as a result of access management direction and inadequate food and attractant storage.

81. However, this proposed Programmatic Amendment Package, the Biological Opinion, and the USFS Biological Assessment is fundamentally flawed, in part, because it fails to comply with NEPA.
82. For example, the Forest Service failed to analyze illegal motorized use of closed and stored roads.
83. The USFWS letter to Anderson accompanying the BO stated, "The Forest made a determination of *may affect, likely to adversely affect* for grizzly bears."
84. If the USFS has determined their management actions are likely to adversely affect grizzly bears, is there also a likelihood that those management actions will affect the recovery of the species?
85. Given the Agency's failure to update the entire Forest Plan in a timely manner, we question how much more time will pass before the plan is modernized and whether the

plan is to continually amend the Forest Plan and never abide by the regulations that require revision every 15 years.

86. An additional response to commenters' articulated concern that replacing management direction for elk could adversely affect the recovery of grizzly bears (EA, p.124) was:

    As a result, new species-specific plan components would only be needed if the proposed elk habitat changes adversely affect the recovery of grizzly bear.

87. An analysis of the recovery of grizzly bear seems to be missing from the EA documentation.
88. In response to consistent and recent sightings of grizzly bears on the BNF, FOB wrote a letter in the fall of 2021 asking for a species-specific amendment for grizzly bears. (See Attachment D, FOB Letter to BNF on Grizzly Programmatic Amendment – 2021)
89. More than one year later, the Agency has yet to respond.
90. Subsequently, two sub adult grizzlies spent the greater portion of the 2022 summer on the BNF.
91. There is no communication agreement between the BNF and the USFWS for grizzly, a document which should include possible release sites.
92. Therefore, the two grizzly bears were moved to the Sapphire Mountains, a substantial distance from the designated Bitterroot Ecosystem (BE).
93. During the April 12, 2023, Spring Bitterroot Subcommittee meeting, Hilary Cooley continued to express the need for a communication agreement with the BNF.
94. Yet, no progress has been made on a communication and release plan.
95. That does not bode well should more grizzlies be pre-emptively caught on the BNF.
96. It is past time for a grizzly amendment to the Forest Plan.
97. Connectivity to the Bitterroot Ecosystem (BE), is essential to sustained grizzly recovery.
98. The most recent five-year review published by USFWS emphasizes the importance of connectivity to grizzly bear recovery. (See Attachment E, 2021 US Fish and Wildlife Service 5-year review of grizzly bears in the lower-48 states, p. 21)

    The uncertainty associated with the stressors of human-bear conflicts, human population growth, and potential **reductions in connectivity** further represent a possible reduction in overall viability of the grizzly bear in the lower-48 States in the foreseeable future. (Emphasis added)

99. In a recent ruling on the Flathead Forest Plan, the Court found that forests must consider the direct, indirect, and cumulative effects of proposed actions on the entire population of grizzly bears in the lower 48. (See Attachment F, WEG et al. v. USFS, Steele et al (district court opinion and order) - 24jun21)
100. The decision found, "…, there is no question or argument that the Service has unreasonably delayed in carrying out the non-discretionary commitments in the ROD in violation of the APA." (See Attachment G, AWR v. Cooley (district court opinion and order) - 15mar23, p. 26; See also Attachment H, USFWS Court Submission With Bitterroot Grizzlies Schedule - 14apr23)

101. Currently in draft form, Montana Fish Wildlife and Parks (MFWP) has proposed a grizzly bear management plan. (See Attachment I, MFWP Grizzly Bear Management Plan [draft] – 2022)
102. To protect grizzly bears, MFWP plan (p. 11) recommends:

> FWP would support land management agencies' policies previously agreed to as part of the CSs. Elsewhere, FWP would continue existing policy of avoiding open road densities exceeding 1 mi/mi2 on lands it owns or manages. FWP would take the view that, outside of areas with specific road density standards, grizzly bears can coexist with humans in areas with moderate amounts of motorized access if attractants are well managed, conflicts are minimized, and mortality of grizzly bears is sufficiently low.

103. The plan discusses the importance of the BNF to grizzly bear recovery (p. 81).

> Due largely to its many miles of remote and protected habitat, the Bitterroot area (primarily in Idaho, but also extending east to the foothills of the Bitterroot Mountains in Montana) has long been identified as a priority area for grizzly bear recovery (Mattson and Merrill 2002, Roy et al., 2001, USFWS 2000). Merrill et al. (1999) identified the Idaho portion of the Bitterroot area as potentially suitable for grizzly bears. Extrapolating from Resource Selection Function models developed in Yellowstone and the Swan Mountain Range, Boyce and Waller (2003) projected that the Bitterroot area could potentially support over 300 grizzly bears. Using a more general predictive model, Mowat et al. (2013) predicted that the Bitterroot area could support over 400. Boyce et al. (2002) used theory and estimates of the potential population size in the Bitterroot to bolster the case that even a small population in the greater Bitterroot area would substantially buffer grizzly bears against complete extirpation in the U.S. Rocky Mountains, assuming low levels of dispersal among the NCDE, Cabinet-Yaak, and Bitterroot populations.

104. The USFW 2021 BO conservation recommendations (Attachment C, p. 51) are:

> Continue to manage access on the Forest to achieve lower road densities and high secure habitat, particularly in areas important for connectivity for grizzly bears. By managing motorized access, several grizzly bear management objectives could be met including: (1) minimizing human interaction and potential grizzly bear mortality; (2) minimizing displacement from important habitats; (3) minimizing habituation to humans; and (4) providing relatively secure habitat where energetic requirements can be met (Interagency Grizzly Bear Committee 1998). Additionally, lower road densities and higher secure habitat would also benefit other wildlife and public resources.
>
> The presence of attractants is a major factor leading to the food conditioning and habituation, and the eventual direct mortality or management removal of grizzly bears. The Service recommends that the Forest add food storage requirements to permits and contracts when planning projects and pursue a Forest-wide food storage order. As grazing permits are evaluated, the Service recommends the Forest discuss with permittees their plans for timely removal of livestock carcasses and consider adding

prohibitions on feeding supplemental grains or other livestock feed on grazing allotments. Management of garbage, food and livestock feed storage benefits grizzly bears as well as black bears and other carnivores. Human/carnivore and livestock/carnivore interactions would also be reduced, leading to a public safety benefit.

105. The BO points out the fact that lack of food storage orders on the BNF is a continued threat to the recovery of grizzlies.
106. The recommendations included in the BO suggest road density is important for the recovery of grizzly bears, yet this amendment package allows for increased road densities.
107. As the MFWS BO (p. 28) suggests:

Overall, existing motorized routes and any new routes constructed in the future within action area, temporary or permanent, may affect grizzly bears. These effects may be insignificant in some situations or adverse in others. Adverse effects may significantly impact an adult female grizzly bears' ability to find food resources, breed and raise young, and find adequate shelter at some time over the life of the [BNF's already outdated] Forest Plan.

108. The BNF must stop delaying and promptly complete a programmatic amendment to the Forest Plan for grizzly bears which includes standards for motorized access and road densities.

Biodiversity

109. Commenters voiced concerns related to the removal of the current Forest Plan elk habitat effectiveness thresholds that provide protection for numerous native species. (EA p. 125)
110. The Agency response (EA p.126), in part maintains:

This amendment will therefore not result in substantial losses in or degradation of habitat because:

1) The majority of drainages on the Forest have been out of compliance with this standard since the adoption of the Forest Plan, removing the standard will not make a substantial change in on-the-ground conditions.
2) The revised plan components in the proposed action include guidelines that will limit the construction of new, permanent roads.
3) No actual road construction or changes in road density are authorized by this amendment. Any such proposed actions will be subject to project-level effects analysis.

111. Point 1 is an unconditional admission that the BNF has been ignoring the 1987 Forest Plan since its creation.
112. That unqualified admission reveals the Agency has disregarded directives contained in the National Forest Management Act of 1976 for more than three decades.

113.Point 2 states that new “guidelines will limit the construction of new, permanent roads.”
114.As we have previously expressed, “guidelines” are not “standards” and are therefore not binding.
115.And, as has been revealed by numerous studies, unless completely obliterated, any and all roads (administrative, open, closed, blocked, etc.) will be used by the public.
116.Point 3 claims that “[n]o actual road construction or changes in road density are authorized by this amendment.”
117.However, as worded, the proposed amendments authorize and enable new road construction during future projects.

Snags and Coarse Woody Debris

118.“Some commenters felt the agency had not considered important aspects of snags and coarse woody debris such as how they contribute to soil function and the existence of mycorrhizae and carbon in the soil.” (EA p.126)
119.The Forest Service response to the publics’ concerns was both terse and disrespectful.

Additional discussion and literature citations were added to the EA.

120.Such responses do nothing to increase the publics’ confidence in the Agency and only substantiate the wide-spread belief that Forest Service assertions that public input is incorporated into policy are little more than pretense.

Summary

121.The proposed old-growth amendment provides no required percentages of old growth in areas suitable for timber production.
122.Instead, it suggests the retention of old growth on the entire forest "when possible."
123.When wouldn't it be possible?
124.The current Forest Plan (1987) allows for the protection of all old-growth and mature trees that exist on the BNF should the agency choose to do so, (which it has not).
125. That allowance easily fulfills Biden's Executive Order 14072 to preserve old-growth and mature forests.
126.The BNF does not need the proposed old-growth Forest Plan amendment to meet E.O. 14072 objectives.
127.Therefore, the Agency’s desire to amend the old-growth portion of the current 1987 Forest Plan implies there is another reason for the proposed amendment, an unspecified, hidden agenda.
128.Given the past implementation of similar versions of the proposed old-growth amendment in concert with amendments to elk habitat, snag retention, and coarse woody debris, a logical conclusion is that the Forest Service’s intends to make it easier to satisfy NEPA and NFMA requirement while increasing the amount of logging that occurs on the BNF.

129. The newly proposed definition of old growth (not a standard) suggests (not requires) minimum, old-growth characteristics.
130. For example, in Ponderosa Pine-Doug Fir forests, eight 21" dbh trees, greater than 170 years old per acre) need to be preserved. (There is a basal area condition, but that can be obtained with any size tree.)
131. It must be noted that Green et al 1992 calls this a "screening process," not a "definition."

    The minimum criteria are used to determine if a stand is potentially old growth. Where these values are clearly exceeded, a stand will usually be old growth. (Green et al 1992, p. 11)

132. The BNF's proposed definition used Green's identification of "potential" old growth and claims that defines old growth, supposedly "increasing" the old growth on the forest.
133. Paradoxically, the same amount of old growth will exist on the BNF after the proposed redefinition as before.
134. The proposed definition is more encompassing than the 1987 Forest Plan definition, but no new trees will be magically created.
135. The proposed definition undeniably allows the Agency to log old-growth stands down to the status of "potential" old growth, not necessarily well-functioning old growth.
136. Numerous studies have concluded that more old-growth trees and more old-growth characteristics mean better functioning old-growth ecosystems.
137. Many independent scientists (i.e., not attached to the timber industry, Forest Service, or BLM) now recommend that no old trees should ever be logged because that degrades old-growth related ecosystems and reduces carbon sequestration.
138. The proposed old-growth amendment allows large, old trees to be cut for any number of the usual reasons (resilience to insects, wildfire, and disease) as long as the minimum criteria are retained.
139. In other words, this proposed amendment allows the forest to degrade existing old-growth stands and still refer to them as old growth.
140. Along with the proposed old growth amendment are amendments that decrease protections for the amounts of elk habitat, coarse woody debris, and snags.
141. Each of these original protections were put in place to preserve wildlife habitat.
142. Those protections are made weaker because "standards," which could be enforced, are being replaced by "guidelines," which cannot.
143. In short, these sweeping Forest Plan Amendments are being proposed to make commercial logging projects easier to get through the NEPA process.
144. There are no proven benefits to forest ecosystems, wildlife, clean air, water, or the public owners of the BNF.
145. The Forest Service declares (EA p. 18):

    "Litigation on the Gold Butterfly Project has led the Forest to propose this amendment [package] to the Forest Plan …"

146. Thus, it appears the Agency is proposing changes to the Forest Plan not to assist it in managing the BNF for the benefit of the forest or the public that owns it, but to

facilitate management agendas while limiting public participation both administratively (during project planning) and in the courts (when administrative processes fail).

147. Undeniably, these proposed Forest Plan amendments are intentionally vague, cosmetic, and not worth the paper on which they are written.
148. Members of FOB and the other aforementioned organizations regularly visit widely dispersed areas of the BNF for research, recreation, enjoyment, and other activities.
149. Because those members' use is so widely dispersed across the BNF, this set of proposed Forest Plan amendments will enable detrimental impacts to those members' future activities in the places they will continue to visit.
150. Since the proposed amendments authorize the implementation of additional ground-disturbing management actions on the entirety of the BNF, there is no real possibility the Agency will not pursue site-specific projects that affect those members.
151. As written, we are strongly opposed to this Forest Plan Amendment Package the Forest Service is proposing.
152. The changes included in the proposal will have a substantial impact on the BNF, a vast array of ecosystems, and the human environment.

Suggested Resolution

153. Therefore, the Forest Service must prepare an environmental impact statement that properly analyzes the programmatic amendment as we explain above using the most recent scientific research, and demonstrates compliance with the Endangered Species Act, particularly in regards to grizzly bear recovery. Such an analysis will remedy the problems this Objection identifies (i.e., eliminating standards, shrinking the retention of functioning old growth, diminishing carbon storage, increasing greenhouse gas emissions, reducing secure elk habitat, disregarding the needs of species of conservation concern, lowering protections for grizzly bears, degrading biodiversity, and downgrading safeguards for snags and coarse woody debris) and/or halting all land-disturbing management activities on the BNF until a Forest Plan Revision is completed.
154. Emerging research appears to support a long-held belief that managed forests are less able to adapt to changing conditions than unmanaged forests. (See Attachment J, Faison, E. K. et al, 2023, The importance of natural forest stewardship in adaptation)
155. Absent the preparation of an environmental impact statement, an alternative resolution would be for the agency to await full Forest Plan Revision and comply with the current forest plan direction. In fact, we question any need for this proposed amendment package which appears designed to enable a significant increase in land-disturbing management activities on the BNF.

Submitted respectfully,

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On the following pages are 10 attachments referenced in the above text by letter (e.g., A, B, C, etc.) and 3 declarations from members or Friends of the Bitterroot.

Exhibit A - Westside project old growth logging

The Forest Service claimed in the Westside EA that there was no old growth in any of the Westside project cutting units. However, documents obtained by FOB through a FOIA request showed that a wildlife technician had identified an area in unit 2c (later renamed 2d) as possible old growth, and that the wildlife biologist later disqualified it because of “the presence of old stumps.” No stand exam was ever done here, although they did 16 other old growth stand exams on the Westside project, finding no old growth. I then investigated this area and contacted Cheri Hartless, who told me that, on a “walk-through”, she had earlier concluded that it was not old growth. Now that many of the trees are cut, it is much easier to determine old growth status by extrapolating the ages/sizes of the cut trees to the remaining ones, with some coring to check these age interpretations.

In this area, I outlined a 25 acre stand of Ponderosa Pine-Doug Fir old growth (90% PP; 10% DF); 21 of those acres were logged as part of unit 2c (later renamed 2d). The attached old growth map shows this stand. There was a sort of embayment of 3-4 acres in the old growth that was not old growth, but I included it in the 21 acres anyway because I did not want to gerrymander the boundaries.

The 21 logged acres would have to have 168 trees (8 per acre) over 170 years old and greater than 21 inches in diameter to qualify as old growth under USFS standards (Greene et al, 1992). I counted 185 such trees in the 21 acres, even including the embayment acres that were not old growth. Unfortunately, the Forest Service cut at least 19 old Doug Firs and 20 old Ponderosa pines, reducing the density to 7 per acre and taking this stand out of old growth status. The oldest Ponderosa cut was 269 years, and the oldest Doug Fir that was not hollow was 237 years, although a few hollow ones were probably older. Every single large Doug Fir was cut in this stand, except for 2 marked wildlife trees. According to Cheri Hartless, these Doug Fir "were encroaching on the crop trees and were diseased." Disease can be as simple as a “thinning crown” or root disease nearby (although none had been documented within this old grove). Of course, the crop trees are Ponderosas.

A look at the ages of adjacent trees showed that the Ponderosas and Doug Firs in any given area were almost exactly the same age, suggesting that they grew up together and there was no encroachment by either species. Large areas had 150-year-old Ponderosas and Doug Firs. Because the 150–250-year-old trees, of both species, all started growing well before fire suppression started, fire suppression or any other human activity (logging, grazing, etc.) had nothing to do with the species composition.

It *was* a classic mixed Ponderosa Pine-Doug Fir Old Growth Forest. Remaining are now 143 old Ponderosas and 2 old Doug Firs (the wildlife trees) – not enough for old growth status. Many other old growth attributes were also lost: I did not examine remaining snags and large dead and downed debris, important components of old growth forests (Kaufmann et al 2007; Green et al., 1992), but it looks like many snags were cut because they were “hazardous.” It is also hard to document the damage to the understory, but the amount of ground disturbance is astounding. Photos of the area are below:

The feller-buncher is on tracks and goes everywhere, including steep slopes up to 55% in violation of the Forest Plan and the Westside design criteria, cutting whatever trees are in its way. The tree in the center of the top photo had orange paint on it but was cut anyway because it was "in the way." The bottom photo shows the 2-foot-deep ruts left behind. We saw the first knapweed and mullein filling in the tracks left 3 months earlier.

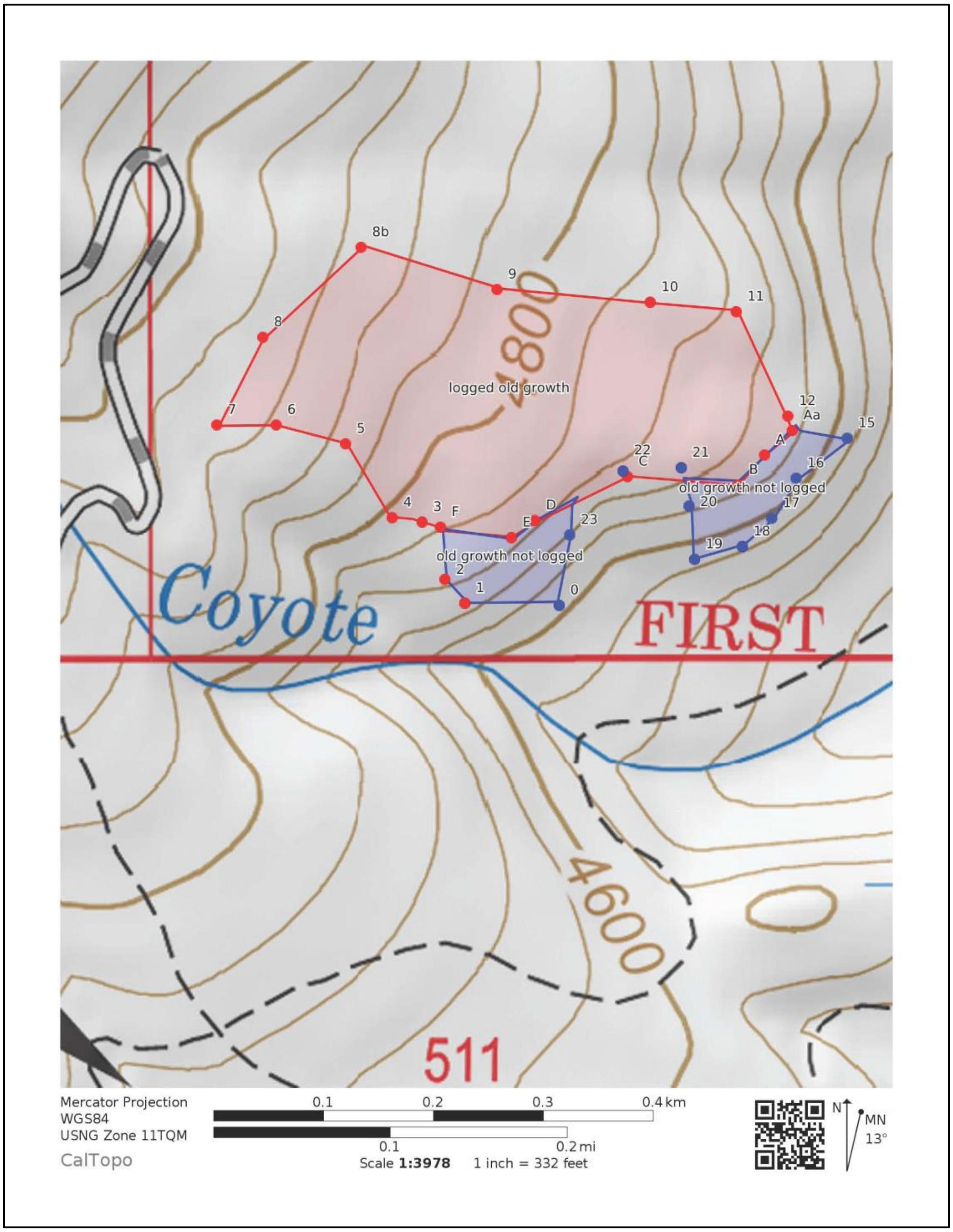
A former wildlife technician had identified this area of fox or coyote dens before the logging. In this view there are at least 4 stumps with 170-230 years of annual rings.

Before and after photos show that the leaning tree that was marked for saving was cut, probably because of its hazard to humans. The tree was hollow, and had 136 annual rings outside the hollow part, so was probably at least 200 years old. There were probably 8 *felled* trees per acre more than 170 years old in the area. The remaining forest may still qualify as OG, but many of its other attributes have been lost.

Before and after photos of an old grove. In this view, there are 9 stumps that ranged in age from 170-218 years old. The remaining large trees are probably of similar age.

Above is the largest Doug Fir in the area before and after. This Doug Fir would have been cut because it has a "thinning top and dead branches throughout the crown" (BNF silviculture), except it was marked as a wildlife tree. Today it still stands but is isolated from any other trees or cover. Does it have the same value for wildlife?

Before and after photos of two large Doug Firs with dwarf mistletoe (BNF). Note boulder next to left one for reference. The one on the right was 190 years old; the one on the left only 150. The new permanent road is directly behind the left one. Note the rocks in the foreground that establish the photo point.



Map showing old growth logged in red and remaining old growth in blue on the Westside project. Ponderosa pine-Doug fir forest, although every large Doug fir was cut except for two marked as wildlife trees.

Author – Jeff Lonn

WORKING PAPER 50

Types of Wildlife Trees and Coarse Woody Debris Required by Wildlife of North-Central British Columbia

2000

British Columbia
Ministry of Forests Research Program

Types of Wildlife Trees and Coarse Woody Debris Required by Wildlife of North-Central British Columbia

Dagmar G. Keisker

BRITISH COLUMBIA

Ministry of Forests Research Program

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ABSTRACT

If wildlife diversity is to be maintained in managed forests, the habitat needs of all wildlife species must be met. This report provides some of the necessary information by describing the habitat requirements of 133 vertebrate species of north-central British Columbia in relation to two special habitat elements: Wildlife Trees and Coarse Woody Debris. To make it easier for habitat managers to apply this information, requirements were condensed into a series of Habitat Summary Tables. The tables, which are based mainly on published research reviewed up to 1995, describe in detail the varieties of Wildlife Trees and Coarse Woody Debris that are required by wildlife.

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CONTENTS

User's Guide to the Habitat Summary Tables

INTRODUCTION

Wildlife Trees and Coarse Woody Debris

In recent years, forest managers have become increasingly aware of the role both of trees with special characteristics ("wildlife trees") and of fallen woody material ("coarse woody debris") in maintaining biodiversity. These forest elements, which often result from damage or disease, provide critical wildlife habitat that will not necessarily be available in managed stands unless special measures are taken to ensure its presence.

In British Columbia, several initiatives have been taken to provide Wildlife Trees (WTs) and Coarse Woody Debris (CWD) in managed stands. The Wildlife Tree Committee, a joint undertaking of the Ministry of Forests, Ministry of Environment, Lands and Parks, Workers' Compensation Board, and several other groups, was formed in 1985 to find ways to maintain WTs without compromising worker safety. This partnership has resulted in a training program in which forest workers have learned to conserve WTs where possible, to recognize dangerous trees, and to make appropriate safety decisions (Wildlife Tree Committee of British Columbia 1997). The *Forest Practices Code of British Columbia Act* and its associated regulations, which came into effect in 1995, recognized the importance of WTs and CWD by requiring that forest development plans set objectives for their retention. The Biodiversity Guidebook recommended how the retention of those structures could be integrated into forest management at the landscape and stand levels (B.C. Ministry of Forests and BC Environment 1995). Today it is common practice to set aside portions of each harvest block as Wildlife Tree Patches.

Purpose of this Report and Target Audience

The main challenge in managing wildlife diversity is accommodating the large number of wildlife species and their great variety of habitat requirements. In north-central British Columbia, for example, the habitat needs of nearly 200 terrestrial vertebrate species, including 133 species that use WTs or CWD, are affected by forest management and must be considered in the integration of wildlife diversity and timber resource use. Research on wildlife diversity has proliferated since the early 1980s, and a wealth of knowledge on habitat requirements has accumulated.

The purpose of this document is twofold: 1) to introduce Habitat Summary Tables as a framework for condensing large volumes of existing information on wildlife habitat requirements in a format based on biological patterns; and 2) to present WT- and CWD-related Habitat Summary Tables that were prepared in 1994 and 1995, respectively, and that describe in detail the varieties of WTs and CWD required by wildlife. The tables are intended for use primarily by wildlife professionals, foresters, and others involved in managing habitat to maintain wildlife diversity in north-central British Columbia. However, anyone requiring wildlife habitat information in a condensed format may find the tables useful.

Scope of the Report

Habitat elements: The Habitat Summary Tables presented in this report focus on wildlife requirements involving two special habitat elements that are directly affected by forest management: Wildlife Trees and Coarse Woody Debris.

Wildlife species and biogeoclimatic zones: Covered in this report are the habitat needs of all 133 terrestrial vertebrate species that use WTs or CWD and that have been recorded, or that potentially occur, in the Sub-Boreal Spruce (SBS), Engelmann Spruce – Subalpine Fir (ESSF), and Interior Cedar – Hemlock (ICH) biogeoclimatic zones north of 52°N. This latitude extends through the vicinities of Kleena Kleene, Alexis Creek, Williams Lake, Mahood Lake, Blue River, and the Columbia Icefield.

Information sources: Information was gathered mainly from literature published up to 1994 and 1995, for WTs and CWD, respectively. Emphasis in the review was on results of original research. Although the literature search was extensive, some important papers were undoubtedly missed and some were unobtainable within the time constraints of the project. A bibliography of the reviewed literature is provided in the Appendix. Additional information was provided by researchers involved in current local projects and by other wildlife experts.

Geographic applicability: Habitat information was compiled from studies conducted throughout each wildlife species' range. Examining habitat use patterns from different geographic areas was an important aid in the identification of critical habitat features (outlined on page 3).

Most of the critical features listed in the Habitat Summary Tables represent fundamental needs of the animals (e.g., WT size or degree of concealment of CWD-associated spaces) that are likely to be valid throughout the ranges of the wildlife species. The actual descriptions of these features (e.g., >27 cm dbh for aspen/birch in Wildlife Tree Table 2-1, or the lists of reported forms of concealment shown in many CWD tables) represent measurements or forms of the critical features that have been reported to be suitable. Because research information collected in north-central British Columbia is scarce for most wildlife species, these descriptions are based mainly on studies conducted elsewhere. Care was therefore taken to exclude any information that may represent local habitat use patterns unlikely to be valid in the SBS, ICH, and ESSF zones in north-central British Columbia. The applicability of research findings to these zones was evaluated by examining the similarity of the study areas to ecosystems in these zones (including presence of competing wildlife species that may have influenced reported habitat use patterns) and by assessing the geographic constancy of the findings.

Most of the descriptions of critical features are probably also valid in the Interior Douglas-fir (IDF), Montane Spruce (MS), Sub-Boreal Pine – Spruce (SBPS), Boreal White and Black Spruce (BWBS), and Spruce – Willow – Birch (SWB) biogeoclimatic zones in British Columbia, although some differences exist in the occurrence of tree and wildlife species. Descriptions are probably least applicable to the southern Coast (Coastal Western Hemlock [CWH] and Coastal Douglas-fir [CDF] zones) and the very dry Interior (Ponderosa Pine [PP] zone), which are most dissimilar from forest types in the majority of studies from which habitat information was extracted. However, only field research can provide definite confirmation of the applicability of the descriptions to the SBS, ICH, ESSF, and other zones.

The Concept of "Types"

"Types" are integral to the condensing of habitat information: The summarizing of information on wildlife habitat requirements was achieved through delineating "Types" of habitat. This process began with reviewing the literature and recording, for each wildlife species, all habitat requirements involving WTs and CWD. Some of these requirements were statistically substantiated *preferences* (i.e., habitat parameters being used significantly more than in proportion to their availability). However, the information extracted from most studies represented only observed habitat *use* because actual preferences had not been determined.

As the list of required habitat attributes grew, two patterns emerged that could be used to condense this information:

1. Commonly, several different reported habitat requirements described, or were correlated with, the same underlying "critical feature." The list of reported habitat needs could be greatly shortened by identifying and including only these underlying critical habitat features. This approach was particularly helpful for condensing the often attribute-rich descriptions of habitat needs relating to WT or CWD surroundings.

   Correlation with a critical feature frequently made habitat characteristics appear required that had no function. For example, 86% of Pileated Woodpecker nest trees found in an Oregon study were situated on ridge tops or on the mid-upper third of slopes (Bull 1987). This affinity for higher ground may not have been due to any requirement for this characteristic itself, but to the correlation between slope position and presence of a preferred tree species, ponderosa pine, which grew on these higher sites. This tree species possessed critical features that were important for cavity construction, such as a sufficiently large size.

   The identification of underlying critical features was based mainly on the various study authors' interpretations of the habitat use patterns they found. Those explanations were supplemented by reviewing further information on the functional significance of possible critical features (e.g., warm roost temperatures are important to ensure rapid growth of young Little Brown Myotis before and after birth, which ultimately increases their chance of surviving their first winter [Fenton and Barclay 1980; Barclay 1982]), and by assessing the geographic constancy of their use (i.e., features that consistently receive much use throughout a species' range are likely to represent fundamental needs). Some critical features were easy to identify because they represent obvious necessities (e.g., a sufficiently large tree diameter is required to accommodate a nest or roost cavity).

2. Critical features could be grouped into sets, each of which represents a configuration of WT or CWD features that is used by a number of different wildlife species for specific functions. Considering features in sets resulted in further consolidation of the list of habitat requirements and allowed groups of wildlife species to be treated collectively. The sets, or configurations, of critical features are the "Types" that form the basic units of the Habitat Summary Tables. Types are thus not preconceived categories, but habitat use patterns that emerged from the review of available wildlife habitat information.

With this approach, the habitat requirements of the 79 species of WT users and the 78 species of CWD users of north-central British Columbia were condensed into 10 WT Types and 6 CWD Types. For each Type, the critical features that define it were described in as much detail as available information allowed. At this level, the focus shifted from a need to condense information to a need to find more information to fill knowledge gaps. Descriptions of critical features show the forms or quantitative values that have been reported to be preferred or commonly used, and that can therefore be considered suitable. Further literature review and local field research are likely to widen the ranges of most of the values and qualitative characteristics shown in the tables, but some may become narrower to accurately reflect specific habitat needs in north-central British Columbia.

Although the system of Types helped to organize and greatly condense existing habitat information, much complexity and variation remains throughout the summary tables. Examples are the different strengths of association of wildlife species with a Type and the "Special Requirements" of some species within a Type. Also important is the need to include the context of the surrounding habitat among the critical features of WT and CWD Types, because research has shown that animals do not perceive these habitat elements in isolation.

Definition of "Type": A Type is a specific configuration of habitat features that seems to be required by at least one wildlife species for specific functions. For example, Wildlife Trees of Type 6 (WT-6: Cracks, Loose Bark, or Deeply Furrowed Bark) seem to be required by Brown Creepers for nesting.

Most critical features are not mutually exclusive. A single WT or piece of CWD can have the features of more than one Type and may therefore serve several functions for several groups of wildlife species. In theory, all Types must be present to maintain the full complement of native wildlife species. However, field testing is required to verify this hypothesis.

Format and Contents of the Tables

There are five summary tables for WTs (listed below) and five corresponding tables for CWD:

Table 1: Types of Wildlife Trees, arranged by function, that are required by wildlife species occurring in the SBS, northern ESSF, and northern ICH biogeoclimatic zones
Table 2: Descriptions of each of the 10 Types of Wildlife Trees listed in Table 1
Table 3: Cross-reference summarizing the associations of wildlife species with the 10 Types of Wildlife Trees
Table 4: The 79 vertebrate species that are associated with Wildlife Trees and have been recorded, or potentially occur, in the SBS, northern ESSF, and northern ICH biogeoclimatic zones
Table 5: Research needs relevant to Wildlife Tree management

Table 2 of the WT chapter, and Table 7 of the CWD chapter contain the entire condensed habitat information. The other tables provide no further information, but are references to specific components of Tables 2 and 7.

Within Tables 2 and 7, there is one subtable for each Type, describing it in detail (e.g., Table 2-1, 2-2, etc.). Footnotes offer additional information, including literature references for some citations of data from specific studies. It was not practical, within the condensed table format, to directly link all entries to all the literature sources from which information was derived. Instead, literature sources are provided as a bibliography in the Appendix. Terms and symbols used in the tables are defined on pages 13–17.

The format and contents of the subtables of Tables 2 and 7 are explained below.

COLUMN 1: FUNCTION AND WILDLIFE SPECIES ASSOCIATED WITH THE TYPE

Function: Only main functions are considered. Other, often incidental, uses that are not tied to specific configurations of habitat features and that would not require specific management attention are not considered in the delineation of Types and are not mentioned in column 1. For CWD, such other functions are very numerous and are listed in an addendum to Table 6, because awareness of these additional functions may help habitat managers to estimate the required overall abundance of CWD.

Wildlife species: The list of wildlife users shown for each Type is subdivided according to the strength of each species' association with the Type. These three levels of relative importance of a Type (marked ■, ◪, and ☐) are defined on page 16. Table 2-4 indicates, for example, that Wood Ducks (■) tend to be restricted to (or strongly prefer) WT-4 for reproduction/resting, whereas Northern Hawk Owls (◪) use WT-4 as well as other Types for this function without apparent strong preferences, and Merlins (☐) make only occasional use of WT-4 for reproduction/resting. For WT-10 (hunting perches), definitions had to be worded slightly differently because species may use alternative kinds of perches as well as alternative hunting techniques. The lists of occasional users of each Type (marked ☐) depend on reports of incidental observations and are likely to be incomplete.

An overview of the Types used by each wildlife species is provided by Tables 3 and 8. Table 3 shows, for example, that the alternative WT Types used by Northern Hawk Owls for reproduction/resting are WT-4 and WT-8, and that for foraging, this species primarily uses WT-10. Human-made structures, such as nest boxes, are not considered alternative Types.

COLUMN 2: TREE SPECIES AND DECAY CLASSES (OR LOG DECOMPOSITION CLASSES) IN WHICH THE TYPE OCCURS MOST COMMONLY

The purpose of column 2 is to indicate where the Type is most likely to be found. For WTs, tree species is a good guide to likely occurrences of specific Types. The tree species listed are those that most commonly possess or develop the combination of critical features that characterizes the Type, and that are commonly used by the wildlife species associated with the Type. Only tree species occurring in the SBS, northern ESSF, and northern ICH biogeoclimatic zones are mentioned. Occurrence of CWD Types was not found to be clearly related to any site parameters or to tree species.

Column 2 also shows how each Type relates to classification systems commonly used in British Columbia: the Decay Classes of the B.C. Wildlife Tree Classification (Wildlife Tree Committee of British Columbia 1997) or the Log Decomposition Classes of Maser et al. (1979, p. 80). However, Types generally do not correspond directly to the categories of these classification systems, because the design of these systems was not based primarily on wildlife requirements but on decomposition sequences. For example, WT-1 trees are most likely to be found in Decay Classes 2, 3, or 4, but not all trees in these classes are WT-1—that is, not all have "internal decay surrounded by hard outer wood" and other critical features of WT-1.

COLUMNS 3 TO X: CRITICAL FEATURES OF THE TYPE

The remaining columns detail the critical features of the Type. Critical features are those that best describe the actual requirements that underlie observed habitat use patterns. These requirements are determined by physiological, security-related, social, or other universal or locally specific needs. Some examples and further explanations are provided on pages 3 and 13. Critical features may pertain to the WT or CWD itself, or to its location with respect to the surrounding habitat. Features pertaining to location reflect stand-level requirements as well as landscape-level considerations such as habitat interspersion and stand connectivity.

The number of critical features varies among Types. Descriptions of critical features are as detailed as available information permits. Where data from natural sites are insufficient, descriptions of successfully used human-made structures (e.g., nest boxes or bat roosts in buildings) are included in the characterization of a Type's critical features. Information on wildlife needs related to CWD is generally limited, and actual measurements of critical CWD features are very scarce, partly because some features are difficult to quantify (e.g., degree of concealment).

Many critical features, such as the pattern of wood decay in WT-1, are quite specific, but others are not. For example, several species require "some tree cover" around CWD-5, but appear to be flexible with respect to the exact characteristics of this tree cover, such as the degree of crown closure or the tree species composition. Such flexibility is especially prevalent in the case of CWD, where the functions of many critical features (e.g., small concealed spaces for nesting, resting, and escape) can be served by a great variety of forms, decay stages, and sizes of CWD. Most wildlife species associated with the Types that serve structural functions (CWD-1 to 5) are not even restricted to CWD for these functions (i.e., presence of wood does not appear to be critical). Non-woody materials (rocks and cutbanks) therefore had to be included in these Types to more closely reflect the animals' perception of their habitat. Without this broader definition, none of the wildlife species associated with CWD-2 to 5 could be said to require these Types (i.e., none would be marked ■). Because many critical features of CWD have such wide ranges and are also very common, the same piece of CWD very often serves as more than one Type. In particular, CWD-2, 4, and 6 frequently occur together.

Some of the critical features, such as internal tree decay, are not readily visible. For these features, indicators are described (as far as this information exists) to help detect them in the field.

Variation in habitat requirements occurs even within a Type. To absorb some of it, ranges of values (e.g., a range of tree diameters) have been specified that satisfy all wildlife species associated with a particular Type. More substantial variations are shown as "Special Requirements," such as the need of Pileated Woodpeckers for a much greater tree diameter than that required by the other species using WT-1. Nearly all critical features pertaining to the location of WTs or CWD are special requirements that are important for only some of the wildlife species associated with a particular Type. For each special requirement, the pertinent wildlife species are shown in parentheses. Special requirements are mentioned only for the main users of a Type (those marked ■ or ◪ in column 1), not for occasional users (marked □).

Content Limitations

The Habitat Summary Tables represent a framework with many information gaps.

During the preparation of the summary tables, many research needs were identified. Knowledge gaps were particularly extensive in the case of CWD. The delineation and description of CWD Types presented in this report should therefore be considered preliminary.

The summary tables will require periodic updates as new information becomes available. Because the tables were prepared in 1994/95, it is clear they lack recent research findings.

Furthermore, although it is hoped that most of the requirements pertaining to the habitat surrounding the WTs and CWD have been addressed in the entries on tree and CWD location, there likely are some omissions and inaccuracies regarding this extensive topic. A complete detailed review of each wildlife species' entire habitat would have been valuable, but was beyond the scope of this project.

The Habitat Summary Tables do not include information on the required numbers and spatial distribution of WTs or CWD of each Type.

Exact relationships between wildlife population sizes and habitat quantity are difficult to determine, especially when groups of wildlife species are considered collectively, as in the Types. Consequently, information is scarce. However, a general indication of the relative quantities needed of each Type may simply be derived from the number of associated wildlife species (i.e., Types used by many species are needed in greater quantities).

Also missing from the tables are wildlife requirements pertaining to the spatial distribution of WTs and CWD (e.g., whether these elements should be clumped or scattered and how far apart they should be). Research results on this topic are equally scarce and their integration into the summary tables would again be complicated by the collective treatment of species.

Potential Applications of the Tables

The Habitat Summary Tables have a wide range of potential applications. For example, they can be used in the following tasks:

Forest and wildlife management:

- designating Wildlife Tree Patches (B.C. Ministry of Forests and BC Environment 1995, pp. 62–70)
- selecting and evaluating other kinds of reserves, including forest ecosystem networks, riparian reserves, and old-growth reserves
- planning for intensively managed areas, such as woodlots and community forests
- identifying trees and CWD with high wildlife value to be retained during forestry operations
- assessing effects of forestry practices on biodiversity attributes
- conducting forest and wildlife habitat inventories

Nature education and conservation:
- preparing interpretation and education programs in parks, nature reserves, and community forests
- conducting park planning
- providing information to help private landowners enhance habitat

Wildlife habitat research:
- assessing habitat values during selection of study areas
- standardizing data collection (by using Types to describe and quantify habitat)
- identifying research needs

Some Practical Considerations in Applying The Tables

It is recommended that users keep in mind the following points when applying the tables of WT and CWD Types in habitat management:

- Different ecosystems are likely to have different frequencies of the various Types. All Types will not usually occur within a single stand. The maintenance of all Types and associated special requirements must therefore be planned and co-ordinated over a larger area. Inventory information showing which Types are common and which are rare in various ecosystems would be an important aid to this management approach.

- Many Types, such as the eight WT Types used for reproduction/resting and the CWD Type providing large concealed spaces, tend to be uncommon or rare in most ecosystems. Their maintenance may require special management attention. Rare Types may need to be retained wherever they are encountered. The recruitment of these Types is naturally low and usually depends on rare chance events. The likelihood of their future development is even lower in managed forests, because the total number of trees in the forest "pool" is reduced through logging, and because silvicultural practices such as stand tending, stand sanitation, site conversion, and short rotations generally impede the development of WTs and large CWD. It may be necessary to promote the recruitment of rare and uncommon Types by:
  - encouraging the specific factors that lead to the development of these Types, and/or
  - creating these Types directly, such as by providing artificial structures that mimic the critical features of the Types (e.g., nest supports in suitable trees for users of WT-8).

- Within each Type, some trees that provide for the "Special Requirements" of particular wildlife species should be present. Most special requirements pertain to WT or CWD location. For example, among the trees that can serve as WT-4 (trees with large cavities), some should, for instance, be located in dense cover, some should be <100 m from open water, and some should be in stands connected by travel corridors if stands are >100 m apart. Furthermore, if a species has several special requirements, those should be combined in the same tree. For example, some WT-4 trees should be near water and have dense cover concealing the nest entrance to be valuable for Wood Ducks (Semel and Sherman 1993).

- Ensuring continuous availability of each Type involves retaining WTs and CWD having current wildlife value, as well as trees that are likely to develop the critical features of the various Types in the future.

- Managing for future development of all Types requires having some knowledge of the ecology of their critical features. Such information is beyond the scope of this report, but is important to aid the selection of likely trees for future recruitment, to ensure that the processes leading to the development of the critical features are not disturbed inadvertently, and to guide efforts aimed at encouraging the development of these features. The following points are examples of such ecological considerations:
  - Factors (e.g., site conditions or disturbance agents) and time frames involved in the development of particular critical features
  - Natural probability of the development of particular critical features: Even if the most likely trees have been chosen for future recruitment, not all of them will actually develop the critical features. Having some estimate of the natural frequency of these features within the population of likely trees would help determine how many trees should be retained to ensure adequate recruitment.
  - Average length of time that WTs or CWD (of a certain tree species) are usable as a particular Type. It should be noted that the usable timespan of a WT Type may end before the tree falls if critical features disappear. For example, cavities dug through live sapwood eventually scar over and become unavailable to the secondary cavity users of WT-3 and WT-4.
  - Linkage of some Types in development: An obvious example is the creation of WT-3 or WT-4 (trees with existing cavities) by primary cavity excavators as they use WT-1 or WT-2.
  - Specific ecology of deciduous trees: Especially in the central and northern Interior of British Columbia, deciduous trees form a major portion of the WT resource, particularly of the Types used for reproduction/resting. Ecological characteristics of deciduous trees that are relevant to WT management, especially for planning future recruitment, include:
    - a relatively limited, often patchy distribution in most biogeoclimatic zones and a further restriction of large trees to particularly favourable sites;
    - a relatively short-lived seral nature;
    - the importance of *live* trembling aspen as WTs, even as substrates for cavity excavation, and their relatively short persistence after tree death; and
    - the clustered distribution of aspen with similar features (including decay characteristics [Hiratsuka and Loman 1984]) due to the dominant, asexual mode of reproduction by root-suckering, which results in clusters of clones.

SUMMARY OF THE REPORT

This report introduces a framework for condensing information on wildlife habitat requirements. Summarized are the habitat needs of wildlife species that occur in north-central British Columbia and that use the special habitat elements Wildlife Trees and Coarse Woody Debris.

The information, compiled mainly from the published literature up to 1995, is presented as a series of Habitat Summary Tables that emphasize the critical habitat features underlying reported habitat use patterns, and that consider groups of wildlife species collectively. Critical features include characteristics of the special habitat elements, as well as requirements relating to the surrounding habitat. The features form sets, termed "Types," each of which is used by several different wildlife species for specific functions. The identification of critical features was based on the interpretations that the authors of the various habitat studies provided for their results, and on further reviews of the features' functional significance and geographic constancy of use.

The requirements of 133 wildlife species were condensed into 10 Types of Wildlife Trees and 6 Types of Coarse Woody Debris. Each Type is described in terms of the critical features that define it, its overall function, and the wildlife species that use it. The wildlife species are differentiated according to the strength of their association with the Type. Also shown in the Habitat Summary Tables are the tree species in which each Wildlife Tree Type is most likely to occur, and the relationship of Types to common classification systems for the two special habitat elements. Field indicators are provided for some of the features that are not readily visible, and special requirements are described to address variability among wildlife species within the same Type. Not included is information on required quantities and spatial distribution of Wildlife Trees or Coarse Woody Debris. Many specific research needs are indicated throughout the tables.

The Habitat Summary Tables have a wide range of potential applications in forest and wildlife management, nature education and conservation, and wildlife habitat research.

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Only references cited in this guide and in footnotes and captions of the Habitat Summary Tables are shown here. A complete bibliography of the literature consulted in the preparation of the tables is provided in the Appendix.

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Habitat Summary Tables

DEFINITIONS AND SYMBOLS

CAVITY HEIGHT (ABOVE GROUND)—*see* TREE DIAMETER

CHAMBER DIMENSIONS—*see* ENTRANCE DIAMETER

COARSE WOODY DEBRIS (CWD)

Coarse Woody Debris includes logs and rooted trunks at an angle of <45° with the ground surface, stumps <1.3 m in height, large detached branches and slabs, large exposed roots, and upturned rootmasses. Taller stumps and more upright logs and rooted trunks are considered Wildlife Trees (WTs).

Most wildlife species associated with the CWD Types that serve structural functions (CWD-1 to CWD-5) do not appear to differentiate between using CWD or non-woody material for these functions (i.e., presence of wood is not a critical feature). To reflect this habitat use pattern, non-woody materials (rocks and cutbanks) are included in CWD-1 to 5, in addition to CWD.

Likewise, wildlife species associated with CWD-1, 2, 3, and 6 may not differentiate between CWD and tree bases that have the critical features of these Types. Bases of standing trees are therefore included in these Types.

CRITICAL FEATURES

Critical features are the actual requirements that are represented by, or that underlie, observed patterns of habitat use and that reflect physiological and other needs. For example, the observed preference of WT-1 users for nesting in aspen and certain other tree species is due largely to the prevalence of critical wood decay features in these trees. The decay features are necessary because they allow secure nest cavities to be built in substrates that do not exceed the woodpeckers' physical excavation capabilities.

DECAY CLASSES

Decay Classes are the nine classes of the B.C. Wildlife Tree Classification System (Wildlife Tree Committee of British Columbia 1997).

Note: The Decay Classes listed for each Type of WT should not be equated with these Types, because the Types' critical features are not necessarily present in all trees in the classes shown and may even occur in only a small proportion of trees in these classes.

ENTRANCE DIAMETER, CHAMBER DIMENSIONS

The values shown for these variables represent ranges of reported means, which are often relatively narrow (in some cases consisting of single values). Any value within these narrow ranges is probably suitable for all wildlife species associated with the Type. Values above or below the ranges may not be acceptable for all users of the Type. Only means of samples with n ≥ 15 are included in the ranges, unless stated otherwise. Values are rounded to the nearest centimetre.

HUNTING PERCHES

Hunting perches in the forest interior, which are used by predators that rely primarily on their hearing to locate prey (e.g., Boreal Owl and Northern Saw-whet Owl), are not included in this report because these perches are not considered WTs. They possess no special characteristics (e.g., an open structure or a location in or next to open areas) that would distinguish them from most other trees. The Boreal Owl and Northern Saw-whet Owl are included as ◪ users of WT-10 because they also hunt from perches located in or next to clearings.

IMMEDIATE SURROUNDINGS

"Immediate Surroundings" refers to requirements at a "patch" scale—that is, right around the WT or CWD. Examples are an unobstructed flight path to the nest or dense vegetation for nest concealment or thermal cover. For small species whose home ranges are largely contained in the patch around the WT or CWD, "Immediate Surroundings" also describes general habitat needs that are not directly related to these two special habitat elements. For more mobile species, general forest habitat needs are shown under "Proximity to Specific Forest Stands." In most of the WT studies reviewed, plot sizes for sampling the immediate surroundings of nest, roost, or foraging trees ranged from 0.1 to 0.4 ha. No data are available on the actual wildlife requirements regarding the sizes of the patches with the features described under "Immediate Surroundings," for WTs or CWD.

KNIFE TEST

The Knife Test is used to rank relative wood hardness (slightly modified from Harris 1983). It is based on the penetration of a knife blade following a "standardized" thrust (after bark has been removed):

- **Very hard:** **<1 cm**
- **Hard:** **≥1 cm and <2 cm**
- **Soft:** **≥2 cm and <5 cm**
- **Rotted:** **≥5 cm**

Very few test scores using the above scale are available for trees used by species other than the Pileated Woodpecker.

LOCATION OF THE CWD—*see* TREE LOCATION

LOG DECOMPOSITION CLASSES

Log Decomposition Classes refer to the five-class system described by Maser et al. (1979, p. 80).

Note: The Log Decomposition Classes shown for each Type of CWD should not be equated with any of these Types, because the critical features of each Type are not necessarily present in all logs in the classes shown.

MAXIMUM DISTANCE FROM FOREST

This critical feature refers to the limited distance that some species will travel from forest to use WTs or CWD in open areas.

Minimum stand size

"Minimum Stand Size" pertains to the size of forest fragments (in unforested areas) that contain WTs or CWD of a particular Type. It does not refer to the animals' total forest area requirements. Although important, the latter is beyond the scope of this report. In addition to adequate stand size, sufficient distance of the WTs or CWD away from the forest edge is probably critical for some forest-interior species. Furthermore, if WTs or CWD are located in unforested areas, the size of nearby forest stands may be important, but no research was found addressing this hypothesis.

Natural cavities

"Natural Cavities" are tree holes caused by decay and/or mechanical damage. Cavities resulting from the excavation of nests, roosts, or feeding holes by primary cavity excavators are not included.

Proximity to specific forest stands

This entry summarizes critical features of the general forest habitat if these features are required in close proximity to the WTs or CWD. No information on actual distances was found. Requirements for nearby unforested habitat are addressed under "Proximity to Open Areas or Edge."

Stand connectivity

"Stand Connectivity" refers to the need for travel corridors that connect forest fragments containing the WTs or CWD to the rest of an animal's habitat. Travel corridors are needed if unforested areas form a barrier to movements or impose an increased energy expenditure or predation risk when crossed.

Tree diameter, cavity height (above ground)

The sizes shown in bold will satisfy all wildlife species associated with the Type, except those with "Special Requirements." Values in parentheses are suitable for some but not all of the species. To arrive at the figures, the lowest reported means were considered for each of the wildlife species. The highest value in this range (i.e., the mean for the species requiring the greatest size) is the one shown in bold. The lowest value in the range is the one in parentheses, but it is not shown if the range is very narrow. If actual preferences are known, they are used instead of the reported means for the species. Research findings are included only if sample sizes are ≥5. Tree diameters are rounded to the nearest centimetre. The needs of occasional users of a Type (marked ☐) are not considered.

Tree location, location of the CWD

Entries under these headings deal with the need for WTs or CWD to be located near suitable habitat (see "Proximity to Specific Forest Stands," "Proximity to Open Areas or Edge," and "Proximity to Water"). Requirements relating to the location of WTs or CWD in a fragmented forest landscape are also addressed (see "Minimum Stand Size," "Maximum Distance from Forest," and "Stand Connectivity"), as are patch-scale habitat features required right next to the WTs or CWD (see "Immediate Surroundings").

TREE SPECIES

Tree species considered: **SBS zone**: hybrid white spruce (*Picea glauca* x *engelmannii*), black spruce (*Picea mariana*), subalpine fir (*Abies lasiocarpa*), interior Douglas-fir (*Pseudotsuga menziesii* var. *glauca*), lodgepole pine (*Pinus contorta* var. *latifolia*), paper birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*); **northern ESSF zone**: Engelmann spruce (*Picea engelmannii*), subalpine fir, lodgepole pine, and whitebark pine (*Pinus albicaulis*); and **northern ICH zone**: western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), white spruce (*Picea glauca*), Engelmann spruce, and all species listed for the SBS zone.

WILDLIFE SPECIES

Strength of association of species with WT-1 to WT-9, and with the Types of Coarse Woody Debris:

■ Species that seem to be restricted to the Type or that appear to strongly prefer it

◪ WT Types: Species that use alternative Types (or habitat elements other than WTs) for the same function, without apparent strong preferences

◪ CWD Types: Species that use alternative Types (or habitat elements other than CWD, rocks, or cutbanks) for the same function, without apparent strong preferences

☐ Species that have been reported to use the Type occasionally

Strength of association of species with WT-10:

■ Species that hunt primarily from perches of Type WT-10

◪ Species that hunt from perches of Type WT-10 as well as other perches (not considered WTs), and species that perch-hunt from WT-10 as well as using alternative hunting techniques

☐ Species that occasionally perch-hunt using WT-10, but primarily use other hunting techniques

Species with restricted distributions:

(L)	Lower-elevation species:	Unlikely to occur in the ESSF zone
(H)	Higher-elevation species:	In southern areas, restricted mainly to the ESSF zone. At higher latitudes, the species occurs at lower elevations (i.e., it may occur in northern parts of the SBS zone).
(S)	Southern species:	Occurs in the ICH, SBS, and (unless marked as a low-elevation species) in the ESSF zone, but its occurrence north of

latitude 52°N (in Interior British Columbia) is sparse or localized.

(Sh)	Southern species of humid microclimates:	Associated mainly with humid, shady sites in the ICH zone. May also be found in similar microclimates in the SBS and ESSF zones.
(N)	Northern species:	Unlikely to occur in the ICH zone, although it may be present in the northwestern patch of ICH that is found in the Prince Rupert Forest Region.

WILDLIFE TREE (WT)

For the purposes of this report, a Wildlife Tree is defined as a standing dead or live tree with special characteristics that are valuable for wildlife and that distinguish the tree from most other trees in the forest. Stumps <1.3 m in height and logs or rooted trunks at an angle of <45° with the ground surface are considered to be Coarse Woody Debris.

WILDLIFE TREES

TABLE 1 *Types of Wildlife Trees (WTs),[1] arranged by function, that are required by wildlife species occurring in the SBS, northern ESSF, and northern ICH biogeoclimatic zones. Only those configurations of features that appear to be required (i.e., marked ■ in Table 2) by at least one wildlife species are delineated as individual Types. Most Types are not mutually exclusive (i.e., two or more Types can occur together in the same tree). Complete descriptions of each Type are provided in Tables 2-1 to 2-10.*

Main functions of Wildlife Trees	Configurations of Wildlife Tree features required by wildlife species occurring in the SBS, ESSF, and ICH zones		Main users
Reproduction/Resting: a. Substrates for excavation of cavities	WT-1:	Hard Outer Wood Surrounding Decay-Softened Inner Wood	Woodpeckers (stronger excavators)
	WT-2:	Outer and Inner Wood Softened by Decay	Woodpeckers (weaker excavators), chickadees, Red-breasted Nuthatch
Reproduction/Resting: b. Existing cavities	WT-3:	Small, Excavated or Natural Cavities	Chickadees, nuthatches, Northern Pygmy-Owl, swallows, other passerines, bats
	WT-4:	Large, Excavated or Natural Cavities	Ducks, American Kestrel, owls, Mountain Bluebird, European Starling, Northern Flicker, swallows, other passerines, bats, squirrels, Marten
	WT-5:	Very Large Natural Cavities and Hollow Trees	Vaux's Swift, mustelids, Barred Owl, bats, Red Squirrel
	WT-6:	Cracks, Loose Bark, or Deeply Furrowed Bark	Brown Creeper, bats
Reproduction/Resting: c. Large open-nest supports and other non-cavity sites	WT-7:	Witches' Brooms	Squirrels, mustelids, Merlin, owls
	WT-8:	Large Branches, Multiple Leaders, or Large-Diameter Broken Tops	Great Blue Heron, diurnal raptors, owls, Common Raven
Foraging: a. Feeding substrates	WT-9:	Arthropods in Wood or under Bark[2]	Woodpeckers
Foraging: b. Hunting perches	WT-10:	Open-Structured Trees in or adjacent to Open Areas	Diurnal raptors, owls, various passerines, Belted Kingfisher

1 Trees used for sap-feeding are not considered WTs because no information was found to indicate that they have special characteristics that distinguish them from most other trees in the stand. If future research shows that special characteristics are required for sap-feeding (e.g., sap with a high sugar content or flow volume), then trees with such features should be included as an additional WT Type. Active sapwells would be reliable field indicators. Although not regarded as WTs in this report, tree species used for sap-feeding are included as critical stand features of the habitat near WT-1.

2 Arthropods on tree surfaces or in shallow bark irregularities are not included in this report. Presence of such prey is not considered a special characteristic that would define trees as WTs.

TABLES 2-1 to 2-10. Descriptions of each of the 10 Types of Wildlife Trees (WTs) listed in Table 1. Types are described in terms of their critical features, reported values or forms of these critical features, overall function, associated wildlife species, and the tree species and Decay Classes in which the Type is most commonly found. Wildlife and tree species considered are those that occur in the SBS, northern ESSF, and northern ICH biogeoclimatic zones. "Special Requirements" pertain to only some of the wildlife species associated with the Type. Descriptions of Types are based mainly on habitat research results compiled from the literature. Question marks indicate that further information or confirmation of local applicability is needed. Terms and symbols are explained on pages 13–17. Footnotes follow Table 2-10. All information presented is current only to 1994.

TABLE 2-1 ***WT-1: Hard outer wood surrounding decay-softened inner wood*** — ***Wildlife Trees (WTs)***

Function and wildlife species associated with WT-1	Tree species and Decay Classes in which WT-1 occurs most commonly	Critical features of WT-1: Wood decay characteristics	Critical features of WT-1: Sapwood condition (live vs. dead)	Critical features of WT-1: Tree size and structure	Critical features of WT-1: Tree location
FUNCTION **Reproduction/Resting:** Substrates for excavation of nest or roost cavities **WILDLIFE SPECIES** (*SBS, ESSF, ICH zones*) ■ Yellow-bellied Sapsucker (L,N) (*rare*) ■ Red-naped Sapsucker (S) ■ Red-breasted Sapsucker ■ Hairy Woodpecker ■ Three-toed Woodpecker ■ Black-backed Woodpecker ■ Pileated Woodpecker ?□ or ◪ Northern Flicker	**TREE SPECIES** *SBS zone*: **Trembling aspen** **Black cottonwood** *Others often used by Three-toed and Black-backed Woodpeckers:* Spruces Subalpine fir Lodgepole pine *ESSF zone*: *tentative – data scarce* **Subalpine fir** *Less commonly ?:* Engelmann spruce Lodgepole pine *ICH zone*: *tentative – data scarce* **Western redcedar ?** **Western hemlock ?** **Trembling aspen** **Black cottonwood** *Others often used: same as for SBS zone* **DECAY CLASSES** **2, 3, 4**	**INTERNAL DECAY[1] SURROUNDED BY HARD OUTER WOOD** A pocket of decay is sufficient. *For its above-ground position, see Tree Size: Cavity Height.* ***Field Indicators [2] of Internal Decay:*** **Existing excavated nest cavities[3]** Very reliable indicator. Excavated nest cavities have circular or oval, smooth-edged entrances. Aborted excavation attempts can usually be discerned by the funnel-shaped narrowing of the entrance. **Fruiting bodies of heartrot fungi** Very reliable indicator. Some heartrot fungi common in north-central B.C.: Trembling aspen, black cottonwood[4]: *Phellinus tremulae* Western hemlock, subalpine fir: *Echinodontium tinctorium* Western redcedar: *Phellinus weirii* Lodgepole pine, spruces: *Phellinus pini* **Broken-off tops** May be associated with internal decay as well as some dead sapwood (*see next column*). May be a useful indicator in black cottonwood and all ? conifers in the SBS zone[5], but not in trembling aspen. **Old trunk injuries** – Reliability ? ***Knife Test Score of Outer Wood Hardness:*** **Hard**	*Requirements for dead sapwood pertain only to the part of the tree in which the cavity is excavated (e.g., trunk top, one side of trunk, large branch). The whole tree need not be dead.* **DEAD[6] REQUIRED** Hybrid white spruce White spruce Engelmann spruce Black spruce ? Douglas-fir Lodgepole pine Paper birch Black cottonwood ? LIVE AND DEAD USED INDISCRIMINATELY Trembling aspen[7] Subalpine fir ? Western redcedar ? Western hemlock ?	**TREE DIAMETER** (dbh)[8] Aspen/birch: **>27 cm** Other species[9]: **>37 cm** ***Special Requirement:*** (Pileated Woodpecker): Aspen/birch: **>40 cm** Other species[9]: **>54 cm** **CAVITY HEIGHT** (above ground) **>**(2) **4.8 m** ***Special Requirement:*** (Pileated Woodpecker): **>9.2 m** **BRANCH-FREE TRUNK PORTIONS ?** *(tentatively included as critical, no data available)* Length: sufficient to accommodate a nest/roost cavity in knot-free wood ? (e.g., 17–21 cm ? for sapsuckers, 38–58 cm ? for Pileated Woodpeckers)	*All features are **Special Requirements**.* **IMMEDIATE SURROUNDINGS** **Multi-layered, relatively dense canopy and numerous large trees**[10] (Pileated Woodpecker) **PROXIMITY TO SPECIFIC FOREST STANDS** **Coniferous forest** (Three-toed and Black-backed Woodpeckers) **Stands containing birch, large willows [11], or western hemlock** (sapsuckers) **PROXIMITY TO OPEN AREAS** **In or near open areas** (Northern Flicker, others ?[12]): ? *data on actual distances insufficient* **MINIMUM STAND SIZE** (Pileated, Three-toed, and Black-backed Woodpeckers, others ?): ? *data on actual sizes insufficient* **MAXIMUM DISTANCE FROM FOREST** (sapsuckers, Hairy Woodpecker): ? *no data on actual distances*

TABLE 2-2 ***WT-2: Outer and inner wood softened by decay***

Function and wildlife species associated with WT-2	Tree species and Decay Classes in which WT-2 occurs most commonly	Critical features of WT-2 Wood decay characteristics and sapwood condition	Tree size	Tree location
FUNCTION **Reproduction/Resting:** Substrates for excavation of nest or roost cavities **WILDLIFE SPECIES** (*SBS, ESSF, and ICH zones*) ■ Downy Woodpecker[13] (L?) ?■ or ◪ Black-capped Chickadee ◪ Northern Flicker ?◪ or □ Mountain Chickadee ◪ Boreal Chickadee (H) ◪ Chestnut-backed Chickadee (Sh) (*rare*) ◪ Red-breasted Nuthatch □ Hairy Woodpecker □ Three-toed Woodpecker □ Black-backed Woodpecker □ White-breasted Nuthatch (L,S) (*rare*)	**TREE SPECIES** *SBS zone*: **Trembling aspen** **Paper birch** **Black cottonwood** **Douglas-fir**[14] **Subalpine fir ?** *ESSF zone*: *? data insufficient* *ICH zone*: *? data insufficient* **DECAY CLASSES** **5, 6, 7** also **2, 3, 4** if dead tree portions with the features of WT-2 are present	**INTERNAL DECAY ACCESSIBLE THROUGH DEAD DECAY-SOFTENED OUTER WOOD** A tree portion (e.g., dead top or trunk scar) with these features may be sufficient (i.e., the whole tree need not be dead). Some hard inner wood may be present if the softened outer wood is thick enough to accommodate a nest cavity. *For the above-ground position of the tree portion with suitable decay, see Tree Size: Cavity Height.* ***Field Indicators[2] of Internal Decay:*** **Existing excavated nest cavities**[3] (*as in Table 2-1*) **Fruiting bodies of heartrot fungi** Some heartrot fungi common in north-central B.C. (*see Table 2-1 for other tree species):* Paper birch: *Phellinus igniarius* and *Fomes fomentarius* Douglas-fir: *Fomitopsis pinicola* (also found on other tree species) and *Phellinus pini* **Old trunk injuries** – Reliability ? **Broken-off tops** Are a more reliable indicator for WT-2 than for WT-1, in all tree species, because broken tops are likely to occur in trees with the decay-softened outer and inner wood that characterizes WT-2. Trees with *rotted* outer wood (*see below*) and internal decay are especially likely to have broken tops. ***Knife Test Score of Outer Wood Hardness:*** **Soft**[15] (all species associated with WT-2 except chickadees) **Rotted** (Chickadees; Red-breasted Nuthatch uses both soft and rotted outer wood ?)	**TREE DIAMETER** (dbh)[8] Aspen/birch: **>**(13) **30 cm** Other species[9]: **>**(31) **37 cm** **CAVITY HEIGHT** (above ground) **>**(2.2) **4.7 m**	*All features are **Special Requirements**.* **PROXIMITY TO SPECIFIC FOREST STANDS** **Stands with deciduous vegetation** (Black-capped Chickadee) **Stands with coniferous trees** (Mountain, Boreal, and Chestnut-backed Chickadees, Red-breasted Nuthatch) **Older forest**[16] (Red-breasted Nuthatch) **PROXIMITY TO OPEN AREAS OR EDGE** ? *data on actual distances insufficient* **In or near open areas** (Northern Flicker) **Near edges if forests are closed** (Downy Woodpecker, chickadees) **MINIMUM STAND SIZE** (Downy Woodpecker, chickadees, Red-breasted Nuthatch): ? *no data on actual sizes* **MAXIMUM DISTANCE FROM FOREST** (species ?): ? *no data on actual distances* **STAND CONNECTIVITY** **Treed corridors or tree patches** (chickadees and nuthatches): required for crossing treeless ? areas >500 m ? wide

TABLE 2-3 *WT-3: Small, excavated or natural cavities*

		Critical features of WT-3	
Function and wildlife species associated with WT-3	**Tree species and Decay Classes in which WT-3 occurs most commonly**	**Cavity size, above-ground height, and microclimate**	**Tree location**
FUNCTION **Reproduction/Resting:** Existing cavities for nesting or resting **WILDLIFE SPECIES** (*SBS, ESSF, and ICH zones*) ■ White-breasted Nuthatch (L,S) (*rare*) ◪ Northern Pygmy-Owl ◪ Tree Swallow (L) ◪ Violet-green Swallow ? ◪ or ■ Mountain Chickadee ◪ Boreal Chickadee (H) ◪ Chestnut-backed Chickadee (Sh) (*rare*) ◪ Red-breasted Nuthatch ◪ House Wren (L,S) (*rare*) ◪ House Sparrow (*introduced*) ◪ Big Brown Bat ◪ Silver-haired Bat ◪ Western Long-eared Myotis ◪ Little Brown Myotis ◪ Northern Long-eared Myotis (*rare*) ◪ Long-legged Myotis ?□ or ◪ Black-capped Chickadee ?□ or ◪ Brown Creeper (roosting) □ Winter Wren □ Mountain Bluebird □ European Starling (*introduced*) □ Southern Red-backed Vole □ Deer Mouse □ Yellow-pine Chipmunk □ Least Weasel (*rare*)	**TREE SPECIES** *SBS zone*: **Trembling aspen** *Less commonly:* All other tree species *ESSF zone*: *tentative – data scarce:* **Subalpine fir ?** *Less commonly:* All other tree species *ICH zone*: *tentative – data scarce:* **Western redcedar** **Western hemlock** **Trembling aspen** *Less commonly:* All other tree species **DECAY CLASSES** **2, 3, 4** *Less commonly:* 5, 6, 7	**ENTRANCE DIAMETER** **4 cm**[17] ***Special Requirement:*** (chickadees, others ?): **3 cm**[18] **CHAMBER DIMENSIONS** *For excavated cavities, chamber dimensions are indicated by entrance diameter*[19] **Cavity depth:** **17–21 cm** **Cavity diameter:** **11–12 cm** *Not included:* Chickadee- and nuthatch-excavated cavity chambers are narrower ? *data insufficient* **CAVITY HEIGHT** (above ground) **>**(2.2) **3.5 m** ? ***Special Requirement:*** (bats - maternity roosts): **>10 m** ***Special Requirements:*** **THICK, FIRM CAVITY WALLS** [20] (bats, others ?): ? *tentatively included as critical, no data available* **CAVITY TEMPERATURE** [21] (bats, others ?): **Warm and stable ?** Required temperatures for bats vary with roost type (maternity, day, night, or hibernation roost), female reproductive status, and bat species.	*All features are **Special Requirements**.* **IMMEDIATE SURROUNDINGS** **Unobstructed flight path to the cavity entrance**[22] (bats, swallows) **Sparse vegetation at and below nest height** (House Wren) **PROXIMITY TO SPECIFIC FOREST STANDS** **Stands with deciduous vegetation** (Black-capped Chickadee, House Wren) **Stands with coniferous trees** (Mountain, Boreal, and Chestnut-backed Chickadees, Red-breasted Nuthatch) **Older forest**[16] (Red-breasted Nuthatch) **Areas with low cover of shrubs or tall herbs** (House Wren) **PROXIMITY TO OPEN AREAS OR EDGE** ? *data on actual distances insufficient* **In or near open areas** (swallows, House Sparrow [near human habitation]) **Near edges if forests are closed** (chickadees, White-breasted Nuthatch, House Wren, Little Brown Myotis, other bats ?) **PROXIMITY TO WATER** **Near water** (Bats: *not critical where terrestrial habitats offer sufficient prey* ?) **MINIMUM STAND SIZE** (Northern Pygmy-Owl, chickadees, nuthatches, Big Brown Bat, Silver-haired Bat, other bats ?): ? *no data on actual sizes* **MAXIMUM DISTANCE FROM FOREST** (species ?): ? *no data on actual distances* **STAND CONNECTIVITY** **Treed corridors or tree patches** (chickadees, nuthatches, others ?): required for crossing treeless ? areas >500 m ? wide

Function and wildlife species associated with WT-4	Tree species and Decay Classes in which WT-4 occurs most commonly	Critical features of WT-4	
		Cavity size, above-ground height, and microclimate	**Tree location**
FUNCTION **Reproduction/Resting:** Existing cavities for nesting, denning, or resting **WILDLIFE SPECIES** (*SBS, ESSF, and ICH zones*) ■ Wood Duck (L,S) (*rare*) ■ Common Goldeneye ■ Barrow's Goldeneye ■ Bufflehead (L) ■ Hooded Merganser (L) ■ American Kestrel ■ Boreal Owl (H) ■ Northern Saw-whet Owl ■ Mountain Bluebird ■ European Starling (*introduced*) ◪ Common Merganser (L) ◪ Northern Hawk Owl (H) ◪ Northern Pygmy-Owl ◪ Northern Flicker ◪ Tree Swallow (L) ◪ Violet-green Swallow ◪ House Wren (L,S) (*rare*) ◪ House Sparrow (*introduced*) ◪ Big Brown Bat ◪ Silver-haired Bat ◪ Western Long-eared Myotis ◪ Little Brown Myotis ◪ Northern Long-eared Myotis (*rare*) ◪ Long-legged Myotis ◪ Northern Flying Squirrel ◪ Red Squirrel ◪ Marten ☐ Merlin ☐ "Western Flycatcher" Complex (Sh?) (*rare*) ☐ Western Kingbird (L,S) (*rare*?) ☐ Barn Swallow ☐ Mountain Chickadee ☐ White-breasted Nuthatch (L,S) (*rare*) ☐ Winter Wren ☐ Townsend's Solitaire ?☐ House Finch (L?,S) ☐ Hoary Bat (*rare*) ☐ Southern Red-backed Vole ☐ Bushy-tailed Woodrat ☐ Deer Mouse ☐ Yellow-pine Chipmunk ☐ Ermine ☐ Long-tailed Weasel ☐ Least Weasel (*rare*)	**TREE SPECIES** *SBS zone:* **Trembling aspen** **Black cottonwood** **Douglas-fir** *ESSF zone:* *? data insufficient* *ICH zone:* *tentative – data scarce:* **Western redcedar ?** **Western hemlock ?** **Trembling aspen** **Black cottonwood** **Douglas-fir** **DECAY CLASSES** **2, 3, 4, 5, 6, 7**	*For bats, data are very scarce.* **ENTRANCE DIAMETER** Both of the following sizes should be present[23]: Flicker-excavated (approximately circular): **6–7 cm** Pileated Woodpecker-excavated (usually oval, height x width): **11–12 x 9 cm** **CHAMBER DIMENSIONS** *For excavated cavities, chamber dimensions are indicated by entrance diameter*[19] **Cavity depth:** (20)[24] **27–35 cm ?** **Cavity diameter: 15–20 cm ?** **CAVITY HEIGHT** (above ground) **>**(2) **5 m ?** ***Special Requirement:*** (bats - maternity roosts): **>10 m** ***Special Requirements:*** **THICK, FIRM CAVITY WALLS** (bats, others ?): ? *tentatively included as critical, no data available* **CAVITY TEMPERATURE**[21] (bats, others ?): *as in Table 2-3*	*All features are **Special Requirements**.* **IMMEDIATE SURROUNDINGS** **Dense tree cover** (Wood Duck, Marten ?) **Unobstructed flight path to the cavity**[22] (bats, swallows) **Sparse vegetation at and below nest height** (House Wren) **PROXIMITY TO SPECIFIC FOREST STANDS** Stands with: **Deciduous vegetation with low cover of shrubs or tall herbs** (House Wren) **Abundant conifer seed** (Red Squirrel) **Moderate conifer canopy closure and abundant CWD**[25] (Marten) **PROXIMITY TO OPEN AREAS OR EDGE** ? *data on actual distances insufficient* **In or near open areas** (many species, including European Starling) **Near edges if forests are closed** (House Wren, Little Brown Myotis, other bats ?) **PROXIMITY TO WATER** **<100 m from open water** (reported distance for most nests of the six duck species) **Near water** (bats: *may not be critical* ?) **MAXIMUM DISTANCE FROM FOREST** (species ?): ? *no data on actual distances* **MINIMUM STAND SIZE** (Wood Duck, Northern Saw-whet Owl, Northern Pygmy-Owl, Big Brown Bat, Silver-haired Bat, other bats ?, squirrels, Marten): ? *data on actual sizes insufficient* **STAND CONNECTIVITY** **Travel corridors of trees or CWD** (Marten, squirrels): *as in Table 2-5*

Function and wildlife species associated with WT-5	Tree species and Decay Classes in which WT-5 occurs most commonly	Critical features of WT-5: Cavity size, above-ground height, and microclimate	Critical features of WT-5: Tree location
FUNCTION **Reproduction/Resting:** Existing cavities for nesting, denning, or resting **WILDLIFE SPECIES** (*SBS, ESSF, and ICH zones*) ■ Vaux's Swift ■ Fisher (reproduction) ◪ Barred Owl ◪ Big Brown Bat ◪ Silver-haired Bat ◪ Western Long-eared Myotis ◪ Little Brown Myotis ◪ Northern Long-eared Myotis (*rare*) ◪ Long-legged Myotis ◪ Red Squirrel ◪ Marten ◪ Fisher (resting) ☐ Barrow's Goldeneye ☐ American Kestrel ☐ Great Horned Owl ☐ Pileated Woodpecker (roosting) ☐ Southern Red-backed Vole ☐ Bushy-tailed Woodrat ☐ Deer Mouse **?**☐ Northern Flying Squirrel ☐ Yellow-pine Chipmunk ☐ Ermine ☐ Long-tailed Weasel **?**☐ Least Weasel (*rare*) ☐ Black Bear	**TREE SPECIES** *SBS zone*: **Black cottonwood** **Douglas-fir** *ESSF zone*: **Subalpine fir ?** *ICH zone*: **Western redcedar** **Western hemlock** **Black cottonwood** **DECAY CLASSES** **2, 3, 4, 5, 6, 7**	***All figures are tentative - data are very scarce.*** **ENTRANCE DIAMETER** *Requirements*[26] *vary greatly with species and number of cavity occupants.* Some reported[27] diameters: Vaux's Swift nest cavities with side entrances (entrances excavated by Pileated Woodpeckers, height x width): 11 x 8 cm Barred Owl: ≥18 cm Vaux's Swift communal roosts with top entrances (n=2 trees): 29, 64 cm Bats: *Information is insufficient for WT-5, but entrance size requirements are likely the same in WT-3, 4, and 5* ? **CHAMBER DIMENSIONS** Vaux's Swift: **Depth**[28] (reported means): from side entrance down to nest: **2.1 m** (from side entrance to cavity bottom: 3.6 m) from top entrance to nest/roost: ? (from top entrance to cavity bottom: ?) **Diameter:** **>**(20) [29] **28 cm** ? ? *information for other species is insufficient* **CAVITY ENTRANCE HEIGHT** (above ground) **>**(8) **12 m** ? ***Special Requirements:*** **THICK, FIRM CAVITY WALLS** (bats, others ?): ? *tentatively included as critical, no data available* **CAVITY TEMPERATURE** [21] (bats, others ?): *as in Table 2-3*	*All features are* ***Special Requirements****.* **IMMEDIATE SURROUNDINGS** **Dense multi-layered canopy** (Barred Owl ?, Marten ?, Fisher) **Unobstructed flight path to the cavity entrance**[22] (bats, Vaux's Swift) **PROXIMITY TO SPECIFIC FOREST STANDS** Stands with: **Sparse or patchy understory** ? (Barred Owl) **Abundant conifer seed** (Red Squirrel) **Moderate canopy closure and abundant CWD**[25] (especially Marten, also Fisher) **PROXIMITY TO FOREST EDGE** **Near edges if forests are closed** (Little Brown Myotis, other bats ?) **PROXIMITY TO WATER** **Near water** (bats ?, Vaux's Swift: *probably not critical if sufficient insect prey is available over terrestrial habitats* ?) **MINIMUM STAND SIZE** (Barred Owl, Big Brown Bat, Silver-haired Bat, other bats ?, Red Squirrel, Marten, Fisher): ? *data on actual sizes insufficient* **STAND CONNECTIVITY** **Travel corridors of trees or CWD** (Marten, Fisher, squirrels): required if the distance through a treeless area exceeds 100 m ? (shorter for squirrels ?). Treeless, CWD corridors of any length may be unsuitable for Northern Flying Squirrel ? Corridor width: ? *data insufficient*

Function and wildlife species associated with WT-6	Tree species and Decay Classes in which WT-6 occurs most commonly	Critical features of WT-6		
		Cavity size, above-ground height, and microclimate	**Cavity orientation**	**Tree location**
FUNCTION **Reproduction/Resting:** Existing cavities for nesting or resting **WILDLIFE SPECIES** (*SBS, ESSF, and ICH zones*) ■ Brown Creeper (Sh?) ◪ Big Brown Bat (resting) ◪ Silver-haired Bat (mainly resting) ◪ Western Long-eared Myotis (resting) ◪ Little Brown Myotis (resting) ◪ Northern Long-eared Myotis (*rare*) ◪ Long-legged Myotis □ Winter Wren	**TREE SPECIES** ? *data insufficient* Reported nest-use by Brown Creeper includes all major tree species that occur in the SBS, ESSF, and ICH zones, *except* subalpine fir, Engelmann spruce, and paper birch. **DECAY CLASSES** **3, 4, 5, 6, 7** *Less commonly:* 1, 2	*Data are very scarce.* **ENTRANCE DIAMETER** Brown Creeper (reported mean of shortest dimension)[30]: 2.8 cm **CHAMBER DIMENSIONS** Brown Creeper (reported means)[30]: Cavity diameter: side to side: 16.6 cm front to back: 7.1 cm direction unspecified: 7.8 cm Cavity depth: 5.4 cm **CAVITY HEIGHT** (above ground) Brown Creeper: >2.1 m ? *data insufficient for bats* ***Special Requirement:*** CAVITY TEMPERATURE[21] (bats, others ?): *as in Table 2-3*	*Data are very scarce.* **BOTTOM OR SIDE ENTRANCES** ***Special Requirement:*** **SOUTHWESTERN EXPOSURE** (Little Brown Myotis day roosts) *No data for other species*	*All features are* ***Special Requirements****.* **IMMEDIATE SURROUNDINGS** **Unobstructed flight path to the cavity entrance**[22] (bats) **PROXIMITY TO SPECIFIC FOREST STANDS** **Older, coniferous or mixed forest**[16] (Brown Creeper) **PROXIMITY TO FOREST EDGE** **Near edges if forests are closed** (Little Brown Myotis, other bats ?) **PROXIMITY TO WATER** **Near water** (bats: *may not be critical* ?) **MINIMUM STAND SIZE** (Brown Creeper, Big Brown Bat, Silver-haired Bat, other bats ?): ? *data on actual sizes insufficient* **STAND CONNECTIVITY** **Treed corridors or tree patches** (Brown Creeper, others ?): required for crossing treeless ? areas >500 m ? wide

TABLE 2-7 ***WT-7: Witches' brooms***[31]

Function and wildlife species associated with WT-7	Tree species and Decay Classes in which WT-7 occurs most commonly	Critical features of WT-7	
		Deformity size and height above ground	**Tree location**
FUNCTION **Reproduction/Resting:** Non-cavity sites (open or covered) for nesting or resting **WILDLIFE SPECIES** (*SBS, ESSF, and ICH zones*) ■ Northern Flying Squirrel (winter resting) ?■ or ◪ Marten (non-winter resting) ?■ Fisher (non-winter and mild-winter[32] resting) ◪ Merlin ◪ Great Horned Owl ◪ Long-eared Owl (L,S) (*rare*) ◪ Northern Flying Squirrel (non-winter) ?◪ Red Squirrel □ Common Goldeneye □ Barrow's Goldeneye □ Northern Goshawk ?□ Barred Owl □ Great Gray Owl	**TREE SPECIES** (*SBS, ESSF, and ICH zones*) **All spruces** *Less commonly:* Subalpine fir Lodgepole pine **DECAY CLASSES** **2, 3**	**DEFORMITY SIZE** ? *actual measurements are scarce* Northern Flying Squirrel (range, n=34)[33]: Horizontal diameter: 0.5–1.0 m **ABOVE-GROUND HEIGHT** ? *data insufficient* ***Special Requirement:*** **Within (neither above nor below) the canopy of the nest tree and surrounding trees** (Barred, Great Gray, and Long-eared Owls)	*All features are **Special Requirements**.* **IMMEDIATE SURROUNDINGS** **Dense multi-layered canopy** (Marten ?, Fisher) **Warm roost temperature** (especially Northern Flying Squirrel in winter) **PROXIMITY TO SPECIFIC FOREST STANDS** Stands with: **Abundant conifer seed** (Red Squirrel) **Moderate canopy closure and abundant CWD**[25] (especially Marten, also Fisher) **PROXIMITY TO OPEN AREAS** **In or near open areas** (Great Horned Owl) **MINIMUM STAND SIZE** (Red Squirrel, Northern Flying Squirrel, Marten, Fisher): ? *data on actual sizes insufficient* **STAND CONNECTIVITY** **Travel corridors of trees or CWD** (Marten, Fisher, squirrels): *as in Table 2-5*

Function and wildlife species associated with WT-8	Tree species and Decay Classes in which WT-8 occurs most commonly	Critical features of WT-8: Tree structure and size	Critical features of WT-8: Tree location
FUNCTION **Reproduction/Resting:** Supports for large open nest structures; other open nest and roost sites for large-bodied species **WILDLIFE SPECIES** (*SBS, ESSF, ICH zones*) ■ Great Blue Heron (L,S) (colonial nester)[34] ■ Osprey (L) ■ Bald Eagle ■ Northern Goshawk ■ Swainson's Hawk (L?,S) (*rare*) ■ Red-tailed Hawk ■ Great Gray Owl ◪ Great Horned Owl ◪ Northern Hawk Owl (H) ◪ Barred Owl ◪ Common Raven ☐ Golden Eagle ☐ Merlin ?☐ Peregrine Falcon (*rare*) ☐ Long-eared Owl (L,S) (*rare*) ☐ Marten (resting)	**TREE SPECIES** (*SBS, ESSF, and ICH zones*) *Data are scarce for the ESSF and ICH zones.* **Black cottonwood** **Douglas-fir** *Somewhat less commonly:* Trembling aspen Lodgepole pine ? **DECAY CLASSES** **1, 2, 3, 4, 5, 6**	**STRUCTURE OF NEST SUPPORT OR ROOST BRANCHES** ***Most Commonly Reported:*** **Crotch between large branches and trunk** **Crotch between multiple leaders** **Top of broken-off tree** ***Special Requirements:*** (owls and falcons, which do not build nests): **Existing stick-nests** of other species, or **Large concave tops of broken-off trees** (especially herons and eagles): **Open crown structure** for easy nest or roost access **Horizontal branches** for roosting **DIMENSIONS OF NEST SUPPORT OR ROOST BRANCHES** **Branch size:** Red-tailed Hawk (reported mean, n=18 nests)[35]: 8.9 cm diameter Bald Eagle: stout roost branches needed (? *no data on actual sizes)* ? *no data for other wildlife species* **Size of broken top surface**: ? *no data* Nest-support size and branch arrangement must be suitable to support nests of the following sizes (ranges of reported means - *tentative*): Nest diameter: 68–140 cm Nest depth: 40–90 cm **HEIGHT OF NEST SUPPORT OR ROOST BRANCHES** (above ground): **Nest heights** (range of reported means): **9–32 m** ***Special Requirements:*** **At or near the top of the nest tree and above the crowns of surrounding trees**, providing an unobstructed view from the nest (Osprey, Bald Eagle, Swainson's Hawk ?, and Red-tailed Hawk) **Within (neither above nor below) the canopy of the nest tree or surrounding trees** (Barred, Great Gray, and Long-eared Owls) **Low within the nest tree crown or below it** (Northern Goshawk) ? *no information for roosts*	*All features are* ***Special Requirements.*** **IMMEDIATE SURROUNDINGS** **Dense canopy** (Northern Goshawk, Barred Owl ?) **Moderate (30–50% ?) canopy closure** (Bald Eagle ?, Great Gray Owl) **Open/semi-open canopy or low canopy height** (Osprey, Red-tailed Hawk ?, Northern Hawk Owl ?) **Unobstructed flight path to the nest** (Northern Goshawk) **PROXIMITY TO SPECIFIC FOREST STANDS** **Forest with sparse or patchy understory ?** (Northern Goshawk, Barred Owl) **PROXIMITY TO OPEN AREAS** **In or near open or sparsely treed areas with sparse or patchy shrub layers** (many species associated with WT-8) **PROXIMITY TO WATER** **≤120 m from open water** (reported distance for most nests of Great Blue Heron, Osprey, and Bald Eagle) **MINIMUM STAND SIZE** (for reproduction/resting) (Northern Goshawk, Barred Owl ?): 8–10 ha ?

TABLE 2-9 *WT-9: Arthropods in wood or under bark*

Function and wildlife species associated with WT-9	Tree species and Decay Classes in which WT-9 occurs most commonly	Critical features of WT-9: Abundant suitable prey	Critical features of WT-9: Above-ground height of infestation	Critical features of WT-9: Tree location
FUNCTION **Foraging**: Feeding substrates harbouring arthropod prey WILDLIFE SPECIES (*SBS, ESSF, and ICH zones*) ■ Hairy Woodpecker ■ Three-toed Woodpecker ■ Black-backed Woodpecker (winter)[36] ■ Pileated Woodpecker (winter) ◪ Downy Woodpecker (L?) ◪ Black-backed Woodpecker (non-winter) ◪ Pileated Woodpecker (non-winter) ☐ Yellow-bellied Sapsucker (L,N) (*rare*) ☐ Red-naped Sapsucker (S) ☐ Red-breasted Sapsucker ☐ Northern Flicker	TREE SPECIES (*SBS, ESSF, and ICH zones*) **Lodgepole pine** **Spruces** **Douglas-fir** **Subalpine fir ?** **Western redcedar ?** Temporary, local high prey densities can also occur in any other tree species. DECAY CLASSES **2, 3, 4, 5, 6, 7, 8**	***Reported Woodpecker Prey Species That Occur in North-Central British Columbia:*** IN WOOD ***Invading Sound Wood*** (may be inaccessible for Downy Woodpecker): **Carpenter ants** (*Camponotus* spp.) **Wood-boring beetles** flatheaded borers: e.g., *Chrysobothrys* spp. ? (Buprestidae) roundheaded borers: e.g., *Saperda calcarata* (Cerambycidae) sawyer beetles: *Monochamus* spp. ? (Cerambycidae) **Wood-boring caterpillars** e.g., aspen carpenterworm: *Acossus populi* ? (Cossidae) **Ambrosia beetles** ? ***Present in Rotted (especially Moist) Wood:*** Numerous potential prey species (*not reviewed*) UNDER BARK ***Invading Live Bark:*** **Bark beetles** (e.g., *Dendroctonus* and *Ips* spp.) **Wood-boring beetles** (as above) **Wood-boring caterpillars** (as above) **Weevils** (species ?) **Checkered beetles** (Cleridae [insect predators]) ***Present under Loose Bark:*** **Numerous potential prey species** (*not reviewed*) ***Special Requirements:*** **Carpenter ants** (a major prey of Pileated Woodpecker) **Bark beetles** (the main prey of Three-toed Woodpecker)	***Winter:*** ABOVE SNOW LEVEL	*All features are* ***Special Requirements.*** PROXIMITY TO SPECIFIC FOREST STANDS Stands with: **Multi-layered, relatively dense canopy and numerous large trees** (Pileated Woodpecker) MINIMUM STAND SIZE (for foraging) (Pileated Woodpecker): ? *no data* MAXIMUM DISTANCE FROM FOREST (all species ?)*:* ? *no data on actual distances* *No other consistent patterns are apparent.* Presence of abundant suitable prey generally overrides any potential importance of foraging substrate location ?

Function and wildlife species associated with WT-10	Tree species and Decay Classes in which WT-10 occurs most commonly	Critical features of WT-10: Tree structure and perch height	Critical features of WT-10: Tree location
FUNCTION **Foraging:** Hunting perches providing an unobstructed view of the hunting habitat for visually oriented predators (also used for resting) **WILDLIFE SPECIES** (*SBS, ESSF, and ICH zones*) ■ American Kestrel ■ Great Horned Owl ■ Northern Hawk Owl (H) ■ Great Gray Owl ■ Olive-sided Flycatcher ◪ Bald Eagle ◪ Red-tailed Hawk ◪ Merlin ◪ Northern Pygmy-Owl ◪ Barred Owl ◪ Boreal Owl (H) ◪ Northern Saw-whet Owl ◪ Belted Kingfisher ◪ Western Kingbird (L,S) (*rare*) ◪ Eastern Kingbird (L) ◪ Mountain Bluebird ◪ Northern Shrike (L) □ Osprey (L) □ Swainson's Hawk (L?,S) (*rare*) □ Rough-legged Hawk □ Golden Eagle ?□ Short-eared Owl	**TREE SPECIES** ? *data insufficient* *Often used by Bald Eagle:* Black cottonwood (also conifers) **DECAY CLASSES** **2, 3, 4, 5, 6** *Less commonly:* 1, 7, 8	**TREE STRUCTURE** **Open crown structure**, often resulting from dead or broken branches, dead or broken tops, or seasonally bare crowns. Species hunting from low perches may use dead branches below a dense crown. ***Special Requirement:*** **Stout horizontal branches at or near the top of the crown** (especially Bald Eagle) **PERCH HEIGHT** Bald Eagle (range of reported mean heights of perch trees): 19.1–23.8 m ? *no data for other species* ***Special Requirement:*** **Low perches** (Great Gray Owl ?, Belted Kingfisher, Mountain Bluebird): ? *no data on actual heights*	**IMMEDIATE SURROUNDINGS** In or adjacent to: **Unforested areas, forest openings, or areas with a sparse tree layer** ***Special Requirement:*** **Absence of ground-obstructing shrub or herb layer** (especially diurnal raptors, Mountain Bluebird) **Areas with abundant prey:** Small vertebrates (most diurnal raptors and owls, Northern Shrike) Fish and/or waterfowl (Osprey, Bald Eagle, Belted Kingfisher) Insects (especially flycatchers and Mountain Bluebird) **PROXIMITY TO SPECIFIC FOREST STANDS** ***Special Requirement:*** **Stands with moderate (30–50 % ?) canopy closure** (Bald Eagle, Great Gray Owl ?) **PROXIMITY TO WATER** ***Special Requirements:*** **Next to open water** (Bald Eagle [*when hunting aquatic prey*], Osprey, Belted Kingfisher) **Near water** (Olive-sided Flycatcher [*probably not critical where terrestrial habitats offer sufficient prey*], Eastern Kingbird)

Footnotes Providing Additional Information for Tables 2-1 to 2-10 (Literature cited in the footnotes is shown at the end of the User's Guide)

1 In tree species with soft wood, decay may not be necessary for Pileated Woodpeckers to excavate nest cavities (Harris 1983; Bull 1987).

2 Some indicators are reliable signs of internal decay, but decay may also be present without any indicators. Reliance on indicators could thus result in underestimating the number of WT-1 and WT-2 trees present. Local field research is needed to determine indicator power: % of trees **with** the indicator that indeed have internal decay, in relation to the % of trees **without** the indicator that also have internal decay (see, for example: Anderson and Schipper 1978; Hiratsuka and Loman 1984). The proportion of decayed trees that lack fungal fruiting bodies as a decay indicator can be high (M. Machmer, pers. comm., March 1999).

3 Although ■-marked species associated with WT-1 and WT-2 excavate a new nest cavity each year, they often re-use the same tree for this purpose. Species marked ◪ associated with these two Types also frequently re-use the same tree, either excavating a new cavity or using an existing one (often re-occupying their **own** old cavities, at least in the case of Northern Flicker). Trees with existing cavities can thus serve as WT-1 or 2 as well as WT-3 or 4.

4 In balsam poplar (*Populus balsamifera* ssp. *balsamifera*), *Phellinus tremulae* does not commonly produce fruiting bodies (Hiratsuka and Loman 1984). This may also apply to black cottonwood.

5 Information is insufficient for conifer species of other zones included in this report (western redcedar, western hemlock, and whitebark pine).

6 Cavities are not drilled through live sapwood, even if internal decay is present.

7 Although both live and dead trembling aspen are suitable for WT-1 users, dead trembling aspen are less valuable from a management standpoint because they tend to fall relatively soon after tree death.

8 The actual critical feature is diameter at cavity height, rather than diameter at breast height (dbh), but the former is not shown because data are very scarce.

9 Reported mean sizes are mainly for ponderosa pine, western larch, grand fir, western white pine, and black cottonwood, as well as *Pinus* and *Abies* spp. not occurring in British Columbia.

10 For example, Pileated Woodpecker nest sites in northeastern Oregon had mean stem densities of 2.4 large (≥50 cm dbh) live trees and 1.9 large dead trees per 0.1 ha (Bull 1987 [n=105 nest trees]). Mean canopy height was 29 m and mean canopy closure was 70%. Roost sites had a mean canopy closure of 62.5% (Bull et al. 1992 [n=123]). Mean basal areas around Pileated Woodpecker nest and roost trees reported in a number of studies ranged from 25 to 36 m^2/ha.

11 These plants, especially birch, are used for sap-feeding. Western hemlock seems to be important in the ICH zone, as was found in the Revelstoke area (M. Machmer, pers. comm., March 1999). Subalpine fir also appears to be important in some areas (K. Parker, pers. comm., March 1999). Sapsuckers also feed, to a lesser extent, on sap, cambium, and phloem tissue of many other tree species (including pine, Douglas-fir, spruce ?, and aspen). Conifers are important in early spring. Large-diameter willow stems are becoming scarce in (parts of ?) north-central British Columbia because of the widespread continual killing of willow stems by the introduced weevil *Cryptorhynchus lapathi* (D. Keisker, pers. obs.).

12 Hairy, Three-toed, and Black-backed Woodpeckers appear to nest often near forest openings, but data are scarce. In Missouri, the mean distance of five Hairy Woodpecker nests from the nearest canopy opening was 7.4 m (Brawn et al. 1984). In contrast, for 14 Pileated Woodpecker nests the mean distance was 79.3 m.

13 The association of Downy Woodpeckers with trees having softened outer wood (WT-2) versus trees with hard outer wood (WT-1) requires further study. Downy Woodpeckers have been observed to excavate through hard outer wood. However, the species is shown as a WT-2 user because of its strong affinity for dead sapwood even in trembling aspen, and because its ability to penetrate hard outer wood may be limited to trees or tree portions in which this hard outer layer is thin. Further study is also needed for Northern Flickers.

14 Nuthatches, chickadees, and, in some areas, Downy Woodpeckers appear to be the main species that excavate nest or roost cavities in Interior Douglas-fir. Other woodpeckers show only limited nesting use of Interior Douglas-fir.

15 The soft outer wood is usually ? still harder than the inner wood.

16 Further research is needed to identify the actual critical features that are provided by mature or old-growth forests. For Red-breasted Nuthatches and Brown Creepers, these features may include structural diversity of the tree layer and abundance of bark arthropods. Conifer seed supply may be an additional critical feature for Red-breasted Nuthatches.

17 In the SBS and probably also in the ICH zone, the majority of small cavities are old nest holes excavated by sapsuckers and Hairy and Three-toed Woodpeckers. In the ESSF zone, most small cavities were probably excavated by Three-toed Woodpeckers. The "range" of means shown (narrowed to a single value by rounding to the nearest centimetre) is based on nests of Red-naped Sapsuckers and Hairy Woodpeckers. Means for species with n<15 (Red-breasted

Nuthatch, Black-backed Woodpecker, and Tree Swallow using mainly Hairy Woodpecker nests) also round to 4 cm.

18 In the SBS zone (and probably also in the ICH ?), the very small existing holes used by chickadees are often old nest holes excavated by Downy Woodpeckers.

19 In excavated nest cavities, the entrance diameters shown are a fairly reliable indicator of suitable internal cavity dimensions. However, in the case of natural cavities, feeding excavations, and unfinished nest cavities, entrance diameter cannot be used to indicate internal cavity dimensions. Natural cavities and feeding excavations can usually be distinguished from nest holes by the irregular shape of their entrances. Unfinished nest cavities are often identifiable by the funnel-shaped narrowing of the entrance.

20 Bats have often been reported to prefer cavities in large-diameter trees that are live or at early decay stages. Thick, firm cavity walls have been suggested as the critical feature underlying this preference. They would provide good thermal insulation and protection from predators and would lessen the danger of tree breakage.

21 Cavity temperature is affected by tree location (vegetation density in the immediate surroundings and topographic location), cavity dimensions, entrance orientation, wall thickness, and the metabolic rate, number, and spacing of the occupants.

22 The preference of bats for uncluttered roost tree surroundings may also be related to increased solar exposure and the resulting warmer roosts.

23 Most large (WT-4) cavities represent nest or roost holes excavated by Northern Flickers or Pileated Woodpeckers, or natural cavities. The range of means shown for Flicker-excavated cavities is based on >300 Northern Flicker nests, 26 Bufflehead nests, and 41 European Starling nests in the "Cariboo Parklands" of British Columbia (Erskine and McLaren 1972; Peterson and Gauthier 1985). The range of means shown for Pileated Woodpecker-excavated cavities is based only on nests and roosts of the excavator species (Bull 1987; Bull et al. 1992 [n=110]). Available measurements for Pileated Woodpecker cavities actually occupied by secondary cavity users are scarce.

Flicker-excavated cavities are usually too small for: Wood Duck, Common Goldeneye, Barrow's Goldeneye, Hooded Merganser, Common Merganser, Northern Hawk Owl ?, and Marten ?. Use of Flicker-excavated cavities has been observed very frequently for: Bufflehead, Northern Saw-whet Owl, Northern Flicker (often re-uses its cavities), European Starling, Mountain Bluebird, and Tree Swallow. Common Mergansers may need cavity entrances larger than those excavated by Pileated Woodpeckers (Lumsden et al. 1986 [nest box study]).

24 Data may have included small (WT-3) cavities. This depth may not be suitable for all species associated with WT-4.

25 In the SBS biogeoclimatic zone during winter, Marten tended to use areas in the 20–60% coniferous canopy closure classes and areas with >200 m^3 CWD (>20 cm in diameter), including >100 m^3 hard CWD (Lofroth 1993). Fishers in the SBS zone preferred areas in the 20–60% coniferous canopy closure classes, significantly so in winter, but also preferred areas with 20–40% deciduous canopy closure, significantly so in summer (Weir 1995). Fisher habitat use throughout the year is tied to presence of CWD, but required volumes of CWD appear to be lower than those reported for Marten.

26 It is not known whether species associated with WT-5 prefer the smallest entrances they can use, as most WT-3 and many WT-4 species do. If so, a range of entrance sizes must be available also for WT-5.

27 Vaux's Swift nests: Bull and Cooper (1991 [means, n=21]). The minimum entrance size used was 5.1 × 4.4 cm. Vaux's Swift nest cavities may have side or top entrances. No measurements are available for top entrances of nest trees. One chimney nest was in a 30 × 30 cm flue (Campbell et al. 1990b). Vaux's Swift communal roosts: Bull (1991). Barred Owl: Johnson (1987 [recommended entrance size for nest boxes]).

28 Data shown are from one study in Oregon (Bull and Cooper 1991 [n=19 nests]) where Vaux's Swifts attached their nests to the inside walls of hollow trees accessed through side entrances excavated by Pileated Woodpeckers. It is not clear which is critical: both the distance of the nest below the entrance hole and the height of the nest above the cavity bottom, or only the former. Data are therefore provided for both. Nests or roosts accessed from top entrances (i.e., through a broken-off tree top exposing the hollow core) may need to be deeper down than those in cavities with side entrances, because of greater exposure ? Furthermore, communal roosts (which may house several hundred swifts [Bull 1991]) probably need to be deeper than nest cavities. The depths of two communal roost cavities with top entrances were 6 and 9 m (Bull 1991). The roosting depth of the swifts within the 9-m deep cavity was estimated at 2–7 m below the top entrance.

29 Minimum reported nest-cavity diameter (Bull and Cooper 1991).

30 Entrance diameter: Raphael and White (1984 [n=10]). Chamber dimensions: Davis (1978 [n=5]), Raphael and White (1984 [n=10]).

31 In north-central British Columbia, witches' brooms represent growth deformities caused by fungal rusts (*Chrysomyxa arctostaphyli* on spruce, *Melampsorella caryophyllacearum* on subalpine fir) or dwarf mistletoe (*Arceuthobium americanum* on lodgepole pine). Lodgepole pine is also affected by needle cast fungus (*Elytroderma deformans*), but the resulting brooms are usually small and tuft-like. In addition, some trees, especially black spruce, produce physiological brooms that are not caused by pathogens.

32 During periods when temperatures are warmer than approximately -10ºC (R.D. Weir, pers. comm.).

33 Mowrey and Zasada (1984).

34 Colonial species usually need several adjacent trees of the required Type.

35 Bednarz and Dinsmore (1982).

36 Black-backed and Pileated Woodpeckers seem to require WT-9 only when CWD is snow-covered and therefore unavailable as an alternative foraging substrate.

TABLE 3 *Cross-reference summarizing the associations of wildlife species (occurring in the SBS, northern ESSF, and northern ICH biogeoclimatic zones) with the 10 Types of Wildlife Trees (WTs) listed in Table 1 and described in Tables 2-1 to 2-10*

■ = *Species that seem to be restricted to the Type or that appear to strongly prefer it*

◪ = *Species that use alternative Types (or habitat elements other than Wildlife Trees) for the same function, without apparent strong preferences*

□ = *Species that have been reported to use the Type occasionally*

Wildlife species using Wildlife Trees	Types used for reproduction/resting								Types used for foraging	
	WT-1	WT-2	WT-3	WT-4	WT-5	WT-6	WT-7	WT-8	WT-9	WT-10
Birds										
Great Blue Heron								■		
Wood Duck				■						
Common Goldeneye				■			□			
Barrow's Goldeneye				■	□		□			
Bufflehead				■						
Hooded Merganser				■						
Common Merganser				◪						
Osprey								■		□
Bald Eagle								■		◪
Northern Goshawk							□	■		
Swainson's Hawk								■		□
Red-tailed Hawk								■		◪
Rough-legged Hawk										□
Golden Eagle								□		□
American Kestrel				■	□					■
Merlin				□			◪	□		◪
Peregrine Falcon								?□		
Great Horned Owl					□		◪	◪		■
Northern Hawk Owl				◪				◪		■
Northern Pygmy-Owl			◪	◪						◪
Barred Owl					◪		?□	◪		◪
Great Gray Owl							□	■		■
Long-eared Owl							◪	□		
Short-eared Owl										?□
Boreal Owl				■						◪
Northern Saw-whet Owl				■						◪
Vaux's Swift					■					
Belted Kingfisher										◪
Yellow-bellied Sapsucker	■								□	
Red-naped Sapsucker	■								□	
Red-breasted Sapsucker	■								□	
Downy Woodpecker		■							◪	
Hairy Woodpecker	■	□							■	
Three-toed Woodpecker	■	□							■	
Black-backed Woodpecker	■	□							■, ◪	
Northern Flicker	?□ ◪	◪		◪					□	
Pileated Woodpecker	■				□				■, ◪	
Olive-sided Flycatcher										■

TABLE 3 *Continued*

Wildlife species using Wildlife Trees	Types used for reproduction/resting								Types used for foraging	
	WT-1	WT-2	WT-3	WT-4	WT-5	WT-6	WT-7	WT-8	WT-9	WT-10
"Western Flycatcher" Complex				□						
Western Kingbird				□						◪
Eastern Kingbird										◪
Tree Swallow			◪	◪						
Violet-green Swallow			◪	◪						
Barn Swallow				□						
Common Raven								◪		
Black-capped Chickadee		?■ ◪	?□ ◪							
Mountain Chickadee		?◪□	?◪■	□						
Boreal Chickadee		◪	◪							
Chestnut-backed Chickadee		◪	◪							
Red-breasted Nuthatch		◪	◪							
White-breasted Nuthatch		□	■	□						
Brown Creeper			?□ ◪			■				
House Wren			◪	◪						
Winter Wren			□	□		□				
Mountain Bluebird			□	■						◪
Townsend's Solitaire				□						
Northern Shrike										◪
European Starling (introduced)			□	■						
House Finch				?□						
House Sparrow (introduced)			◪	◪						
Mammals										
Big Brown Bat			◪	◪	◪	◪				
Silver-haired Bat			◪	◪	◪	◪				
Hoary Bat				□						
Western Long-eared Myotis			◪	◪	◪	◪				
Little Brown Myotis			◪	◪	◪	◪				
Northern Long-eared Myotis			◪	◪	◪	◪				
Long-legged Myotis			◪	◪	◪	◪				
Southern Red-backed Vole			□	□	□					
Bushy-tailed Woodrat				□	□					
Deer Mouse			□	□	□					
Northern Flying Squirrel				◪	?□		■, ◪			
Yellow-pine Chipmunk			□	□	□					
Red Squirrel				◪	◪		?◪			
Marten				◪	◪		?■ ◪	□		
Fisher					■, ◪		?■			
Ermine				□	□					
Long-tailed Weasel				□	□					
Least Weasel			□	□	?□					
Black Bear					□					

TABLE 4 *The 79 vertebrate species that are associated with Wildlife Trees and have been recorded, or potentially occur, in the SBS, northern ESSF, and northern ICH biogeoclimatic zones. Species occurrence in these zones is based mainly on the* Checklist of Cariboo Birds *(Roberts and Gebauer 1992), Volumes 1 to 3 of* The Birds of British Columbia *(Campbell et al. 1990a, 1990b, 1997), and consultation with wildlife experts. Nomenclature and species codes are consistent with Cannings and Harcombe (1990).*

Wildlife Tree use[1]	Status[2]	English name (restrictions in distribution)[3]	Scientific name	Species code
Birds (60 species)				
●	Blue	**Great Blue Heron** (L,S)	*Ardea herodias*	B-GBHE
●	rare	**Wood Duck** (L,S)	*Aix sponsa*	B-WODU
●		**Common Goldeneye**	*Bucephala clangula*	B-COGO
●		**Barrow's Goldeneye**	*Bucephala islandica*	B-BAGO
●		**Bufflehead** (L)	*Bucephala albeola*	B-BUFF
●		**Hooded Merganser** (L)	*Lophodytes cucullatus*	B-HOME
●		**Common Merganser** (L)	*Mergus merganser*	B-COME
●		**Osprey** (L)	*Pandion haliaetus*	B-OSPR
●		**Bald Eagle**	*Haliaeetus leucocephalus*	B-BAEA
●		**Northern Goshawk**	*Accipiter gentilis*	B-NOGO
●	Red, rare	**Swainson's Hawk** (L?,S)	*Buteo swainsoni*	B-SWHA
●		**Red-tailed Hawk**	*Buteo jamaicensis*	B-RTHA
❍		Rough-legged Hawk	*Buteo lagopus*	B-RLHA
❍		Golden Eagle	*Aquila chrysaetos*	B-GOEA
●		**American Kestrel**	*Falco sparverius*	B-AMKE
●		**Merlin**	*Falco columbarius*	B-MERL
?❍	Red, rare	Peregrine Falcon	*Falco peregrinus anatum*	B-PEFA
●		**Great Horned Owl**	*Bubo virginianus*	B-GHOW
●		**Northern Hawk Owl** (H)	*Surnia ulula*	B-NHOW
●		**Northern Pygmy-Owl**	*Glaucidium gnoma*	B-NPOW
●		**Barred Owl**	*Strix varia*	B-BAOW
●		**Great Gray Owl**	*Strix nebulosa*	B-GGOW
●	rare	**Long-eared Owl** (L,S)	*Asio otus*	B-LEOW
?❍	Blue	Short-eared Owl	*Asio flammeus*	B-SEOW
●		**Boreal Owl** (H)	*Aegolius funereus*	B-BOOW
●		**Northern Saw-whet Owl**	*Aegolius acadius*	B-NSWO
●		**Vaux's Swift**	*Chaetura vauxi*	B-VASW
●		**Belted Kingfisher**	*Ceryle alcyon*	B-BEKI
●	rare	**Yellow-bellied Sapsucker** (L,N)	*Sphyrapicus varius*	B-YBSA
●		**Red-naped Sapsucker** (S)	*Sphyrapicus nuchalis*	B-RNSA
●		**Red-breasted Sapsucker**	*Sphyrapicus ruber*	B-RBSA
●		**Downy Woodpecker** (L?)	*Picoides pubescens*	B-DOWO
●		**Hairy Woodpecker**	*Picoides villosus*	B-HAWO
●		**Three-toed Woodpecker**	*Picoides tridactylus*	B-TTWO
●		**Black-backed Woodpecker**	*Picoides arcticus*	B-BBWO
●		**Northern Flicker**	*Colaptes auratus*	B-NOFL
●		**Pileated Woodpecker**	*Dryocopus pileatus*	B-PIWO
●		**Olive-sided Flycatcher**	*Contopus borealis*	B-OSFL
❍	rare	"Western Flycatcher" Complex[4] (Sh?)	*Empidonax* spp.	B-WEFL
●	rare	**Western Kingbird** (L,S)	*Tyrannus verticalis*	B-WEKI
●		**Eastern Kingbird** (L)	*Tyrannus tyrannus*	B-EAKI
●		**Tree Swallow** (L)	*Tachycineta bicolor*	B-TRSW
●		**Violet-green Swallow**	*Tachycineta thalassina*	B-VGSW
❍		Barn Swallow	*Hirundo rustica*	B-BASW
●		**Common Raven**	*Corvus corax*	B-CORA
●		**Black-capped Chickadee**	*Parus atricapillus*	B-BCCH
●		**Mountain Chickadee**	*Parus gambeli*	B-MOCH
●		**Boreal Chickadee** (H)	*Parus hudsonicus*	B-BOCH

TABLE 4 *Continued*

Wildlife Tree use[1]	Status[2]	English name (restrictions in distribution)[3]	Scientific name	Species code
●	rare	**Chestnut-backed Chickadee** (Sh)	*Parus rufescens*	B-CBCH
●		**Red-breasted Nuthatch**	*Sitta canadensis*	B-RBNU
●	rare	**White-breasted Nuthatch** (L,S)	*Sitta carolinensis*	B-WBNU
●		**Brown Creeper** (Sh?)	*Certhia americana*	B-BRCR
●	rare	**House Wren** (L,S)	*Troglodytes aedon*	B-HOWR
❍		Winter Wren	*Troglodytes troglodytes*	B-WIWR
●		**Mountain Bluebird**	*Sialia currucoides*	B-MOBL
❍		Townsend's Solitaire	*Myadestes townsendi*	B-TOSO
●		**Northern Shrike** (L)	*Lanius excubitor*	B-NOSH
●	introduced	**European Starling**	*Sturnus vulgaris*	B-EUST
?❍		House Finch (L?,S)	*Carpodacus mexicanus*	B-HOFI
●	introduced	**House Sparrow**	*Passer domesticus*	B-HOSP
Mammals (19 species)				
●		**Big Brown Bat**	*Eptesicus fuscus*	M-EPFU
●		**Silver-haired Bat**	*Lasionycteris noctivagans*	M-LANO
❍	rare	Hoary Bat	*Lasiurus cinereus*	M-LACI
●		**Western Long-eared Myotis**	*Myotis evotis*	M-MYEV
●		Little Brown Myotis	*Myotis lucifugus*	M-MYLU
●	Blue, rare	**Northern Long-eared Myotis**	*Myotis septentrionalis*	M-MYSE
●		**Long-legged Myotis**	*Myotis volans*	M-MYVO
❍		Southern Red-backed Vole	*Clethrionomys gapperi*	M-CLGA
❍		Bushy-tailed Woodrat	*Neotoma cinerea*	M-NECI
❍		Deer Mouse	*Peromyscus maniculatus*	M-PEMA
●		**Northern Flying Squirrel**	*Glaucomys sabrinus*	M-GLSA
❍		Yellow-pine Chipmunk	*Tamias amoenus*	M-TAAM
●		**Red Squirrel**	*Tamiasciurus hudsonicus*	M-TAHU
●		**Marten**	*Martes americana*	M-MAAM
●	Blue	**Fisher**	*Martes pennanti*	M-MAPE
❍		Ermine	*Mustela erminea*	M-MUER
❍		Long-tailed Weasel	*Mustela frenata*	M-MUFR
❍	rare	Least Weasel	*Mustela nivalis*	M-MUNI
❍		Black Bear	*Ursus americanus*	M-URAM

1 ● = Obligate or frequent Wildlife Tree user (61 species) (comprises all species marked ■ or ◪ in at least one Type in Tables 2-1 to 2-10)
❍ = Occasional Wildlife Tree user (18 species)

2 Red = Red-listed in British Columbia (BC Environment 1998)
Blue = Blue-listed in British Columbia (BC Environment 1998)
rare = rare in the SBS as well as in northern parts of the ESSF and ICH biogeoclimatic zones

3 See pages 16–17 for a legend of restrictions in species distribution.

4 Includes Pacific-slope Flycatcher (*Empidonax difficilis*) and Cordilleran Flycatcher (*E. occidentalis*). For further information on taxonomy and status of these species, see Volume 3 of *The Birds of British Columbia* (Campbell et al. 1997).

TABLE 5 *Research needs relevant to Wildlife Tree management. Descriptions of very important knowledge gaps are shown in bold print. Only the main topics are shown in this table. Other specific knowledge gaps are indicated by question marks throughout Tables 2-1 to 2-10. The identification of research needs is current only to 1994. Some of the listed topics are being addressed through research projects initiated since then.*

General topic	Description of research needs
SIZES OF FOREST FRAGMENTS AND HABITAT PATCHES	• **Required sizes of forest fragments used for reproduction/resting by Wildlife Tree users that require forest cover around their nest/den/roost trees**. Required forest fragment sizes used for foraging by Pileated Woodpeckers.
	• Required sizes of the patch of specific habitat immediately surrounding nest/den/roost trees of some Wildlife Tree users (*species shown in most of Tables 2-1 to 2-10, last column*)
TRAVEL CORRIDORS	• **Critical features and number/distribution of the travel corridors that are required by some Wildlife Tree users** (*species shown in Tables 2-2 to 2-7, last column*)
	• Distance between forest fragments beyond which travel corridors are required by the above Wildlife Tree users. At shorter distances, potential disadvantages of using corridors (e.g., longer total travel distance due to less direct route, territorial conflict) may outweigh the possible advantages of using corridors (e.g., thermal and snow interception cover, reduced predation risk).
HABITAT INTERSPERSION	• **Maximum distances between foraging habitat and reproductive or resting habitat of Wildlife Tree users**
DISTANCE TO OPEN AREAS OR TO FOREST	• Maximum distance of Wildlife Trees in forest to the nearest open (unforested) area, for wildlife species associated with open areas or forest edge (*species shown in Tables 2-1 to 2-8, last column*)
	• Maximum distance of Wildlife Trees located in open areas to the nearest forested area
WILDLIFE TREE HABITAT QUALITY OF DIFFERENT ECOSYSTEMS	• Total area required (contiguously or as separate patches) in different ecosystems (including seral ecosystems) to support specific population densities of Wildlife Tree users. This assessment of required area could replace estimation of required Wildlife Tree numbers for the more common Types of Wildlife Trees, especially for trees used as foraging substrates.
	• Ecologically most meaningful units (e.g., site series or smaller/larger units ?) for the above assessment of differences in Wildlife Tree habitat quality
REQUIRED NUMBERS OF WILDLIFE TREES	• Numbers of Wildlife Trees required to support specific population densities of Wildlife Tree users; especially important for the uncommon or rare Types of Wildlife Trees and for trees to be retained in open areas (e.g., hunting perches)
ROOSTING HABITAT REQUIREMENTS	• Do roost trees differ from nest trees, as documented by Bull et al. (1992) for Pileated Woodpeckers in Oregon?
	• Do features of roost tree location differ from those of nest tree location?
	• Do winter and summer roost trees and roost tree locations differ? An example would be the seasonal selection of roost trees according to topography (reflecting site temperature differences) that was observed for Pileated Woodpeckers in northeastern Oregon. *See also nest/roost temperature below.*

TABLE 5 *Continued*

General topic	Description of research needs
IMMEDIATE NEST/ROOST TREE SURROUNDINGS	• Requirements of secondary cavity users and open nesters regarding immediate nest/roost tree surroundings (*see Tables 2-3 to 2-8, last column*)
	• Effects of immediate surroundings and other factors (*see footnote 21 of Table 2*) on nest/roost cavity temperature. Should management aim at ensuring the availability of a diversity of thermal regimes?
HABITAT REQUIREMENTS OF INDIVIDUAL WILDLIFE SPECIES	• **Habitat requirements of the following obligate or frequent Wildlife Tree users that occur in the SBS, ESSF, or ICH zones of north-central B.C. are in particular need of local field study in that region: Hooded and Common Mergansers, Northern Hawk Owl, Northern Pygmy-Owl, Barred Owl, the local applicability of the large body of Scandinavian literature on the Boreal Owl, Vaux's Swift, Black-backed Woodpecker, Brown Creeper, Western and Northern Long-eared Myotis, Long-legged Myotis, Silver-haired Bat, maternal dens of Marten and the habitat surrounding the dens.**
	• Confirm which species of secondary cavity users require large cavities (WT-4, distinguish cavities made by Northern Flickers from those made by Pileated Woodpeckers) and which species can use smaller cavities (WT-3).
	• Capabilities/preferences of primary cavity excavators for outer wood hardness rated with the Knife Test scale (especially for Downy, Hairy, Three-toed, and Black-backed Woodpeckers and Northern Flickers). Is the thickness of hard outer wood critical for Downy Woodpeckers? *See footnote 13 of Table 2.*
PATTERNS OF WILDLIFE TREE USE IN DIFFERENT BIOGEOCLIMATIC ZONES	• **Information on Wildlife Tree use is very scarce for the ICH zone (moist, wet, and very wet subzones).** This zone is of particular interest because it is the only zone in Interior B.C. in which western redcedar and western hemlock are common, both of which appear to be important Wildlife Tree species. Patterns of Wildlife Tree use and ecology might therefore be different from other Interior zones.
ECOLOGY OF THE CRITICAL FEATURES OF EACH WILDLIFE TREE TYPE	• **Factors influencing development of the critical features, time frame of development, usable period, and frequency of occurrence in different ecosystems**
	• **Ecology, temporal dynamics, and landscape-level management of overmature deciduous stands that contain the critical wildlife habitat features described in this report**
	• **Ecology and habitat requirements of important prey species, especially carpenter ants and wood-boring beetles**
	• Power (i.e., strength of correlation) of field indicators of internal decay in north-central B.C. (*see footnote 2 of Table 2*). Indicator power can vary among tree species, decay species, sites?, and perhaps other factors?
	• Feasibility, cost, and benefits of artificial creation of critical features; especially relevant for rare Types such as WT-5 (Very Large Natural Cavities and Hollow Trees)

TABLE 6 *Types of Coarse Woody Debris (CWD), arranged by function, that are required by wildlife species occurring in the SBS, northern ESSF, and northern ICH biogeoclimatic zones. Rocks, cutbanks, and tree bases are included in some of the Types. Only those configurations of features that appear to be required (i.e., marked ■ in Table 7) by at least one wildlife species are delineated as individual Types. Most Types are not mutually exclusive (i.e., a single piece of CWD can serve as more than one Type). In particular, the features of CWD-2, 4, and 6 often occur together in the same log or stack of CWD. Complete descriptions of each Type are provided in Tables 7-1 to 7-6.*

Main functions[1] of Coarse Woody Debris	Configurations of CWD features required by wildlife species occurring in the SBS, ESSF, and ICH zones	Main users
Reproduction/Resting[2]/ Escape: Concealed spaces	CWD-1: Large Concealed Spaces	Cats, mustelids, grouse, Snowshoe Hare, Bushy-tailed Woodrat, Porcupine, canids, Black Bear
	CWD-2: Small Concealed Spaces (or Soft Substrate Allowing Excavation of Such Spaces) at or below Ground Level beneath Hard Material	Amphibians, snakes, shrews, voles, squirrels, Deer Mouse, jumping mice, weasels
	CWD-3: Small Concealed Spaces above Ground Level	Winter Wren, Townsend's Solitaire, Northern Waterthrush, Pacific Treefrog, flycatchers, other passerines, Deer Mouse
Travel: a. Concealed runways	CWD-4: Long Concealed Spaces (or Soft Substrate Allowing Construction of Runways)	Long-toed Salamander, voles, Rubber Boa, shrews, Deer Mouse, squirrels, weasels
Travel: b. Exposed, raised travel lanes	CWD-5: Large or Elevated, Long Material Clear of Dense Vegetation	Squirrels, Marten
Foraging: Feeding substrates	CWD-6: Invertebrates in Wood, under Bark or Moss Cover, or in Litter/Humus Accumulated around CWD	Amphibians, woodpeckers, Winter Wren, shrews, Deer Mouse, Striped Skunk, bears

1 See attached "Addendum to Table 6" for a list of other functions of CWD.

2 Including hibernation, thermoregulation, and hygroregulation.

ADDENDUM TO TABLE 6

In addition to the main functions shown in Table 6, Coarse Woody Debris (CWD) serves a large number of other functions for many of the CWD users listed in Table 9 and for numerous other wildlife species. These other functions are not necessarily less important to the animals. However, they were not considered in the delineation of CWD Types, either because they do not require specific configurations of CWD features (i.e., any CWD can serve the function) or because they represent incidental uses of CWD, and for these reasons do not require specific management attention.

A (probably incomplete) list of such other functions reported for CWD is provided below because awareness of these numerous additional uses of CWD is useful when estimating the required overall abundance of CWD.

Other functions of Coarse Woody Debris (CWD)	Wildlife species or species groups associated with these functions
Uses Related to Reproduction/Resting	
Occasional bedding-down alongside large logs	Moose, Mule Deer
Occasional nesting next to logs or boulders	Ground-nesting birds, Heather Vole subnivean winter nests
Occasional use of stumps or logs as nest platforms	Common Nighthawk (esp. very decayed CWD), Canada Goose, Mallard
Occasional use of CWD floating or partly submerged in water, as nest platforms	Common Loon, grebes, American Coot, Black Tern
Use of partly submerged anchored CWD, or of floating CWD, as resting and preening sites	Waterfowl, Muskrat, River Otter, Mink
Uses Related to Foraging/Food	
Prey-plucking sites	Accipiter hawks
Use of stumps, elevated logs, upturned rootmasses, etc. as food-handling/lookout sites	Columbian Ground Squirrel, Yellow-pine Chipmunk, Red Squirrel, many birds (esp. ground feeders ?)
Shoreline logs extend foraging access into open water.	Solitary Sandpiper (also other shorebirds ?)
Use of partly submerged anchored CWD, or of floating CWD, as feeding sites	Muskrat, River Otter, Mink
Stumps classified as CWD (<1.3 m tall) may be used as low hunting perches.	Mountain Bluebird, Townsend's Solitaire, Northern Shrike, Barred Owl, Great Gray Owl, other owls ?, Belted Kingfisher, some flycatchers
Open-structured branches and roots of CWD may be used as perches for flycatching.	Probably all *Empidonax* flycatchers, other small species that flycatch occasionally
Gleaning for arthropods on CWD surfaces or in shallow bark irregularities	Many songbird and woodpecker species
Parts of recently fallen CWD may serve as food.	Beaver, Moose, Mule Deer
CWD supports the growth of wood-inhabiting fungi. In addition, water retention by CWD may enhance and prolong the fruiting of hypogeous fungi. Fungi, especially hypogeous species, are an important food.	Shrews, rodents (including squirrels)
Other Uses	
Marking sites	Mustelids
Sunning sites	Reptiles
Soil exposed by uprooted trees, and dry, very decayed wood may be used as dusting sites.	Grouse species
Use of logs as display (drumming) sites	Ruffed Grouse
Use of logs extending across streams or small canyons as bridges	Deer Mouse, Northern Flying Squirrel, jumping mice, Bobcat, Marten, and probably many others

TABLES 7-1 to 7-6. Descriptions of each of the six Types of Coarse Woody Debris listed in Table 6. Types are described in terms of their critical features, reported values or forms of these critical features, overall function, associated wildlife species (occurring in the SBS, northern ESSF, and northern ICH biogeoclimatic zones), and their relationship to the Log Decomposition Classification. "Special Requirements" pertain to only some of the wildlife species associated with the Type. Descriptions of Types are based mainly on habitat research results compiled from the literature. Question marks indicate that further information or confirmation of local applicability is needed. Terms and symbols are explained on pages 13–17. Footnotes are shown after Table 7-6. All information presented is current only to 1995.

TABLE 7-1 *CWD-1: Large concealed spaces*

Coarse Woody Debris (CWD)

Function and wildlife species associated with CWD-1		Log Decomposition Classes in which CWD-1 occurs most commonly	Critical features of CWD-1: Space size, microclimate, and access	Critical features of CWD-1: Degree of concealment
FUNCTION **Reproduction/Resting[1]/Escape**: Concealed spaces (Also used as hunting sites by some species, especially Fisher, and for food caching by Marten and Bushy-tailed Woodrat) WILDLIFE SPECIES (*SBS, ESSF, ICH zones*) ■ Cougar ?■ or ◪ Lynx ?■ or ◪ Bobcat ■ Fisher (cold-winter[2] resting) ◪ Blue Grouse (H) ◪ Ruffed Grouse ◪ Snowshoe Hare ◪ Bushy-tailed Woodrat ◪ Porcupine ◪ Red Fox ?◪ or ■ Wolverine ◪ River Otter ◪ Marten ◪ Striped Skunk ◪ Black Bear	□ Mallard □ Harlequin Duck (*rare*) □ Hooded Merganser (L) □ Common Merganser (L) ?□ or ◪ Spruce Grouse (H?) □ American Dipper ?□ or ◪ Woodchuck ?□ or ◪ Coyote ?□ or ◪ Gray Wolf ?□ or ◪ Long-tailed Weasel ?□ or ◪ Mink □ Grizzly Bear	LOG DECOMPOSITION CLASSES **1, 2, 3**	SPACE SIZE ? *data insufficient* SPACE MICROCLIMATE ? *data insufficient* (Influenced by a variety of factors, including space dimensions, substrate [e.g., wood, rock, or soil], depth below snow or ground, and CWD location [immediate surroundings and topographic location]) ***Special Requirements:*** **Availability of a variety of resting sites with different thermal properties** (Marten, others ?): May be critical for thermoregulation ? **Subnivean spaces associated with wood[3]** (Marten, Fisher ?, others ?) **Spaces excavated in soil[4]** (Black Bear): often under upturned rootmasses ? ***Special Requirement:*** ACCESS POINTS TO SUBNIVEAN SPACES[5] (Marten, Fisher, others ?): Structures that create a break in the snow surface (e.g., overlapping stacks of CWD, limbs of the CWD, or nearby small conifers with low branches)	DEGREE OF CONCEALMENT ? *no specific data (difficult to quantify)* ***Reported forms of concealment:*** **Spaces under elevated logs** (logs supported by their limbs, other CWD, or ground irregularities) **Hollow logs/stumps or ones with very large cavities** **Upturned rootmasses** **Slash piles** **Spaces under or within rock** (e.g., large spaces under or among boulders, and caves or crevices in rock outcrops or cliffs) **CWD or rock + additional cover** (e.g., branches [esp. foliated or snow-covered] of the CWD itself or of adjacent plants, or other CWD positioned to form a concealed space) **Subnivean spaces associated with CWD or rocks** **Spaces excavated in soil (associated with CWD, rock, or cutbanks)**

Critical features of CWD-1

Location of the CWD

All features are ***Special Requirements.***

IMMEDIATE SURROUNDINGS
Presence of Red Squirrel middens (Marten)
Free space in front of entrance ?? (Red Fox: natal dens)
Absence of roads or other sources of disturbance (most species)

TOPOGRAPHIC LOCATION
On a slope for drainage (most species, *may not be critical depending on slope position and soil type*)[6]
On south-facing slopes ? (Red Fox: natal dens)
Higher elevations (Blue Grouse)

PROXIMITY TO SPECIFIC FOREST STANDS
Stands with:
Deciduous trees (especially trembling aspen) and abundant shrubs (including fruit-producing species) (Ruffed Grouse)
Moderate canopy closure[7] (Marten, Fisher)
Conifers dominating ? (Lynx, Wolverine, Porcupine)
Dense low-shrub cover (Porcupine, River Otter, Striped Skunk)
Abundant prey[8] (carnivores)

PROXIMITY TO OPEN AREAS OR EDGE ? *no data on actual distances*
Reported general habitat descriptions:
Open areas interspersed with dense shrub thickets (Striped Skunk)
Forest interspersed with open areas (Red Fox)
Some shrubby open areas and forest edges (Blue Grouse [not necessarily shrubby], Ruffed Grouse)

PROXIMITY TO WATER
Near relatively large waterbodies containing fish (River Otter, natal dens: within 800 m ?)
Near water (*not critical* ?) (Marten, Cougar, Gray Wolf)

MINIMUM STAND SIZE
(Blue Grouse ?, Ruffed Grouse, Lynx, Bobcat, Marten, Fisher): ? *data on actual sizes insufficient*

STAND CONNECTIVITY
Travel corridors of trees or CWD
(Marten, Fisher, others ?): Critical for distances >100 m ? through treeless areas.
Corridor width: ? *data insufficient*

TABLE 7-2 ***CWD-2: Small concealed spaces (or soft substrate allowing excavation of such spaces) at or below ground level beneath hard material***

Function and wildlife species associated with CWD-2	**Log Decomposition Classes in which CWD-2 occurs most commonly**	**Critical features of CWD-2**		
		Extent of concealed spaces or soft material[9] for burrow excavation; access	**Space size and degree of concealment**	**Microclimate of the concealed space**
FUNCTION **Reproduction/Resting[1]/ Escape**: Concealed spaces (Also used for food caching by many small mammals) **WILDLIFE SPECIES** (*SBS, ESSF, ICH zones*) ■ Long-toed Salamander (not for reproduction) ■ Western Garter Snake[10] ■ Common Garter Snake ■ Common Shrew ■ Pygmy Shrew ?■ or ◪ Dusky Shrew ?■ or ◪ Water Shrew ■ Vagrant Shrew ?■ or ◪ Southern Red-backed Vole ?■ or ◪ Long-tailed Vole ■ Heather Vole (summer nests) ?■ or ◪ Golden-mantled Ground Squirrel (H) ■ Yellow-pine Chipmunk ◪ Western Toad ◪ Pacific Treefrog (L?,S) ?◪ or ■ Rubber Boa (S) (*rare*) ◪ Meadow Vole ◪ Deer Mouse ◪ Red Squirrel[11] ◪ Meadow Jumping Mouse ◪ Western Jumping Mouse ◪ Ermine ◪ Long-tailed Weasel ◪ Least Weasel (*rare*) □ Winter Wren □ Townsend's Solitaire □ Hermit Thrush □ Dark-eyed Junco □ Bushy-tailed Woodrat *Additional species often use CWD-2 as hunting sites, especially Marten and Fisher*	**LOG DECOMPOSITION CLASSES** **1, 2, 3**	**EXTENT OF AREA CONCEALED BY HARD MATERIAL** ? *data insufficient* ***Special Requirements:*** **BELOW-GROUND DEPTH OF SPACES OR SOFT MATERIAL** (hibernating species, others ?): ? *data insufficient:* Shallow: **<20 cm** ? (e.g., Heather Vole) Deep: **20-90 cm** (Golden-mantled Ground Squirrel) **>70 cm** ? (e.g., Yellow-pine Chipmunk, winter) **PRESENCE OF EXISTING SPACES** (non-burrowing species: Long-toed Salamander, Pacific Treefrog ?, garter snakes, Vagrant Shrew, other shrews ?, birds) **ACCESS POINTS TO SUBNIVEAN SPACES** [5] (Marten, weasels ?): *as in Table 7-1*	**SIZE AND DEGREE OF CONCEALMENT** Space size small enough for effective concealment: ? *no data* ***Reported forms of concealment:*** **Small spaces under CWD resting on the ground** (e.g., under logs, slabs, stumps, exposed roots, or upturned rootmasses) **Hollow logs/stumps or ones with cavities at or below ground level** (with relatively hard shell) **Loose bark on CWD resting on the ground** **Subnivean spaces associated with CWD** **Rock providing small concealed spaces** (e.g., spaces under or among rocks, or crevices in rock outcrops) **Burrows in soft material[9] under CWD or rock** **Any of the above may have additional cover of concealing vegetation** (e.g., branches of the CWD itself or of adjacent trees or shrubs, or tall grass).	(Influenced by a variety of factors, *see Table 7-1*) **THERMAL PROPERTIES** ***Special Requirements:*** **Thermally buffered, subterranean spaces** (for hibernation: amphibians, reptiles, Golden-mantled Ground Squirrel, Yellow-pine Chipmunk, jumping mice) **Diversity of thermal regimes** (Long-toed Salamander ?) **HUMIDITY** ***Special Requirements:*** **Dry** (Heather Vole, Deer Mouse ?, others ?) **Moist** (all amphibians, all shrews ?, others ?)

Critical features of CWD-2

Location of the CWD

All features are ***Special Requirements.***

IMMEDIATE SURROUNDINGS

Dense herb or shrub layer (Long-tailed Vole, Yellow-pine Chipmunk, Ermine, Long-tailed Weasel ?, others ?)
Dense? low?-shrub layer especially of Ericaceae (and similar families and willows) (Heather Vole)
Relatively dry sites (Heather Vole, Deer Mouse ?)
Mesic sites (Southern Red-backed Vole, Long-tailed Vole ?)
Grassy sites (Meadow Vole, jumping mice)
Relatively moist sites (Common, Water, and Vagrant Shrews, jumping mice)
Rich soils with low acidity (*may not be critical* ?) (Vagrant Shrew)
Sites (e.g., CWD-6) providing invertebrate prey (all amphibian species, shrews)

TOPOGRAPHIC LOCATION

Higher elevation (Golden-mantled Ground Squirrel)

PROXIMITY TO SPECIFIC FOREST STANDS

Stands with abundant conifer seed (Red Squirrel)
Forest[12] ? (Southern Red-backed Vole)

PROXIMITY TO OPEN AREAS OR EDGE

In or near:
Open forests, forest edges, or unforested areas (Heather Vole ?, Golden-mantled Ground Squirrel, Yellow-pine Chipmunk, Ermine ?, Long-tailed and Least Weasels ?)
Meadows and wetlands ? (Long-tailed Vole, Meadow Vole, jumping mice)

PROXIMITY TO WATER

Near temporary or permanent, quiet water bodies with shallow edges (all amphibians)
Near open water or wetlands (Rubber Boa ?, garter snakes, Pygmy Shrew, Vagrant Shrew, Water Shrew [**adjacent** to water], Western Jumping Mouse ?)

MINIMUM STAND SIZE

(Red Squirrel, Southern Red-backed Vole, others ?): ? *data on actual sizes insufficient*

MAXIMUM DISTANCE FROM FOREST

(Red Squirrel, Southern Red-backed Vole, others ?): ? *no data on actual distances*

Function and wildlife species associated with CWD-3	Log Decomposition Classes in which CWD-3 occurs most commonly	Critical features of CWD-3: Size and above-ground height of the concealed space and degree of concealment	Critical features of CWD-3: Location of the CWD
FUNCTION **Reproduction/Resting**: Concealed spaces **WILDLIFE SPECIES** (*SBS, ESSF, ICH zones*) ■ Winter Wren ■ Townsend's Solitaire[13] ?■ Northern Waterthrush ◪ Pacific Treefrog (L?,S) (thermo-, hygroregulation) ◪ Yellow-bellied Flycatcher (L,N) (*rare*) ◪ "Western Flycatcher" complex (Sh?) (*rare*) ◪ American Dipper ?◪ or ☐ Wilson's Warbler ?◪ or ☐ Song Sparrow (L?) ?◪ or ☐ Dark-eyed Junco ◪ Deer Mouse ☐ Mallard ☐ Harlequin Duck (*rare*) ☐ Hermit Thrush ☐ American Robin ☐ Many Wildlife Tree users[14]	**LOG DECOMPOSITION CLASSES** **1, 2, 3, 4?** (*Difficult to relate to the Log Decomposition Classes because CWD-3 pertains mainly to CWD other than logs.*)	**SPACE SIZE AND DEGREE OF CONCEALMENT** ? *data insufficient* ***Special Requirements:*** **Relatively deep** cavities (Winter Wren) **Shallow** depressions or ledges (Yellow-bellied Flycatcher, Wilson's Warbler, Song Sparrow, Dark-eyed Junco, others ?) **Heavy moss cover** (*may not be critical* ?) (Yellow-bellied Flycatcher) ***Reported nest sites:*** **Cavities, depressions, and ledges**: **in upturned rootmasses** **in cutbanks, cliffs, or large rocks** (usually concealed by overhanging vegetation or other material, sometimes associated with large exposed tree roots) **in stumps, logs, or among stacks of logs** **ABOVE-GROUND HEIGHT** **>0.8 m** ? *data insufficient*	*All features are **Special Requirements**.* **IMMEDIATE SURROUNDINGS** **Dense low-shrub cover** (Winter Wren ?, Northern Waterthrush, Wilson's Warbler, Song Sparrow) **PROXIMITY TO SPECIFIC FOREST STANDS** **Wetlands with trees or tall ? shrubs** (e.g., black spruce, willows) *or* **dry stands of deciduous or mixed deciduous/coniferous trees** (Yellow-bellied Flycatcher) **Along small water courses or in other moist shady areas with an open mid-stratum** ("Western Flycatcher" complex) **Forest with a dense, structurally diverse lower stratum**[15] (Winter Wren) **Relatively open coniferous ? forest** (Townsend's Solitaire) **Forest or stands of tall shrubs** (Northern Waterthrush) **PROXIMITY TO OPEN AREAS OR EDGE** **In unforested, sparsely treed, or forest-edge areas with dense low-shrub patches/bands** (Wilson's Warbler [esp. willows], Song Sparrow) **PROXIMITY TO WATER** **Near temporary or permanent, quiet water bodies with shallow edges** (Pacific Treefrog) **Adjacent to or overhanging a clear-water, turbulent stream** (American Dipper) **Adjacent to or overhanging** (Northern Waterthrush) **or near** (Song Sparrow) **standing or slow-moving water** **MINIMUM STAND SIZE ?** *no data on actual sizes* **MAXIMUM DISTANCE FROM FOREST** (Winter Wren, Townsend's Solitaire ?, others ?): ? *no data on actual distances* **STAND CONNECTIVITY ?** *no data*

TABLE 7-4 *CWD-4: Long concealed spaces (or soft substrate allowing construction of runways)*

		Critical features of CWD-4		
Function and wildlife species associated with CWD-4	**Log Decomposition Classes in which CWD-4 occurs most commonly**	**Length of the concealed space, orientation, and access**	**Degree of concealment**	**Microclimate of the concealed space**
FUNCTION **Travel**: Concealed runways **WILDLIFE SPECIES** (*SBS, ESSF, ICH zones*) ■ Long-toed Salamander[16] ■ Southern Red-backed Vole ?■ most CWD-4 spp. (early spring[17]) ◪ Rubber Boa (S) (*rare*) ◪ Common Shrew ◪ Pygmy Shrew ◪ Dusky Shrew ◪ Water Shrew ◪ Vagrant Shrew ◪ Long-tailed Vole ?◪ or ☐ Heather Vole ◪ Deer Mouse ?◪ or ☐ Northern Flying Squirrel (winter) ◪ Yellow-pine Chipmunk ◪ Red Squirrel (winter) ◪ Ermine ?◪ or ☐ Long-tailed Weasel ?◪ or ☐ Least Weasel (*rare*) ☐ Winter Wren ?☐ Song Sparrow (L?) ?☐ or ◪ Meadow Vole ☐ Meadow Jumping Mouse ☐ Western Jumping Mouse *Additional species often use CWD-4 as hunting sites, especially Marten and Fisher*	**LOG DECOMPOSITION CLASSES** **1, 2, 3?, 4?** (**4** only for excavated runways)	**LENGTH** (*length of individual CWD pieces may not be critical as long as there is continuity*): ? *actual measurements insufficient* **ORIENTATION** **Positioned to form nearly continuous travel lanes** ***Special Requirement:*** **ACCESS POINTS TO SUBNIVEAN SPACES** [5] (Marten, weasels ?): *as in Table 7-1*	**DEGREE OF CONCEALMENT** Space size small enough for effective concealment: ? *no data* ***Reported forms of concealment:*** **Under or alongside logs resting on or close to the ground, with or without additional cover** (e.g., branches of the CWD itself or of adjacent trees or shrubs, tall grass, other CWD, or snow) **Logs with heavy moss cover**[18] **Networks of passages in stacks of CWD or talus** **Runways excavated in soft material**[9] **in, under, or alongside logs**	**HUMIDITY** ***Special Requirement:*** **Moist** (Long-toed Salamander)

Critical features of CWD-4

Location of the CWD

All features are ***Special Requirements****.*

IMMEDIATE SURROUNDINGS
- **Dense herb or shrub layer** (Long-tailed Vole, others ?)
- **Dense? low?-shrub layer especially of Ericaceae** (and similar families and willows) (Heather Vole)
- **Relatively dry sites** (Heather Vole, Deer Mouse ?)
- **Mesic sites** (Southern Red-backed Vole, Long-tailed Vole ?)
- **Grassy sites** (Meadow Vole)
- **Relatively moist sites** (Common, Water, and Vagrant Shrews)
- **Rich soils with low acidity** (*may not be critical* ?) (Vagrant Shrew)
- **Sites providing invertebrate prey (e.g., CWD-6)** (Long-toed Salamander, all shrews)

PROXIMITY TO SPECIFIC FOREST STANDS
- **Stands with abundant conifer seed** (Red Squirrel)
- **Forest**[12] ? (Southern Red-backed Vole)

PROXIMITY TO OPEN AREAS OR EDGE

In or near:
- **Open forests, forest edges, or unforested areas** (Heather Vole ?, Yellow-pine Chipmunk, Ermine ?, Long-tailed and Least Weasels ?)
- **Meadows and wetlands ?** (Long-tailed Vole, Meadow Vole)

PROXIMITY TO WATER
- **Near temporary or permanent, quiet water bodies with shallow edges** (Long-toed Salamander)
- **Near open water or wetlands** (Rubber Boa ?, Pygmy Shrew, Water Shrew [**adjacent** to water], Vagrant Shrew)

MAXIMUM DISTANCE FROM FOREST

(Red Squirrel, Southern Red-backed Vole, others ?): ? *no data on actual distances*

Function and wildlife species associated with CWD-5	**Log Decomposition Classes in which CWD-5 occurs most commonly**	**Critical features of CWD-5**		
		Log length and above-ground height of the log top	**Orientation**	**Location of the CWD**
FUNCTION **Travel**: Exposed, raised travel lanes **WILDLIFE SPECIES** (*SBS, ESSF, ICH zones*) ■ Red Squirrel (non-winter) ?◪ or ■ Northern Flying Squirrel ?◪ or ■ Yellow-pine Chipmunk ◪ Red Squirrel (winter) ◪ Marten ☐ Bushy-tailed Woodrat ?☐ Lynx ?☐ Bobcat ☐ Fisher ☐ Ermine ☐ Long-tailed Weasel ☐ Least Weasel (*rare*)	**LOG DECOMPOSITION CLASSES** **1, 2, 3?** (**3** only if large)	LENGTH (*length of individual logs is not critical as long as there is continuity*): ? *data insufficient* **ABOVE-GROUND HEIGHT** **Top of log above dense surrounding vegetation**	**POSITIONED TO FORM NEARLY CONTINUOUS TRAVEL LANES**	*All features are* ***Special Requirements***. **IMMEDIATE SURROUNDINGS** **Some tree cover** (Northern Flying Squirrel, Red Squirrel, Marten: if travel distances are long) **PROXIMITY TO SPECIFIC FOREST STANDS** **Stands with abundant conifer seed** (Red Squirrel) **PROXIMITY TO OPEN AREAS OR EDGE** In or near: **Open forests, forest edges, or unforested areas** (Yellow-pine Chipmunk) **MAXIMUM DISTANCE FROM FOREST** (Squirrels, Marten): ? *no data on actual distances* STAND CONNECTIVITY ? *data insufficient*

Function and wildlife species associated with CWD-6	Log Decomposition Classes in which CWD-6 occurs most commonly	Critical features of CWD-6: Abundant suitable prey	Critical features of CWD-6: Position of prey within substrate and substrate condition
FUNCTION **Foraging:** Feeding substrates WILDLIFE SPECIES (*SBS, ESSF, ICH zones*) ■ Long-toed Salamander ◪ Pacific Treefrog (L?,S) ◪ Black-backed Woodpecker ?◪ Northern Flicker ◪ Pileated Woodpecker ◪ Winter Wren ?◪ or ☐ Dark-eyed Junco ◪ Common Shrew ◪ Pygmy Shrew ◪ Dusky Shrew ◪ Vagrant Shrew ◪ Deer Mouse ◪ Striped Skunk ◪ Black Bear ◪ Grizzly Bear ☐ Western Toad ?☐ Western Garter Snake ?☐ Common Garter Snake ?☐ Spruce Grouse (H?) ?☐ Blue Grouse (H) ?☐ Ruffed Grouse ?☐ or ◪ Downy Woodpecker (L?) ?☐ or ◪ Hairy Woodpecker ?☐ or ◪ Three-toed Woodpecker ?☐ Steller's Jay ?☐ or ◪ House Wren (L,S) (*rare*) ?☐ or ◪ Veery (L) ?☐ Swainson's Thrush ?☐ or ◪ Hermit Thrush ?☐ Nashville Warbler (S) ?☐ or ◪ Northern Waterthrush ?☐ Chipping Sparrow ?☐ Fox Sparrow (H?) ?☐ Song Sparrow (L?) ?☐ Lincoln's Sparrow ?☐ White-throated Sparrow ?☐ Golden-crowned Sparrow (H) ?☐ White-crowned Sparrow ☐ Water Shrew ☐ Southern Red-backed Vole ?☐ Northern Flying Squirrel ☐ Yellow-pine Chipmunk ?☐ Red Squirrel ?☐ Wolverine ?☐ Marten ?☐ Fisher ☐ Ermine ☐ Long-tailed Weasel ☐ Least Weasel (*rare*) ?☐ Mink	LOG DECOMPOSITION CLASSES **1, 2, 3, 4, 5** (**1** only for woodpeckers)	***Special Requirements:*** **Ants** (important prey of Northern Flicker, Pileated Woodpecker, bears) **Soft-bodied invertebrates, especially worms ?** (important prey of Long-toed Salamanders) *See Table 2-9 for a list of woodpecker prey species.*	POSITION OF PREY ***Reported foraging sites:*** **Inside the wood** **Between wood and bark** **Between wood and moss cover** **In the litter or humus layer accumulated around CWD** SUBSTRATE CONDITION **Uncharred CWD?** (Burning can render CWD less suitable for invertebrates, thus reducing prey abundance.) ***Special Requirement:*** **CWD with soft decayed wood, loose bark, or moss cover** (amphibians, shrews, rodents)

Critical features of CWD-6	
Location of the CWD	
All features are ***Special Requirements****.* IMMEDIATE SURROUNDINGS **Relatively dry sites** (*may not be critical* ?) (Deer Mouse) **Relatively moist sites** (Common and Vagrant Shrews) **Rich soils with low acidity** (*may not be critical* ?) (Vagrant Shrew) PROXIMITY TO SPECIFIC FOREST STANDS Stands with: **Multi-layered, relatively dense canopy and numerous large trees** (Pileated Woodpecker) **Forest with a dense, structurally diverse lower stratum**[15] (Winter Wren)	PROXIMITY TO OPEN AREAS OR EDGE **Proximity to forest from CWD in open areas:** ? *no data* General habitat: **Open areas interspersed with dense shrub thickets** (Striped Skunk) PROXIMITY TO WATER **Near temporary or permanent, quiet water bodies with shallow edges** (all amphibian species) **Near open water or wetlands** (Pygmy Shrew, Water Shrew [**adjacent** to water], Vagrant Shrew) MINIMUM STAND SIZE (Pileated Woodpecker): ? *no data* MAXIMUM DISTANCE FROM FOREST (Woodpeckers, Winter Wren, others ?): ? *no data on actual distances*

Footnotes Providing Additional Information for Tables 7-1 to 7-6 (Literature cited in the footnotes is shown at the end of the User's Guide)

1 Includes hibernation and thermo- and hygroregulation.

2 During periods when temperatures are colder than -20°C (local study [SBS zone]: Weir 1995).

3 For Marten, subnivean resting sites associated with wood (CWD or low cavities in or below standing trees) may be critical during periods of colder temperatures (mean observed air temperatures: -5.5°C, Buskirk et al. 1989). Fisher in the SBS biogeoclimatic zone used subnivean resting sites (all were CWD-associated) during periods when temperatures were colder than -20°C (Weir 1995).

4 Winter dens excavated into the ground appear to be critical for Black Bears in northern latitudes (e.g., Manitoba, Alberta). In more southern areas (e.g., Tennessee, Georgia) winter dens are often also found at or above ground level.

5 Marten use access points to enter subnivean resting sites or hunting areas.

6 Also not critical during dry seasons, but most species use CWD-1 for reproduction during spring, a potentially wet season.

7 In the SBS biogeoclimatic zone during winter, Marten tended to use areas in the 20–60% coniferous canopy closure classes (Lofroth 1993). Fishers in the SBS zone preferred areas in the 20–60% coniferous canopy closure classes, significantly so in winter, but also preferred areas with 20–40% deciduous canopy closure, significantly so in summer (Weir 1995).

8 Habitat of small mammal prey includes CWD-2, 4, 5, and 6. These Types are thus important also to the predators that rely on small mammals.

9 Soft material for burrowing often results from the presence of CWD: soft decaying wood, fine debris, and humus are generated by decaying CWD, and forest litter is trapped by CWD (i.e., CWD both facilitates burrow construction and acts as protective cover). Soft material also pertains to soft or sandy soils not related to presence of CWD (i.e., CWD serves only as protective cover).

10 Garter snakes often use non-woody substrates for CWD-2.

11 Red Squirrel middens are often associated with CWD (Gurnell 1984), although not necessarily CWD-2 (any other CWD located in coniferous forest may also be used ?). Apart from food caching, middens are used for resting/escape (especially in winter) and sometimes for reproduction.

12 Forest may be required because of reliance on hypogeous fungi.

13 Most nests of Townsend's Solitaire recorded in British Columbia were not actually associated with wood (Campbell et al. 1997). The most common nest sites (95% of 331 described sites) were cutbanks, sometimes sheltered by exposed tree roots and perhaps other CWD.

14 Many Wildlife Tree users occasionally nest or roost in cavities in stumps short enough (i.e., <1.3 m) to be considered CWD-3: ☐ Wood Duck (rare), ☐ Common Goldeneye, ☐ Barrow's Goldeneye, ☐ Bufflehead, ☐ Hooded Merganser, ☐ Common Merganser, ☐ American Kestrel, ?☐ or ◪ Northern Flicker, ☐ Tree Swallow, ☐ Violet-green Swallow, ☐ Black-capped Chickadee, ☐ Mountain Chickadee, ☐ Boreal Chickadee (rare ?), ☐ Chestnut-backed Chickadee (rare), ☐ Red-breasted Nuthatch, ☐ White-breasted Nuthatch (rare), ☐ Brown Creeper, ☐ House Wren (rare), ☐ Mountain Bluebird, ☐ European Starling (introduced), ☐ House Sparrow (introduced), ☐ Big Brown Bat, ☐ Silver-haired Bat, ☐ Western Long-eared Myotis, ☐ Little Brown Myotis, ☐ Long-legged Myotis, ?☐ or ◪ Southern Red-backed Vole, ☐ Bushy-tailed Woodrat, ☐ Yellow-pine Chipmunk, ?☐ Marten (subnivean), ☐ Ermine, ☐ Long-tailed Weasel, and ☐ Least Weasel (rare).

15 Lower-stratum diversity may be provided by shrubs, large CWD of various forms and at various stages of decomposition, and banks of creeks or ravines.

16 Long-toed Salamanders are not restricted to CWD during their spring migration.

17 When alternative cover (e.g., herb layer, leaved-out shrub layer, snow, or unfrozen duff) is sparse or absent.

18 In a local study (SBS zone), Long-toed Salamanders were frequently found in the tunnels formed between log, ground, and the moss-layer that extended over both (K. Ward and B. Chapman. 1995. Amphibians in clearcuts and forests in the Cariboo Forest Region. Unpubl. rep., B.C. Min. For., Williams Lake, B.C.).

TABLE 8 *Cross-reference summarizing the associations of wildlife species (occurring in the SBS, northern ESSF, and northern ICH biogeoclimatic zones) with the six Types of Coarse Woody Debris (CWD) listed in Table 6 and described in Tables 7-1 to 7-6*

■ = *Species that seem to be restricted to the Type or that appear to strongly prefer it*

◪ = *Species that use alternative Types (or habitat elements other than CWD, rocks, or cutbanks [see explanation of CWD on page 13]) for the same function, without apparent strong preferences*

□ = *Species that have been reported to use the Type occasionally*

	Types used for reproduction/resting			Types used for travel		Types used for foraging
Wildlife species using CWD	**CWD-1**	**CWD-2**	**CWD-3**	**CWD-4**	**CWD-5**	**CWD-6**
Amphibians						
Long-toed Salamander		■		■		■
Western Toad		◪				□
Pacific Treefrog		◪	◪			◪
Reptiles						
Rubber Boa		?◪ or ■		◪		
Western Garter Snake		■				?□
Common Garter Snake		■				?□
Birds						
Mallard	□		□			
Harlequin Duck	□		□			
Hooded Merganser	□		□			
Common Merganser	□		□			
Spruce Grouse	?□ or ◪					?□
Blue Grouse	◪					?□
Ruffed Grouse	◪					?□
Downy Woodpecker						?□ or ◪
Hairy Woodpecker						?□ or ◪
Three-toed Woodpecker						?□ or ◪
Black-backed Woodpecker						◪
Northern Flicker			?□ or ◪			?◪
Pileated Woodpecker						◪
Yellow-bellied Flycatcher			◪			
"Western Flycatcher" Complex			◪			
Steller's Jay						?□
House Wren			□			?□ or ◪
Winter Wren		□	■	□		◪
American Dipper	□		◪			
Townsend's Solitaire		□	■			
Veery						?□ or ◪
Swainson's Thrush						?□
Hermit Thrush		□	□			?□ or ◪
American Robin			□			
Nashville Warbler						?□
Northern Waterthrush			?■			?□ or ◪
Wilson's Warbler			?◪ or □			
Chipping Sparrow						?□
Fox Sparrow						?□
Song Sparrow			?◪ or □	?□		?□
Lincoln's Sparrow						?□
White-throated Sparrow						?□
Golden-crowned Sparrow						?□

TABLE 8 *Continued*

Wildlife species using CWD	Types used for reproduction/resting CWD-1	CWD-2	CWD-3	Types used for travel CWD-4	CWD-5	Types used for foraging CWD-6
White-crowned Sparrow						?□
Dark-eyed Junco		□	?◪ or □			?◪ or □
Additional Wildlife Tree Users[1]			□			
Mammals						
Common Shrew		■		◪		◪
Pygmy Shrew		■		◪		◪
Dusky Shrew		?■ or ◪		◪		◪
Water Shrew		?■ or ◪		◪		□
Vagrant Shrew		■		◪		◪
Snowshoe Hare	◪					
Southern Red-backed Vole		?■ or ◪	?□ or ◪	■		□
Long-tailed Vole		?■ or ◪		◪		
Meadow Vole		◪		?□ or ◪		
Heather Vole		■		?◪ or □		
Bushy-tailed Woodrat	◪	□	□		□	
Deer Mouse		◪	◪	◪		◪
Porcupine	◪					
Northern Flying Squirrel				?◪ or □	?◪ or ■	?□
Woodchuck	?□ or ◪					
Golden-mantled Ground Squirrel		?■ or ◪				
Yellow-pine Chipmunk		■	□	◪	?◪ or ■	□
Red Squirrel		◪		◪	■, ◪	?□
Meadow Jumping Mouse		◪		□		
Western Jumping Mouse		◪		□		
Coyote	?□ or ◪					
Gray Wolf	?□ or ◪					
Red Fox	◪					
Cougar	■					
Lynx	?■ or ◪				?□	
Bobcat	?■ or ◪				?□	
Wolverine	?◪ or ■					?□
River Otter	◪					
Marten	◪		?□		◪	?□
Fisher	■				□	?□
Striped Skunk	◪					◪
Ermine		◪	□	◪	□	□
Long-tailed Weasel	?□ or ◪	◪	□	?◪ or □	□	□
Least Weasel		◪	□	?◪ or □	□	□
Mink	?□ or ◪					?□
Black Bear	◪					◪
Grizzly Bear	□					◪
Additional Wildlife Tree Users[1]			□			

1 Many Wildlife Tree users occasionally nest or roost in cavities in stumps short enough (i.e., <1.3 m) to be considered CWD-3. See footnote 14 of Table 7 for a complete list of these species. Table 8 shows only those species individually that also use other Types of CWD.

TABLE 9 *The 78 vertebrate species[1] that use Coarse Woody Debris (CWD) for main[2] functions and have been recorded, or potentially occur, in the SBS, northern ESSF, and northern ICH biogeoclimatic zones. Species occurrence in these zones is based mainly on the* Checklist of Cariboo Birds *(Roberts and Gebauer 1992), Volumes 1 to 3 of* The Birds of British Columbia *(Campbell et al. 1990a, 1990b, 1997), and consultation with wildlife experts. Nomenclature and species codes are consistent with Cannings and Harcombe (1990).*

Use[3] of Coarse Woody Debris	Status[4]	English name (restrictions in distribution)[5]	Scientific name	Species code
Amphibians (3 species)				
●		**Long-toed Salamander**	*Ambystoma macrodactylum*	A-AMMA
●		**Western Toad**	*Bufo boreas*	A-BUBO
●		**Pacific Treefrog** (L?,S)	*Hyla regilla*	A-HYRE
Reptiles (3 species)				
●	Blue, rare	**Rubber Boa** (S)	*Charina bottae*	R-CHBO
●		**Western Garter Snake**	*Thamnophis elegans*	R-THEL
●		**Common Garter Snake**	*Thamnophis sirtalis*	R-THSI
Birds (35 species)				
❍		Mallard	*Anas platyrhynchos*	B-MALL
❍	rare	Harlequin Duck	*Histrionicus histrionicus*	B-HADU
❍		Hooded Merganser (L)	*Lophodytes cucullatus*	B-HOME
❍		Common Merganser (L)	*Mergus merganser*	B-COME
?❍or●		Spruce Grouse (H?)	*Dendragapus canadensis*	B-SPGR
●		**Blue Grouse** (H)	*Dendragapus obscurus*	B-BLGR
●		**Ruffed Grouse**	*Bonasa umbellus*	B-RUGR
?❍or●		Downy Woodpecker (L?)	*Picoides pubescens*	B-DOWO
?❍or●		Hairy Woodpecker	*Picoides villosus*	B-HAWO
?❍or●		Three-toed Woodpecker	*Picoides tridactylus*	B-TTWO
●		**Black-backed Woodpecker**	*Picoides arcticus*	B-BBWO
?●		**Northern Flicker**	*Colaptes auratus*	B-NOFL
●		**Pileated Woodpecker**	*Dryocopus pileatus*	B-PIWO
●	rare	**Yellow-bellied Flycatcher** (L,N)	*Empidonax flaviventris*	B-YBFL
●	rare	**"Western Flycatcher" Complex**[6] (Sh?)	*Empidonax* spp.	B-WEFL
?❍		Steller's Jay	*Cyanocitta stelleri*	B-STJA
?❍or●	rare	House Wren (L,S)	*Troglodytes aedon*	B-HOWR
●		**Winter Wren**	*Troglodytes troglodytes*	B-WIWR
?❍or●		American Dipper	*Cinclus mexicanus*	B-AMDI
●		**Townsend's Solitaire**	*Myadestes townsendi*	B-TOSO
?❍or●		Veery (L)	*Catharus fuscescens*	B-VEER
?❍		Swainson's Thrush	*Catharus ustulatus*	B-SWTH
?❍or●		Hermit Thrush	*Catharus guttatus*	B-HETH
❍		American Robin	*Turdus migratorius*	B-AMRO
?❍		Nashville Warbler (S)	*Vermivora ruficapilla*	B-NAWA
●		**Northern Waterthrush**	*Seiurus noveboracensis*	B-NOWA
?●		**Wilson's Warbler**	*Wilsonia pusilla*	B-WIWA
?❍		Chipping Sparrow	*Spizella passerina*	B-CHSP
?❍		Fox Sparrow (H?)	*Passerella iliaca*	B-FOSP
?●or❍		**Song Sparrow** (L?)	*Melospiza melodia*	B-SOSP
?❍		Lincoln's Sparrow	*Melospiza lincolnii*	B-LISP
?❍		White-throated Sparrow	*Zonotrichia albicollis*	B-WTSP
❍		Golden-crowned Sparrow (H)	*Zonotrichia atricapilla*	B-GCSP
?❍		White-crowned Sparrow	*Zonotrichia leucophrys*	B-WCSP
●		**Dark-eyed Junco**	*Junco hyemalis*	B-DEJU

Use[3] of Coarse Woody Debris	Status[4]	English name (restrictions in distribution)[5]	Scientific name	Species code
Mammals (37 species)				
●		**Common Shrew**	*Sorex cinereus*	M-SOCI
●		**Pygmy Shrew**	*Sorex hoyi*	M-SOHO
●		**Dusky Shrew**	*Sorex monticolus*	M-SOMO
●		**Water Shrew**	*Sorex palustris*	M-SOPA
●		**Vagrant Shrew**	*Sorex vagrans*	M-SOVA
●		**Snowshoe Hare**	*Lepus americanus*	M-LEAM
●		**Southern Red-backed Vole**	*Clethrionomys gapperi*	M-CLGA
●		**Long-tailed Vole**	*Microtus longicaudus*	M-MILO
●		**Meadow Vole**	*Microtus pennsylvanicus*	M-MIPE
●		**Heather Vole**	*Phenacomys intermedius*	M-PHIN
●		**Bushy-tailed Woodrat**	*Neotoma cinerea*	M-NECI
●		**Deer Mouse**	*Peromyscus maniculatus*	M-PEMA
●		**Porcupine**	*Erethizon dorsatum*	M-ERDO
●		**Northern Flying Squirrel**	*Glaucomys sabrinus*	M-GLSA
?❍or●		Woodchuck	*Marmota monax*	M-MAMO
●		**Golden-mantled Ground Squirrel** (H)	*Spermophilus lateralis*	M-SPLA
●		**Yellow-pine Chipmunk**	*Tamias amoenus*	M-TAAM
●		**Red Squirrel**	*Tamiasciurus hudsonicus*	M-TAHU
●		**Meadow Jumping Mouse**	*Zapus hudsonius*	M-ZAHU
●		**Western Jumping Mouse**	*Zapus princeps*	M-ZAPR
?❍or●		Coyote	*Canis latrans*	M-CALA
?❍or●		Gray Wolf	*Canis lupus*	M-CALU
●		**Red Fox**	*Vulpes vulpes*	M-VUVU
●		**Cougar**	*Felis concolor*	M-FECO
●		**Lynx**	*Lynx canadensis*	M-LYCA
●		**Bobcat**	*Lynx rufus*	M-LYRU
●	Blue	**Wolverine**	*Gulo gulo*	M-GUGU
●		**River Otter**	*Lontra canadensis*	M-LOCA
●		**Marten**	*Martes americana*	M-MAAM
●	Blue	**Fisher**	*Martes pennanti*	M-MAPE
●		**Striped Skunk**	*Mephitis mephitis*	M-MEME
●		**Ermine**	*Mustela erminea*	M-MUER
?●		**Long-tailed Weasel**	*Mustela frenata*	M-MUFR
●	rare	**Least Weasel**	*Mustela nivalis*	M-MUNI
?❍or●		Mink	*Mustela vison*	M-MUVI
●		**Black Bear**	*Ursus americanus*	M-URAM
●	Blue	**Grizzly Bear**	*Ursus arctos*	M-URAR

1 Many Wildlife Tree users occasionally nest or roost in cavities in stumps short enough (i.e., <1.3 m) to be considered CWD-3 (see footnote 14 of Table 7). These species are not shown here unless they also use other Types of CWD.

2 Additional species use Coarse Woody Debris for other functions (see Addendum to Table 6).

3 ● = Obligate or frequent user of Coarse Woody Debris (52 species including "?●or❍") (comprises all species marked ■ or ◪ in at least one Type in Tables 7-1 to 7-6)
❍ = Occasional user of Coarse Woody Debris (26 species including "?❍or●")

4 Blue = Blue-listed in British Columbia (BC Environment 1998)
rare = rare in the SBS as well as in northern parts of the ESSF and ICH biogeoclimatic zones

5 See page 16–17 for a legend of restrictions in species distribution.

6 Includes Pacific-slope Flycatcher (*Empidonax difficilis*) and Cordilleran Flycatcher (*E. occidentalis*). For further information on taxonomy and status of these species, see Volume 3 of *The Birds of British Columbia* (Campbell et al. 1997).

TABLE 10 *Research needs relevant to Coarse Woody Debris (CWD) management. Descriptions of very important knowledge gaps are shown in bold print. Only the main topics are shown in this table. Other specific knowledge gaps are indicated by question marks throughout Tables 7-1 to 7-6. The identification of research needs is current only to 1995. Some of the listed topics are being addressed through research projects initiated since then.*

General topic	Description of research needs
LEVELS OF CWD RECRUITMENT IN NATURAL AND IN MANAGED FORESTS	• **Natural abundance and distribution of each Type of CWD in different ecosystems, in stands at different successional stages, and in stands that have been subject to different natural disturbance regimes**
	• **Time frame of development and usable period of each CWD Type in each of the above stand types**
	• **Comparison of natural levels and time frames of CWD recruitment with those in managed forests, and comparison of different management practices that affect CWD recruitment (e.g., silviculture system, rotation length, stand tending practices, and timber harvest practices affecting slash generation/slash location).** Of special interest are CWD-1 (large concealed spaces) and perhaps CWD-3 (includes upturned rootmasses), which are most likely to become uncommon in managed forests.
	• **Effects of post-logging site preparation (especially broadcast burning and mechanical treatments common in the SBS, ESSF, and ICH zones) on CWD abundance and distribution, and specifically on the critical CWD features identified in Tables 7-1 to 7-6 (including CWD surroundings, microclimate, and invertebrate prey). If possible, comparison of actual use of treated and untreated CWD by the wildlife species associated with the various CWD Types.**
SIZES OF FOREST FRAGMENTS AND HABITAT PATCHES	• **For CWD users that need tree cover around CWD: Required sizes of forest stands in fragmented woodlands**
	• For CWD users that need specific habitat around CWD: Required sizes of these patches of specific habitat (*Species shown in Tables 7-1 to 7-6, last column: Immediate Surroundings*)
TRAVEL CORRIDORS	• **Critical features and number/distribution of the treed travel corridors that are required by some CWD users** (*Species shown in Tables 7-1, 7-3, 7-5, last column: Stand Connectivity*)
	• Distance between forest fragments beyond which treed travel corridors are required by the above CWD users
DISTANCE TO OPEN AREAS OR TO FOREST	• **For CWD users primarily associated with forest: Maximum distance of CWD used in open areas from nearest forested area**
	• For CWD users associated with open areas or forest/nonforest edge: maximum distance of CWD used in forest from nearest open (unforested) area (*Species shown in Tables 7-1 to 7-6, last column: Proximity to Open Areas or Edge*)
QUANTITATIVE DESCRIPTIONS OF THE CRITICAL FEATURES OF CWD	• Actual measurements of the dimensions, microclimate, and degree of concealment of CWD-associated spaces that are used by wildlife, and of the sizes of CWD used by wildlife. Statistical use/availability assessments revealing actual wildlife preferences regarding these critical features would be especially valuable.
HABITAT REQUIREMENTS OF INDIVIDUAL WILDLIFE SPECIES	• **Habitat requirements of the following obligate or frequent CWD users that occur in the SBS, ESSF, or ICH zones of north-central B.C. are in particular need of local field study in that region: Long-toed Salamander (microhabitat features), Rubber Boa, Yellow-bellied Flycatcher, Northern Waterthrush, Lynx, Bobcat, Marten** (*information needed for the three preceding species*: **maternal dens and their surrounding habitat**).

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Attachment C

United States Department of the Interior

Fish and Wildlife Service

Montana Ecological Services Office
585 Shephard Way, Suite 1
Helena, Montana 59601-6287

In Reply refer to:
File:M19 Bitterroot National Forest
06E11000-2021-F-0020 Bitterroot Forest Plan Amendment- Grizzly Bears

July 8, 2021

Matthew Anderson, Forest Supervisor
Bitterroot National Forest
1801 North First Street
Hamilton, Montana 59840

Dear Mr. Anderson:

The U.S. Fish and Wildlife Service (Service) has reviewed your October 6, 2020 biological assessment regarding the effects of the continued implementation of the Bitterroot National Forest Plan (Forest Plan), with the proposed Forest Plan Amendment regarding elk standards and the Forest Travel Plan, on the Bitterroot National Forest (Forest). The biological assessment analyzed the effects of the Forest Plan on the federally listed grizzly bear (*Ursus arctos horribilis*). The Forest made a determination of *may affect, likely to adversely affect* for grizzly bears. Additional information was received through January 21, 2021.

The attached biological opinion addresses the effects of the Forest Plan on the listed grizzly bear, and is based on information provided for this action in the biological assessment prepared by Justin Martens, Wildlife Biologist. The biological opinion was prepared in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). A complete project file of this consultation is on file at the Service's Montana Field Office.

Thank you for your continued assistance in the conservation of endangered, threatened, and proposed species. If you have questions or comments related to this consultation, please contact Carly Lewis at (406) 329-3091 or carly_lewis@fws.gov.

Sincerely,

for Jodi L. Bush
Office Supervisor

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

BIOLOGICAL OPINION

on the

Effects of Continued Implementation of the Bitterroot National Forest Plan, Travel Management Plan, and Proposed Elk Amendment on Grizzly Bears

Agency: U.S. Department of Agriculture
Forest Service
Bitterroot National Forest
Hamilton, Montana

Consultation Conducted by: U.S. Fish and Wildlife Service
Montana Field Office
Helena, Montana

Date Issued: July 8, 2021

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I. INTRODUCTION

This biological opinion was prepared by the U.S. Fish and Wildlife Service (Service) and analyzes the effects of the continued implementation of the Bitterroot National Forest Plan (Forest Plan) on the Bitterroot National Forest (Forest) on grizzly bears (*Ursus arctos horribilis*). Formal consultation was initiated on October 6, 2020, the date the Service received the biological assessment (U.S. Forest Service 2020). We continued to receive information regarding the Forest Plan through January 20, 2021.

Section 7(b)(3)(A) of the Endangered Species Act of 1973, as amended (Act) requires that the Secretary of Interior issue biological opinions on federal agency actions that may adversely affect listed species or critical habitat. Biological opinions determine if the action proposed by the action agency is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. Section 7(b)(3)(A) of the Act also requires the Secretary to suggest reasonable and prudent alternatives to any action that is found likely to result in jeopardy or adverse modification of critical habitat, if any has been designated. If the Secretary determines no jeopardy, then regulations implementing the Act further require the Director to specify "reasonable and prudent measures" and "terms and conditions" necessary or appropriate to minimize the impact of any incidental take resulting from the action(s).

Consultation History

In the fall of 2017, the Service determined that grizzly bears may be present on the portion of the Forest east of Highway 93 and added them to the Forest's list of species that may be present. Based on that information, informal consultation began between the Forest and the Service on the effects of the Forest Plan on grizzly bears. On March 15, 2019, the Forest submitted a letter to the Service requesting re-initiation of consultation on the Forest Plan in order to address impacts to grizzly bears given the change of status to 'may be present' on that portion of the Forest. On May 13, 2019, we received a final biological assessment (dated May 7, 2019) and request for consultation on the effects of the Forest Plan on grizzly bears (U.S. Forest Service 2019). We issued a biological opinion on the effects of the Forest Plan on grizzly bears on July 1, 2019 that covered effects to bears on the eastern portion of the Forest.

The ESA regulations for interagency cooperation requires federal agencies to request reinitiation of consultation (50 CFR § 402.16) in four different situations where the federal agency retains discretionary involvement or control over the action, or the action is authorized by law and:

1) the amount or extent of taking specified in the incidental take statement is exceeded;
2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
4) a new species is listed, or critical habitat is designated that may be affected by the identified action.

Grizzly bears have since been detected in a few areas on the western portion of the Forest that were not previously considered in the 2019 biological opinion (see details below). These sightings have prompted the Fish and Wildlife Service to identify additional areas where grizzly bears "may be present" on the Forest, and to clarify that bears making their way onto the Forest are not considered part of an experimental population. In a letter dated January 21, 2020, the Service determined that:

> "the current Endangered Species Act (ESA) section 10(j) rule for grizzly bears in the Bitterroot Grizzly Bear Experimental Population Area (BGBEPA), 50 CFR § 17.84(1), does not apply to grizzly bears that have dispersed into the BGBEPA on their own…[and]…grizzly bears that are present in the BGBEPA are not covered by the 10(j) rule and are considered threatened under the ESA. This means that ESA section 7 consultation obligations apply to proposed federal agency actions that may affect grizzly bear in the BGBEPA (U.S. Department of the Interior, Fish and Wildlife Service 2020b)."

Because the 2019 biological opinion did not consider effects to grizzly bears on the western portion of the Forest, the Forest contacted the Service in February, 2020, regarding the need to reinitiate consultation on the Forest Plan to consider grizzly bears on all portions of the Forest in Montana.

Concurrently, the Forest began pursuing a Forest Plan Amendment to address what it determined were "antiquated standards" regarding elk habitat management on the Forest. During discussions in early consultation regarding this amendment, the two agencies decided it would be both efficient and appropriate to include the Forest Plan Amendment (hereafter, elk amendment) into the reinitiation. The agencies also realized in early consultation discussions that they were remiss in not including the Travel Management Plan for the Forest in the 2019 consultation. The Forest completed the Travel Management Planning Project (hereafter Travel Plan) in 2016, when grizzly bears were still thought to be absent from the Forest U.S. Department of Agriculture 2016a, 2016b).

Thus, this biological opinion supersedes and replaces our 2019 biological opinion on the effects to grizzly bears of the Bitterroot Forest Plan, including the elk amendment and the Travel Plan. The biological assessment (U.S. Forest Service 2020), information in our files, as well as additional information and discussions throughout the informal and formal consultation process were used in the preparation of this biological opinion. A complete project file of this consultation is on file at our office.

Previous consultations on the Forest Plan and Travel Management Plan considered effects to other listed species on the Forest, including Canada lynx (*Lynx canadensis*), bull trout (*Salvelinus confluentus*) and designated critical habitat for bull trout. Canada lynx were previously consulted on for the Forest Plan (Northern Rockies Lynx Management Direction amended to the Forest Plan, U.S. Department of Agriculture 2007a and 2007b) and the Travel Management Planning Process (U.S. Department of Agriculture 2013, U.S. Department of the Interior, Fish and Wildlife Service 2013). Bull Trout were previously consulted on for the Forest Plan (INFISH, U.S. Department of Agriculture 1995) and the Travel Management Planning Project (U.S. Department of Agriculture 2010, U.S. Department of the Interior, Fish and Wildlife Service 2010). We acknowledge that the Forest determined the proposed Forest Plan amendment will have no effect on Canada lynx, bull trout, or designated critical habitat for bull trout, and thus the agencies do not need to consult on these species.

II. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the continued implementation of the 1987 Forest Plan, including the proposed amendment regarding elk habitat. The proposed action also includes the continued implementation of the Bitterroot National Forest Travel Plan (U.S. Forest Service 2016a, 2016b).

Forest Plan
The Forest Plan is the principle long-range guidance document for the Forest, providing direction for project and activity decision making. The Forest Plan provides an integrated plan for land and resource management, articulates goals and objectives, provides the kinds of uses that are suitable for areas of a national forest, management standards and guidelines that apply to different kinds of activities, and the designation of special areas like Research Natural Areas.

For information on Forest Plan direction that may assist in the management of grizzly bears, refer to Appendix B of the biological assessment (U.S. Forest Service 2020). The Forest Plan is considered a framework programmatic action. It does not authorize, fund, or carry out an action but provides direction for future actions that may be authorized, funded, or carried out by the Forest. Therefore, any action subsequently authorized, funded, or carried out under the Forest Plan, will be addressed in subsequent section 7 consultations, as appropriate. If a proposed project is not consistent with the Forest Plan, the project cannot proceed as proposed unless the plan is amended so that the project is consistent with the plan. Activities subsequently authorized, funded, or carried out under the Forest Plan that may affect grizzly bears are described in detail in the biological assessment, which is hereby incorporated by reference (U.S. Forest Service 2020). The Forest estimates that the life of the current Forest Plan is approximately 10 more years.

Elk Amendment
The Forest Plan includes plan components related to elk habitat management during project planning. The Forest proposes to amend these components with new desired conditions, goals, and guidelines, which will remove existing standards and introduce new components. Part of the original standards pertain to motorized access management, which influences habitat effectiveness for elk as well as habitat for grizzly bears. The amendment will complement the Bitterroot National Forest Travel Plan (U.S. Department of Agriculture 2016a, 2016b).

The proposed amendment will provide the Forest with greater flexibility for managing a mosaic of successional stages to support elk, and evaluating and integrating new science regarding elk disturbance in coordination with Montana Fish, Wildlife, and Parks (MTFWP). The full Amendment language clarifies the substitutions and deletions from the current standards to the new components (U.S. Forest Service 2020, Appendix C).

Travel Plan
The Forest completed a Travel Management Plan in 2016, before grizzly bears were present on the Forest (U.S. Department of Agriculture 2016a, 2016b). The Travel Plan only includes portions of the Forest that are within Montana, and addresses both non-winter and over-snow motorized vehicle use. The term “winter” generally refers to the period beginning around December 20–21 and ending around March 19–21 (U.S. Forest Service 2020, p. 6). The following brief synopsis summarizes some changes that were made by the decision:

1) Decrease by 51 miles (3.5 percent) the miles of roads designated open to highway-legal vehicles, both yearlong and seasonally.
2) Decrease by 74 miles (67 percent) the miles of double-track trails designated open to vehicles 50 inches or less in width, yearlong, from 110 miles to 36 miles. Increase by 9 miles (1.5 percent) the miles of double-track trails designated open to vehicles 50 inches or less in width, seasonally.
3) Decrease by 291 miles (88 percent) the miles of single-track trails designated open to motorcycles, yearlong, from 330 miles to 39 miles. Increase by 42 miles (55 percent) the miles open seasonally to motorcycles, from 78 miles to 121 miles.
4) Authorize 30 miles of existing unauthorized routes, including19 miles of double-track trails and 11 miles for use as single-track trails (10 miles seasonally, and 1 mile open yearlong).
5) Decrease the areas designated open to snowmobile use by 205,141 acres (27 percent).
6) Motorized/mechanical transport, including bicycles, is prohibited in the Selway-Bitterroot recommended wilderness area and in the Sapphire and Blue Joint wilderness study areas, for both summer and over-snow use.
7) Game retrieval using motorized means off designated routes is not allowed.

While some of these actions only required administrative changes, and thus we able to be accomplished right away, other actions require on-the-ground changes as projects are implemented on the Forest. The Travel Management Plan Record of Decision stated "The physical treatment of closed routes, through decommissioning or placing in long-term storage, will take future administrative access needs, including fire suppression and timber management, into consideration, and will be analyzed in separate, site-specific NEPA projects and decisions when applicable" (U.S. Forest Service 2016b). The Environmental Baseline for this biological opinion incorporates all on-the-ground changes that have been made to date.

III. STATUS OF THE SPECIES /CRITICAL HABITAT DESCRIPTION

A. Range-Wide Status of the Species

Currently, all grizzly bears in the lower-48 states are protected as threatened. For information on the status of grizzly bears, including species description, life history, and range-wide status and distribution, refer to the Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993), the Grizzly Bear 5-Year Review (U.S. Fish and Wildlife Service 2011b), the grizzly bear recovery program 2019 annual report (U.S. Fish and Wildlife Service 2020), the NCDE Grizzly Bear conservation strategy (NCDE Subcommittee 2000), Grizzly bear demographics in the NCDE (Costello et al. 2016), NCDE grizzly bear population monitoring team annual report 2019 (Costello and Roberts 2020), the Greater Yellowstone Ecosystem conservation strategy (U.S. Fish and Wildlife Service 2016), the Yellowstone Grizzly Bear Investigations 2018 (van Manen et al. 2019), the interagency grizzly bear study team 2019 annual report summary (IGBST 2020), the Cabinet-Yaak Grizzly Bear Recovery Area 2019 Research and Monitoring Progress Report (Kasworm et al. 2020a), Density, distribution, and genetic structure of grizzly bears in the Cabinet-Yaak Ecosystem (Kendall et al. 2016), and the Selkirk Mountains Grizzly Bear Recovery Area 2019 Research and Monitoring Progress Report (Kasworm et al. 2020b). These documents (referenced here), include the best available science regarding the status and distribution of grizzly bears and are incorporated by reference.

B. Status of Critical Habitat

No critical habitat has been designated for grizzly bears.

IV. ENVIRONMENTAL BASELINE

Under the provisions of section 7(a)(2), when considering the "effects of the action" on listed species, the Service is required to consider the environmental baseline. Regulations implementing the Act (50 C.F.R. § 402.02 as revised by 84 FR 44976 in 2019) define the environmental baseline as the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in progress. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

A. Action Area

The action area is the portion of the administrative boundary of the Bitterroot National Forest that falls within the state of Montana (U.S. Forest Service 2020, Appendix A, Map 1). Within the 1,195,544 acre action area (approximately 72% of the total Bitterroot National Forest), private and state lands are interspersed with National Forest System (NFS) lands (see Table 1 in the BA, p.8-9, U.S. Forest Service 2020). Only the NFS lands in the action area are included in the analysis of direct and indirect effects, whereas all land ownerships within the action area are included in the analysis of cumulative effects. The action area spans two mountain ranges in west-central Montana: the Bitterroot Mountains to the west and the Sapphire Mountains to the east of the Bitterroot River valley, bisected by highway 93. Elevations range from 3,200 feet at the north end of the Bitterroot Valley to the 10,157 foot summit of Trapper Peak on the south.

A portion of the action area (21%) falls within the Bitterroot Ecosystem Recovery Zone. The remained is outside of any areas designated for management of grizzly bears by any Recovery Plan or conservation strategies. The BA describes approximately 34% of the action area falls within designated Wilderness, Wilderness Study Areas, and Inventoried Roadless Areas. The Forest also manages 1,179 acres of scattered Forest ownership parcels in the valley bottom that are not part of the action area because they are spatially disconnected from the contiguous Forest land ownership, completely surrounded by private lands, and do not contain enough habitat to support grizzly bear persistence (only 1 parcel contains more than 80 acres).

The Forest divided the action area into 11 Grizzly Bear Analysis Units (GBAUs) for the purpose of analyzing effects to individual grizzly bears at a spatial scale that is biologically relevant to the bear (BA Table 2 and Appendix A, Map 6; U.S. Forest Service 2020). These analysis areas encompass an area approximately the size of an annual home range of an adult female grizzly bear. The areas do not represent actual home ranges, nor do they represent management units for grizzly bears. They simply provide a method for analyzing effects to grizzly bears consistently across the action area. Grizzly bears have not necessarily been verified in each of these analysis areas nor is it implied that occupancy is expected or required. The GBAUs include the suite of seasonal habitats that could support grizzly bear reproduction, although the western GBAUs are restricted in elevation due to the Bitterroot Ecosystem Recovery Zone boundary lying directly adjacent to the west, encompassing the higher elevations. All GBAUs include some higher elevation, steeper terrain that could provide denning habitat, as well as xeric forests and grasslands at lower elevations, and more mesic, productive forest types and wet meadows that are more likely to provide spring and fall food resources. Because the Service has not defined Bear Management Units within the Recovery Zone, the BA analyzed effects of the Forest Plan, Travel Management Plan, and Amendment within the entire portion of the Recovery Zone in Montana that is managed by the Bitterroot National Forest (U.S. Forest Service 2020, Appendix A, Map 6).

B. Status of the Species within the Action Area

This section focuses on the status of grizzly bears occurring within the action area. Recent information indicates only a few verified grizzly bear on or near the Bitterroot National Forest (U.S. Forest Service 2020, p. 13). The verified occurrences have occurred infrequently and not across all portions of the action area. However, we expect that additional grizzly bears may inhabit more portions of the action area over the life of the Forest Plan as grizzly bear populations in both the Yellowstone Grizzly Bear Ecosystem and the Northern Continental Divide Ecosystem continue to expand their range.

The number of grizzly bears using the action area is very low and numbers will increase relatively slowly over time. This is especially true for female grizzly bears. As described in Proctor et al. (2012), males move more frequently and over longer distances than females. Males have large home ranges and establish home ranges nearly three times further away from their mother's home ranges than do female offspring. Females usually establish smaller home ranges than males that overlap with their mother's home range (Waser and Jones 1983; Schwartz et al. 2003). In doing so, they generally disperse over much shorter distances than male grizzly bears (McLellan and Hovey 2001; Proctor et al. 2004). Therefore, female dispersal is a multi-generational process where females must live year-round in an area, successfully reproduce, and offspring disperse into adjacent, unoccupied habitat. Thus, female grizzly bear presence in the action area is likely to increase slowly over time.

C. Factors Affecting Species Environment within the Action Area

This section identifies and describes key areas of Forest management that affect the grizzly bears' environment. These factors include access management, attractant management and developed sites, livestock management, vegetation management, fire management, and oil and gas leasing. General impacts of these factors will be discussed in more detail in the '*Effects of the Action'* section below.

1. Access Management

Wheeled Motorized Access

Motorized access protects secure habitat, which is important to the survival and reproductive success of grizzly bears, especially adult female grizzly bears (Mattson et al. 1987, pp.18-19; IGBC 1994, p. 1). Grizzly bear habitat security is primarily achieved by managing motorized access which: (1) minimizes human interaction and reduces potential grizzly bear mortality risk; (2) minimizes displacement from important habitats; (3) minimizes habituation to humans; and (4) provides habitat where energetic requirements can be met with limited disturbance from humans (Mattson et al. 1987; McLellan and Shackleton 1 88; McLellan 1989; Mace and Manley 1993; Mace et al. 1996; Wakkinen and Kasworm 1997).

Recent research conducted on grizzly bears in Alberta, British Columbia assessed the impact of linear road density on grizzly bears. Boulanger and Stenhouse (2014) found strong spatial gradients in grizzly bear population trends based upon road linear density. Further, the authors identified threshold values for linear road densities associated with desired grizzly bear population outcomes. In their study, most bears occurred in areas with road densities of 2.4 mi/mi^2 (1.5 km/km^2) or less. Adult females occupied habitat with road densities of 2.0 mi/mi^2 (1.25 km/km^2) or less. They recommended that in the core conservation area in Alberta where this research was conducted, road densities below 1.2 mi/mi^2 (0.75 km/km^2) should allow for survival rates of females with dependent offspring high enough to ensure an increasing population (ibid. at p. 18).

Table 1. Linear miles and density of open and total motorized routes within Grizzly Bear Analysis Units (GBAUs) on the Bitterroot National Forest.

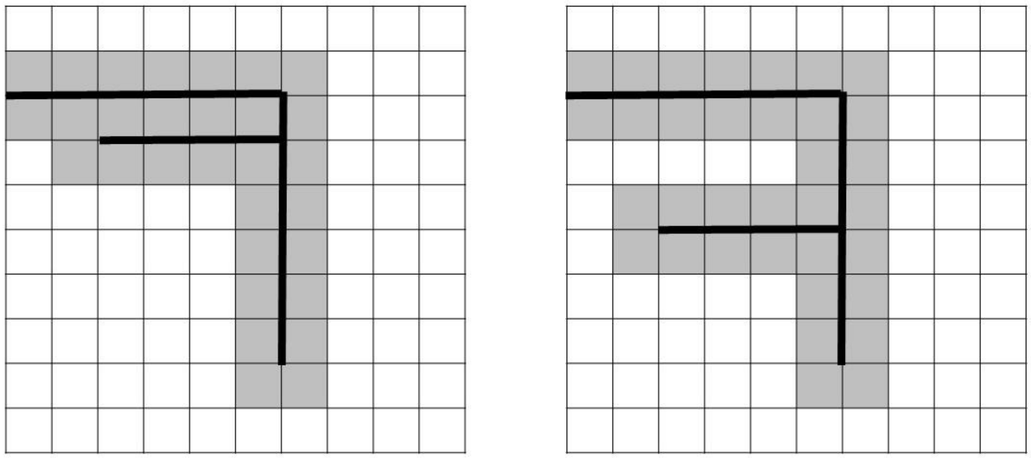
Area/GBAU Name	Square Miles	Linear Route Miles of Total Motorized Routes	Linear Route Density of Total Routes (miles/mile^2)	Linear Route Miles Open to Public Use Only	Linear Route Density of Open Routes (miles/mile^2)
Total Action Area	**1,484.9**	**3,256.0**	**2.2**	**2,567.3**	**1.7**
Burnt Fork Bitterroot River GBAU	156.5	329.4	2.1	260.9	1.7
Lost Horse Creek GBAU	137.7	182.0	1.3	164.9	1.2
Lower Bitterroot River GBAU	75.2	149.2	2.0	105.5	1.4
Lower East Fork Bitterroot River GBAU	138.5	385.2	2.8	306.6	2.2
Lower West Fork Bitterroot River GBAU	158.5	438.2	2.8	360.3	2.3
Skalkaho Creek GBAU	101.8	192.5	1.9	163.8	1.6
Sleeping Child Creek GBAU	151.0	569.7	3.8	383.7	2.5
Upper East Fork Bitterroot River GBAU	164.2	275.3	1.7	210.1	1.3
Upper West Fork Bitterroot River East GBAU	165.5	299.3	1.8	237.4	1.4
Upper West Fork Bitterroot River West GBAU	145.1	216.5	1.5	180.8	1.2
Warm Springs GBAU	90.9	218.7	2.4	191.7	2.1

The Forest provided information regarding linear route density within each GBAU and in the Recovery Zone (**Error! Reference source not found.**). Linear route density for open motorized routes averages 1.7 mi/mi2 across the entire action area, and ranges from 1.2-2.5 mi/mi^2 for any given GBAU. Total linear route density is slightly higher, at 2.2 on average across the entire action area, ranging from 1.3 to 3.5 mi/mi^2 for the individual GBAUs. Within the Recovery Zone portion of the action area, however, liner route densities are well below 1.0 mi/mi^2.

Linear route density information is not directly comparable to the "moving windows" analysis that has been used in some research (e.g. Mace et al. 1996, Wakkinen and Kasworm 1997) and was used to set standards for access management on portions of some National Forests that grizzly bear Recovery Zones. Rather, linear route density is a simple calculation of the linear distance of roads in an analysis area, divided by the total size of the analysis area. While some research has examined linear route densities in relation to grizzly bear populations, linear road density values for grizzly bear selection that are reported in the literature (e.g. Mace and Manley 1993, Boulanger and Stenhouse 2014) are only applicable when they are compared to road densities calculated at a similar scale. Furthermore, while linear route density indicates the total amount of roads in the action area, it does not present a spatial depiction of where routes occur. For example, portions of the analysis area may have high route densities, even within the analysis areas with lower overall linear route densities. Likewise, some portions of analysis areas may have low route densities or even no motorized routes, even within the analysis areas with higher linear route densities).

Although road density provides a useful threshold to describe human-caused effects to grizzly bears based on existing literature, road density alone fails to consider traffic volume, lethality (i.e., the tendency for people to kill bears), proximity to forage resources and how road placement affects habitat patch size (Proctor et al. 2020, pp. 25-26). For instance, even in a bear management unit with overall low road density, there may be patches of high road density interspersed with patches of low road density or even unroaded areas. In these areas, measures of secure habitat may present a more accurate depiction of the spatial mix of motorized routes and secure habitat (Figure 1).

Figure 1. Simplistic example of a 5% decrease in secure habitat while miles of linear routes, and thus linear route density, stay the same. Clear squares represent secure habitat, shaded squares represent non-secure habitat around roads or motorized routes (dark black lines).



In the Yellowstone ecosystem, road densities and the amount of secure habitat within female home ranges had a large influence on their survival (Schwartz et al. 2010). Both road density and the proportion of secure habitat contributed different yet important components influencing survival: road density had more influence on survival as the proportion of secure habitat within female home ranges decreased.

Therefore, the Service also requested that the Forest provide information regarding the amounts of secure habitat within each GBAU. Secure habitat provides an indication of the spatial mix of motorized routes, in relation to areas outside the influence of motorized routes (for example, see Figure 7 in Proctor et al. 2020, p. 26.). Studies have shown that female grizzly bears selected for, and survived better in, areas with greater secure habitat (review in Proctor et al. 2020, p. 25-26; Mace et al. 1996, p. 1,400; Wakkinen and Kasworm 1997, p. 20; Gibeau et al. 2002, p. 126; Schwartz et al. 2010, pp. 659-660).

Secure habitat is generally defined as the area outside the zone of influence of high levels of human disturbance. Most studies (reviewed in Proctor et al. 2020) have used 500 meters as the zone of influence around roads and motorized trails. Some studies have then further defined secure habitat by using a minimum patch size (e.g. Schwartz et al. 2010 used 10 acres; Mace et al. 1996 showed greater use in patches of secure habitat >2,500 acres). As described in Appendix F of the BA (U.S. Forest Service 2020), no current research on grizzly bear habitat use exists for the Bitterroot Ecosystem to inform a minimum size patch of secure habitat that grizzly bears might use. Although larger, less fragmented patches of secure habitat are likely the ideal for a grizzly bear, even a small patch of secure habitat may afford a grizzly bear a valuable space to avoid the effects of motorized routes and to move through or find valuable habitat in the area, and thus may be important for connectivity. Therefore, the Forest chose to use a minimum patch size of just 1 acre when identifying existing secure habitat.

Likewise, due to limitations with the current motorized access data in portions of the action area and in order to be conservative when analyzing effects, the Forest buffered all known existing routes (excluding decommissioned routes) to identify secure habitat. As described in the BA (U.S. Forest Service 2020, p. 16 and Appendix F), the estimates of secure habitat (Table 2) may underestimate actual secure habitat that exists on the ground because some routes that may be physically impassable to motor vehicle use were buffered and excluded from secure habitat, as were non-NFS lands. The Forest will make corrections to this existing condition baseline in future project consultations if other routes are discovered that are currently not captured in the Forest GIS database. Newly discovered roads may or may not affect the existing amount of secure habitat depending on their location.

Table 2. Secure habitat by GBAU and within the Bitterroot Ecosystem on the Bitterroot National Forest lands in Montana.

Area	Total Acres	Secure Habitat	% Secure Habitat by Area
Total Action Area	**1,195,992**	**627,205**	**52%**
Bitterroot Ecosystem within Montana	245,677	244,737	100%
Total for all GBAUs	**950,315**	**382,468**	**32%**
Burnt Fork Bitterroot River GBAU	100,140	32,580	33%
Lost Horse Creek GBAU	88,114	50,150	57%
Lower Bitterroot River GBAU	48,107	20,135	42%
Lower East Fork Bitterroot River GBAU	88,665	12,662	14%
Lower West Fork Bitterroot River GBAU	101,437	35,032	35%
Skalkaho Creek GBAU	65,126	29,548	45%
Sleeping Child Creek GBAU	96,619	13,568	14%
Upper East Fork Bitterroot River GBAU	105,094	62,356	59%
Upper West Fork Bitterroot River East GBAU	105,946	46,621	44%
Upper West Fork Bitterroot River West GBAU	92,892	57,980	62%
Warm Springs GBAU	58,175	21,836	38%

Almost the entire portion of the Bitterroot Ecosystem (Recovery Zone) that is within the portion of the Bitterroot National Forest in Montana offers secure habitat for grizzly bears. This amount of secure habitat far exceeds amounts found in most Bear Management Units or subunits in other Recovery Zones, and thus offers exceptional secure habitat for grizzly bears within the Recovery Zone.

Outside of the Recovery Zone, amounts of secure habitat vary by GBAU. Some of the GBAUs with highest road densities, not surprisingly, also have the lowest amounts of secure habitat (e.g. Lower East Fork Bitterroot River and Sleeping Child Creek GBAUs). However, the Lower West Fork Bitterroot River GBAU has nearly 20% more secure habitat than the Lower East Fork, despite having nearly the same linear road densities. Thus showing that road densities are only one metric to use for assessing suitability, but road densities do not perfectly align with secure habitat for grizzly bears.

The GBAUs with highest amounts of secure habitat include Upper West Fork Bitterroot River West, Upper East Fork Bitterroot, and Lost Horse Creek. These are the GBAUs with the lowest linear road densities, as well. The secure habitat amounts in these GBAUs are similar to amounts shown in northwest Montana to support female grizzly bear home ranges. For example, Mace et al. (1996) found female grizzly bears in the NCDE selected for and survived in home ranges with 56% secure habitat as compared to 30% secure habitat outside the composite female home range. In the greater area of the Yaak and Selkirks Mountains, Wakkinen and Kasworm (1997) found female grizzly bears selected and survived in home ranges with 55% secure habitat relative to 23% -34% secure habitats outside home ranges.

Over-Snow Access Management

Grizzly bears that are entering dens or emerging from dens during the time that motorized over-the-snow activities are occurring could be affected by that motorized use. To determine areas where over-the-snow activities could overlap with grizzly bear habitat use, it is important to know when bears den, then where motorized over-the-snow access can occur.

The Forest estimated and modeled potential denning habitat (U.S. Forest Service 2020, p. 23), and estimated that there are approximately 84,261 acres (7% of the total action area) of modeled denning habitat on NFS lands within the action area. Approximately 62% of this modeled denning habitat is within the Bitterroot Ecosystem (Recovery Zone), although GBAUs do have scattered denning habitat across each area, with the exception of the Lower East Fork Bitterroot River and the Sleeping Child Creek GBAUs (Appendix A, Map 12). There have been no grizzly bear dens identified in the action area.

Of all modeled denning habitat, 85% (71,550acres/84,261 acres) is contained in areas restricted to over- snow vehicles year round. The remaining modeled denning habitat that lies outside of areas restricted to over-snow vehicles is mostly concentrated in the Allan Mountain and Sleeping Child Inventoried Roadless areas within the Upper West Fork East, Warm Springs, and Skalkaho GBAUs. While over-snow vehicle travel is allowed in these areas, other motorized access is limited, thus affording these potential denning areas some level of protection from spring disturbance in years of low snowpack.

Even if denning habitat were to occur outside of the modeled areas, the Travel Management Plan ensures abundant large quite areas that are free from disturbance by over-snow vehicles. Within the Action Area, 623,543 acres (52% of the action area) have over-snow vehicle restrictions (U.S. Forest Service 2020, p. 18). Ninety-three percent (93%) is restricted year round, while 7% is restricted from October 15-December 1st. Seventy-five percent (75%) of all secure habitat in the action area exists in areas that have year-round over-snow vehicle restrictions (Appendix A, Map 8). There are some large, higher elevation areas that contain potential denning habitat across the Forest (in wilderness areas, WSAs, and IRAs) where the use of motorized over-snow vehicles is prohibited. The Forest Plan does not limit over-snow vehicle use specifically in the late spring period, but the Travel Management Plan increased large quiet areas that are free from disturbance by over-snow vehicles.

Unauthorized Motorized Use

A private entity's non-compliance with the Forest's access management is an illegal activity. While illegal use of the Forest via motorized access in areas unauthorized for such use may occur within the action area, such illegal use is not a Forest action. The term "action" for section 7 consultation is defined in the Consultation Handbook (U.S. Fish and Wildlife Service, National Marine Fisheries Service 1998) as: all activities or programs of any kind *authorized, funded,* *and/or carried out*, in whole or in part, by Federal agencies in the United States or upon the high seas (emphasis added). These and any other illegal activities are not the result of a federal action and therefore not analyzed under effects of the action, but their influence is considered for describing the environmental baseline.

Illegal motorized access could theoretically occur anywhere on the Forest. While illegal motorized access has the potential to affect individual grizzly bears, the amount, location, duration, and timing of effects resulting from such illegal use is not known. The probability of long-term illegal motorized access and probability of illegal access coinciding with the presence of grizzly bears is anticipated to be low but is unknown. As such, the potential consequences to grizzly bears are uncertain. Illegal motorized access is expected to be spatially disparate and temporary and is not likely to collectively cause an adverse effect because most Forest users follow travel regulations and when illegal use is observed, or when user-created roads become apparent, the Forest corrects the situation as soon as they are able. Because all routes are considered the same (whether open or restricted) for calculating secure habitat for grizzly bears (as described above), illegal motorized use of restricted routes does not affect secure habitat. Secure habitat could only be affected by off-road use or use of reclaimed/obliterated or bermed roads. However, effects of illegal motorized access would not result in a change in the Forest's baseline access conditions as such use was not authorized, carried out, or funded by the Forest. Also, illegal motorized access would most likely result in temporary effects to grizzly bears as opposed to a permanent change in motorized access conditions because the Forest corrects the situation as soon as they are able, to impacts to multiple resources.

Non-motorized Access and Recreation

Recreation on BNF lands takes many forms, including those that involve motorized use of roads and trails, as discussed above, as well as camping, also discussed above, and finally non-motorized uses such as hiking, biking, hunting, berry picking, cross-country skiing, and other activities. Opportunities range from remote backpack and horse camping to developed campgrounds with tables, toilets, and other amenities; from a feeling of remoteness and solitude to one associated with the presence of other users.

Non-motorized recreational use can occur along restricted roads, trails, and along reclaimed roads or trails, as well as off-road or off-trail. Multiple studies have documented displacement of individual grizzly bears from non-motorized trails to varying degrees (Schallenberger and Jonkel 1980; Jope 1985; McLellan and Shackleton 1989; Kasworm and Manley 1990; Mace and Waller 1998; White et al. 1999). However, none of these studies documented increased mortality risk from foot or horse trails or population level impacts to grizzly bears. For example, while grizzlies in GNP are displaced to some degree by nonmotorized trails (Jope 1985; White et al. 1999), conflicts and grizzly bear mortalities there are extremely infrequent and related almost exclusively to campgrounds and other human-use areas.

Mountain biking does not result in direct mortality of grizzly bears, although encounters with mountain bikes may elicit greater flight response from grizzly bears than other non-motorized use due to the higher potential for sudden encounters (Quinn and Chernoff 2010, Mattson 2019, Herrero and Herrero 2000 *in* Servheen et al. 2017). Sudden surprise encounters can also result in human- grizzly bear conflicts, depending on whether the bear flees or charges. Non-motorized activities such as hunting introduce the potential for intentional (self-defense, poaching or malicious kills, or hunter defense-of-kill) or unintentional (mistaken identity) shootings. Most grizzly bear deaths in the CYE and SE that occur on National Forest lands are hunting related or occur during the hunting season (Kasworm et al. 2020a; Kasworm et al. 2020b). Hunters on the Bitterroot National Forest have been accustomed to not having to worry about encounters with grizzly bears in the past, but the chances of an encounter are increasing as more grizzly bears make their way to the Forest.

2. Food and Attractant Storage and Site Development

The Forest Plan does not contain direction regarding the management of bear attractants. On Forest lands, requirements for proper storage of food, garbage, or other attractants are established and enforced through issuance of a special order(s), rather than through the Forest Plan. At this time, the only food storage order in effect within the action area is for the Anaconda-Pintler wilderness area. To date, no known instances of food conditioning and/or conflicts with grizzly bears related to food and attractant storage have occurred in the action area. Instances of food conditioning and conflicts with black bears are known to have occurred in the Bitterroot valley. As such, the potential does exist for issues with grizzly bears related to food and attractants.

Within the action area, there are currently 27 developed sites that provide for overnight stays, for recreational or administrative use. Recreation use sites include 21 campgrounds and 6 lookouts and cabins that are available for the public to rent (Wood's Cabin, Gird Point Lookout, East Fork Guard Station, TwoGood Cabin, McCart Lookout, Medicine Point Lookout) (Appendix A, Map 10). Eleven campgrounds and 1 cabin have garbage service and are outfitted with bear-resistant trash containers. All of the other campgrounds and cabin/lookout rental sites are required pack it in/pack it out, with no garbage service provided.

In addition, there are scattered administrative sites that include residences, bunkhouses, and staffed lookouts during the fire season. The residences and bunkhouses are located on Ranger District compounds and have garbage service.

3. Livestock Grazing

Grizzly bears frequently coexist with large livestock such as adult cattle without preying on them, but are more likely to attack and kill smaller animals such as domestic sheep, domestic goats, calves, or chickens (Knight and Judd 1983, Anderson et al. 2002); however, recent management reports from MFWP have documented large livestock depredations (cattle), grizzly bear-human conflicts due to boneyards from ranching operations, and management removals due to these depredations (MTFWP 2019). If repeated depredations occur, managers may respond by relocating bears or removing them from the population. Thus, areas with small domestic livestock, and potentially areas with larger livestock, have the potential to become population sinks (Knight et al. 1988). Because of the increased risk to grizzly bears posed by domestic sheep and other small livestock, the Interagency Grizzly Bear Guidelines (Interagency Grizzly Bear Committee 1986) emphasized the desirability of phasing out these types of allotments.

There are no domestic sheep allotments on the Forest. There are a total of 18 cattle grazing allotments currently on the Forest, of which 11 are currently active (U.S. Forest Service 2020, p. 17-18, also Appendix A, Map 9). These allotments cover 193,706 acres, or approximately 16% of the action area.

4. Vegetation Management

Grizzly bears use numerous different habitats for foraging. Use tends to be more frequent in areas that offer some type of hiding cover nearby, particularly during daylight hours (Aune and Kasworm 1989, Mace and Waller 1997). Vegetation management may alter the amount and arrangement of cover and forage available to bears. Timber harvest and fire can locally increase bear foods by stimulating the growth of grasses, forbs, and berry-producing shrubs. Associated roads and human activity can negatively affect grizzly bears by disturbing or displacing bears during logging activities and by increasing mortality risk (Zager et al. 1983).

Suitable timber is defined as those acres that are classified as available for timber production and are specifically managed for growth yield. The Bitterroot Forest Plan identified 389,820 acres as suitable for timber production in Montana (33% of the action area). The planned annual allowable sale quantity was projected to be 33.37 million board feet, to be harvested each year from approximately 3,647 acres in management areas 1, 2, 3a, 3b and 3c (U.S. Forest Service 2020, Appendix B). Forest plan monitoring data show that actual timber harvest levels have been well below the projections made in 1987 (U.S. Forest Service 2020, p. 19). The emphasis of the timber harvest program has been the treatment of hazardous fuels, particularly in the wildland-urban interface, and salvage of bark beetle-killed trees.

5. Fire Management

Wildfire has a strong influence on the age distribution and spatial arrangement of forest vegetation. Although there is substantial variation year-to-year, from 1996 to 2016 a total of 496,354 acres of the Forest were burned by wildfires, or an average of about 23,635 acres/year. Wildfire control efforts and use of prescribed burning occur within the action area. The acres available and locations where such methods are used vary across the action area. The combination of wildfires and active vegetation management (timber harvest, fuels treatment, and prescribed fire) is expected to continue to recruit early forest successional stages that produce a variety of bear foods while maintaining a mosaic of food and cover.

6. Energy and Mineral Development

Energy (specifically oil and gas) and mineral development may increase grizzly bear mortality risk from associated motorized use, habituation to human presence, and/or increased human-grizzly bear encounters and conflicts. Energy and mineral development activities may also result in permanent habitat loss, habitat fragmentation, and displacement of bears.

Currently there is no gas or oil development occurring on the Forest (U.S. Forest Service 2020, p. 20). There are numerous mining claims on the Forest. Although there are many active mining claims on the Forest, at this time there are no active mining operations (ibid.). Minor activities such as surveying and collecting samples on a claim on NFS lands are allowed at any time, but no activities such as construction of roads, building cabins, or caching of food or equipment are authorized. Before an active operation could begin, the claimant would have to file a notice of intent and a plan of operations with the Forest Service. A plan of operations would trigger the NEPA process and ESA Section 7 consultation. At this time there are no notices of intent or plans of operation on the Forest.

The Forest receives numerous requests for riprap material, sand, gravel, and decorative/landscaping stone. Common use and community pit designations are an effective way of meeting this need while ensuring that management plans are developed, and reclamation funds are available. Four pit/collecting areas on the Forest are open to the public: Ambrose, Upper Burnt Fork, Railroad, and Alta Shale. Gravel pits used by the Forest for administrative use include the Lost Horse, Nez Perce Roadside, Nez Perce Borrow (Pete Creek), Jim Hell, Rombo, and Springer Gulch Pits. Five miscellaneous roadside borrow areas, and the Piquett Creek Road roadside borrow area are also used to provide rock for administrative use.

7. Climate Change

In the 5-year status review, the Service examined climate change and potential effects on grizzly bears (U.S. Fish and Wildlife Service 2011). The most likely ways in which climate change may potentially affect grizzly bears are a reduction in snowpack levels, shifts in the denning season, shifts in the abundance and distribution of some natural food sources, and changes in fire regimes due to summer drought. The potential positive and negative effects would likely be variable and are difficult to predict. Grizzly bears are habitat generalists and opportunistic omnivores, which may make them less susceptible to changes in plant communities than some other wildlife species.

V. EFFECTS OF THE ACTION

Regulations implementing the Act define "effects of the action" as "all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (50 CFR 402.02).

The following sections analyze the consequences of the implementation of the elements of the Forest Plan on grizzly bears. The effects will be discussed by broad categories of risk factors as identified in the *Environmental Baseline* section (above). For each category of effect, we begin with a general summary of what the science currently tells us about the potential impacts on grizzly bears and grizzly bear habitat. This is followed by an analysis of the specific effects of the proposed action on grizzly bears and grizzly bear habitat in the action area.

A. Access Management

1. Wheeled Motorized Access

General Effects

This section provides a general discussion of direct and indirect effects of motorized access management on grizzly bears as affected by road densities. Research has confirmed adverse impacts of roads on grizzly bears (Mace et al. 1996, Mace et al. 1999, Proctor et al. 2018). Negative impacts associated with roads and excessive road densities influence grizzly bear population and habitat use patterns. The Grizzly Bear Compendium (IGBC 1987) summarized impacts reported in the literature including:

- Avoidance/displacement of grizzly bears away from roads and road activity;
- Habitat loss, modification, and fragmentation due to roads and road construction, including vegetative and topographic disturbances;
- Changes in grizzly bear behavior, especially habituation to humans, due to ongoing contact with roads and human activities conducted along roads; and
- Direct mortality from road kills, legal and illegal harvest, and other factors resulting from increased human-bear encounters.

The Interagency Grizzly Bear Committee (IGBC) Taskforce provided standardized definitions for roads and standardized methods to measure road densities and define analysis areas within the recovery zones as a result of grizzly bear research information on open and total road densities and grizzly bear core areas (IGBC 1998). The Service considers the management of roads in the recovery zones one of the most important factors in grizzly bear habitat conservation and the IGBC Taskforce guidelines as the best direction with which to manage roads within the recovery zones.

Displacement and security. Some grizzly bears, particularly subadults, readily habituate to humans and consequently suffer increased mortality risk. However, many grizzly bears under-use or avoid otherwise preferred habitats that are frequented by people. Not all avoidance results in significant impacts to grizzly bears. However, if road densities reach a level that such under-use of preferred habitat represents modification of normal grizzly bear behavior, grizzly bears may experience significant impacts. Negative association with roads arises from the grizzly bears' response to vehicles, vehicle noise and other human-related noise around roads, human scent along roads, and hunting and shooting along or from roads. Grizzly bears that experience such negative consequences learn to avoid the disturbance and annoyance generated by roads. Some may not change this resultant avoidance behavior for long periods after road closures. Even occasional human-related vehicle noise can result in annoying grizzly bears to the extent that they continue to avoid roaded habitat.

All factors contributing to direct links between roads and displacement from habitat have not been quantified. The level of road-use by people is likely an important factor in assessing the potential displacement caused by any road. Contemporary research, however, indicates that grizzly bears consistently were displaced from roads and habitat surrounding roads, often despite relatively low levels of human use (Mattson et al. 1987, McLellan and Shackleton 1988, Aune and Kasworm 1989, Kasworm and Manley 1990, Mace and Manley 1993, Mace et al.1996).

Avoidance behavior is often strongest in adult grizzly bears, with males selecting for high quality habitats and absence of humans (Gibeau et al. 2002). Males that were found using high quality habitat near roads, did so during the night where hiding cover was available (ibid). However, adult females were more likely to avoid humans all together, rather than seek out the highest quality habitats. Mueller et al. (2004) reported all age and sex classes used habitats closer to high-use roads and development during the human inactive period. All bears showed a considerably greater avoidance of high-use roads and development during periods of high human activity. They did show however, that regardless of the time of day, subadult bears were found closer to high-use roads than adult bears. Gibeau et al. (2002) also demonstrated that subadults were almost always closer to human activity than adults. Boulanger and Stenhouse (2014) found that subadult grizzly bears were most vulnerable to road-based mortality.

In Montana, Aune and Stivers (1982) reported that grizzly bears avoided roads and adjacent corridors even when the area contained preferred habitat for breeding, feeding, shelter and reproduction. McLellan and Shackleton (1988) found that grizzly bears used areas near roads less than expected in southeastern British Columbia and estimated that 8.7 percent of the total area was rendered incompatible for grizzly bear use because of roads. In Montana, Mace and Manley (1993) reported use of habitat by all sex and age classes of grizzly bears was less than expected in habitats where total road densities exceeded 2 miles per square mile. Twenty-two percent of the South Fork Study area exceeded 2 miles per square mile. Adult grizzly bears used habitats less than expected when open motorized access density exceeded 1 mile per square mile. Further, female grizzly bears in the South Fork Study area tended to use habitat more than 0.5 mile from roads or trails greater than expected. As traffic levels on roads increased, grizzly bear use of adjacent habitat decreased (Mace et al. 1996). In Yellowstone, Mattson et al. (1992) reported wary grizzly bears avoided areas within 2 kilometers (1.2 miles) of major roads and 4 kilometers (2.4 miles) of major developments or town sites.

Mace et al. (1996) and other researchers have used 500 meters as the zone of influence around roads. Waller and Servheen (2005) also demonstrated avoidance of areas within 500 meters of US-2. Benn and Herrero (2002) set zones of influence of 500 meters and 200 meters around roads and trails, respectively. They reported that all 95 human-caused grizzly bear mortalities with known locations that occurred in Banff and Yoho National Parks between 1971 and 1998 occurred within these zones of influence along roads and trails or around human settlements. Gibeau and Stevens (2005) documented bears further from roads when distant from high quality habitat, indicating avoidance behavior.

Research suggests that grizzly bears benefit from road closures aimed at minimizing traffic on roads within important seasonal habitat, especially in low elevation habitats during the spring (Mace et al. 1999). When roads are located in important habitats such as riparian zones, snowchutes and shrub fields, habitat loss through avoidance behavior can be significant. Mace et al. (1996) found that most of the roads within grizzly bear seasonal ranges were either closed to vehicles or used infrequently by humans. Some grizzly bears avoided areas with a high total road density even when the roads were closed to public travel. If human-related disturbances such as high levels of road use continue in preferred habitats for extended periods of time, grizzly bear use of the area may be significantly limited, particularly use by female grizzly bears. In the Swan Mountain study (Mace et al. 1996), female grizzly bear home range selection of unroaded cover types was greatest and as road densities increased, selection declined. Zager (1980) reported the underuse of areas near roads by females with cubs. Aune and Kasworm (1989) and McLellan (1989) found that female cubs generally established their home range within or overlapping with their mother's home range, whereas males generally dispersed from their mother's home range. Long-term displacement of a female from a portion of her home range may result in long-term under-use of that area by female grizzly bears because cubs have limited potential to learn to use the area. In this way, learned avoidance behavior could persist for more than one generation of grizzly bears before grizzly bears again utilize habitat associated with closed roads. Thus, displacement from preferred habitats may significantly modify normal grizzly bear behavioral patterns.

Conversely, grizzly bears can become conditioned to human activity and show a high level of tolerance especially if the location and nature of human use are predictable and do not result in overtly negative impacts for grizzly bears (Mattson 1993). In Glacier National Park, Jope (1985) suggested grizzly bears in parks habituate to high human use and showed less displacement, even in open habitats. Yonge (2001) found that grizzly bears near Cooke City, Montana, were willing to consistently forage in very close proximity to high levels of human use if cover was sufficient and energetically efficient feeding opportunities were present. Both Mattson (1993) and Yonge (2001) postulated that areas with higher levels of human activity might have a positive effect for bears by serving as a kind of refugia for weaker population cohorts (subadults and females with cubs) seeking to avoid intra-specific competition (adult males). However, Mattson qualified this observation by adding that the beneficial effects vary as to whether hunting is allowed, and how closely the human population is regulated. Further, food conditioned grizzly bears were much more likely to be killed by humans.

Both Yonge (2001) and Mattson (1993) indicated that increases in human use levels can be deleterious if some human activities are unregulated, such as use of firearms, presence of attractants, nature and duration of human uses. Conversely, a level of coexistence between humans and grizzly bears can be achieved if such activities are controlled. Near Cooke City, Montana, the New World Mine reclamation project had minimal effects on grizzly bears, in part because reclamation activities were temporally and spatially predictable and people associated with the work were carefully regulated against carrying firearms or having attractants available to grizzly bears (Tyers, unpublished 2006). In the Swan Valley of Montana, raw location data from a small number of collared grizzly bears show nocturnal use of highly roaded habitat (C. Servheen, USFWS, pers. comm. 2005). The Swan Valley data have not been statistically analyzed and the study was not designed to determine the impact of roads on bears, sample size is very small, and perhaps most importantly, mortality rates for these grizzly bears are not yet known. However, these data indicate that some grizzly bears can apparently habituate to relatively high levels of human activity.

Specific causes or factors involved in the selection or preferences for certain home ranges by grizzly bears are not well understood. Mace and Manley (1993) found that grizzly bear home ranges in the South Fork Study area included remote areas in high elevations. South Fork Study grizzly bear habitat-use data, road density analyses of the South Fork Study area, previous studies and CEM analysis (U.S. Forest Service 1994, Mace et al. 1999) suggested that low-elevation habitats were not freely available to grizzly bears because of high road densities and associated human use in these areas. High road densities in low-elevation habitats may result in avoidance of or displacement from important spring seasonal habitat for some grizzly bears or high mortality risk for those individuals that venture into and attempt to exploit resources contained in these low-elevation areas.

Male grizzly bears typically have larger home ranges than females, and males, subadults, and transient grizzly bears are more mobile and do not have the same energetic needs as adult females. Transient individuals are highly mobile and not restricted to finding food and shelter within a home range. Thus, while displacement from habitat along roads may affect behavioral patterns such as feeding or sheltering of all grizzly bears, we do not anticipate such effects would cause harm or significant impairment to these behavioral patterns of transient, subadult, or male grizzly bears. Where road densities are high enough to result in significant displacement, significant impairment to behavioral patterns of adult female grizzly bears may occur.

Secure habitat. Secure habitat describes where grizzly bears can meet their life history needs without the heightened mortality risk or negative consequences of disturbance-related behavioral modifications (i.e., habitat avoidance or nighttime use patterns) or repeated flight response. Secure habitat has been identified as one of the key issues related to effects of motorized access on grizzly bears and is important to the survival and reproductive success of grizzly bears. This metric more adequately represents the potential effects related to motorized access as it provides a more accurate indication of the spatial mix of motorized routes and areas outside the influence of motorized routes (for example, see Figure 7 in Proctor et al. 2020, p. 26.). Studies have shown that female grizzly bears selected for, and survived better in, areas with greater secure habitat (review in Proctor et al. 2020, p. 25-26; Mace et al. 1996, p. 1,400; Wakkinen and Kasworm 1997, p. 20; Gibeau et al. 2002, p. 126; Schwartz et al. 2010, pp. 659-660).

In a comprehensive review of research into the relationships between motorized access and grizzly bears, Proctor et al. (2020) cited research findings indicating that secure habitat may be as or more important than road density in predicting impacts to bears. They also noted that the spatial arrangement of motorized routes and security areas may be critically important in terms of the degree to which bears may be affected by motorized access, stating, "…evenly spaced roads, even at an otherwise acceptable road density, can provide very little security in patches within the range of average daily movements" (Proctor et al. 2018). In other words, the key to limiting impacts of roads on bears is tied to availability, location, and distribution of secure habitat that is a function of not simply numeric density of motorized routes, but the spatial arrangement in which they occur.

Studies in northwest Montana's Rocky Mountains found female grizzly bears selected for and survived in home ranges with 56% secure habitat as compared to 30% secure habitat outside the composite female home range (Mace et al. 1996). Consistently, to the west, female grizzly bears selected and survived in home ranges with 55% secure habitat relative to 23% -34% secure habitats in the greater area of the Yaak and Selkirks Mountains (Wakkinen and Kasworm 1997). Across the border in Canada, researchers found female grizzly bears selected and survived in secure habitats with 74% secure habitat as compared to available habitats with 56% secure habitat (Proctor et al. 2017). In the U.S. Yellowstone ecosystem, road densities and the amount of secure habitat within female home ranges had a large influence on their survival (Schwartz et al. 2010). Both road density and the proportion of secure habitat contributed different yet important components influencing survival: road density had more influence on survival as the proportion of secure habitat within female home ranges decreased.

Habituation to Human Attractants. In converse to avoidance of habitat due to roads, sometimes grizzly bears can become conditioned to human activity and show a high level of tolerance, or habituation, to human activity. If the location and nature of human use are predictable and do not result in overtly negative impacts for grizzly bears (Mattson 1993), areas with higher levels of human activity might have a positive effect for bears by serving as a kind of refugia for weaker population cohorts (e.g., subadults and females with cubs) seeking to avoid intra-specific competition (adult males; Mattson 1993, Yonge 2001). In Glacier National Park, Jope (1985) suggested grizzly bears in parks habituate to high human use and showed less displacement, even in open habitats. Yonge (2001) found that grizzly bears near Cooke City, Montana, were willing to consistently forage in very close proximity to high levels of human use if cover was sufficient and energetically efficient feeding opportunities were present.

Habituation may not be positive, however. Mattson (1993) qualified his observation by adding that the beneficial effects vary as to whether hunting is allowed, and how closely the human population is regulated. Further, food conditioned grizzly bears were much more likely to be killed by humans. This may be especially true for subadults. Mueller et al. (2004) showed that regardless of the time of day, subadult bears were found closer to high-use roads than adult bears. Gibeau et al. (2002) also demonstrated that subadults were almost always closer to human activity than adults. Boulanger and Stenhouse (2014) found that subadult grizzly bears were most vulnerable to road-based mortality. Due to the fact that subadult females tend to remain within a portion of their mother's home range and have smaller dispersal distances, subadult males are at greater mortality risk as a result of habituation than subadult females.

Grizzly Bear Mortality. While grizzly bears are killed by vehicle collision, the most direct form of road-related mortality, the specific relationship between roads and the mortality risk to grizzly bears is difficult to quantify. The level of human use of roads is one of several factors influencing the mortality risk associated with any road. Research supports the premise that forest roads facilitate human access into grizzly bear habitat, which directly or indirectly increases the risk of mortality to grizzly bears (Mace et al. 1987, Mattson et al. 1992, McLellan and Shackleton 1988, Dood et al. 1986).

The presence of roads alone does not necessarily result in direct mortality of grizzly bears, but the proximity of the roads to human population centers, resulting in high numbers of people using roads, and dispersed recreation in habitat around roads can pose considerable risks to grizzly bears. Social values and attitudes also contribute to the level of mortality risk to grizzly bears. Incidental or accidental human-caused grizzly bear mortality, combined with a few individuals intent on illegally shooting grizzly bears, can collectively result in serious, detrimental effects to grizzly bear populations. Access management can be instrumental to reducing mortality risk to grizzly bears by managing the present and anticipated future road use-levels resulting from the increasing human population in western Montana.

Effects in the Action Area

The Forest Plan, Travel Management Plan, and proposed Amendment would allow for future projects to create new permanent and temporary motorized routes and to remove existing motorized routes in the action area. No standards exist that would limit the miles of routes that could be built in the future other than land designations that prohibit route construction by law, policy or rule. No motorized route construction is allowed in Wilderness, Wilderness Study Areas (WSA), and Inventoried Roadless Areas (IRAs). Outside of these areas, the Forest calculated the amount of area in GBAUs where route construction is allowed.

The Forest may propose in future projects to create new motorized routes in areas that are currently not secure habitat for grizzly bears. In these cases, higher route densities may exacerbate effects to grizzly bears moving into or through the area including higher mortality and displacement, although depending on the status of these roads (open to public motorized use or restricted) and time on the landscape (permanent versus temporary route) these effects would be less than new permanent routes into existing secure habitat. If new motorized routes are constructed in or near areas that currently offer secure habitat, a decrease in the amount or arrangement of secure habitat may occur. Alternatively, building a new route in the midst of a dense area of existing roads may have little to no effect on existing secure habitat.

While not specifically proposed under the Forest Plan, permanent and temporary route construction and use may occur on a project by project basis. Temporary roads built for resource extraction such as timber harvest or mining may be short-term in duration of use or may remain on the landscape for several years and receive a substantive amount of use. The Forest Plan, Travel Management Plan, and Amendment do not restrict the amount of time a temporary road can last. However, for the sake of analysis, the Forest considers a temporary road to be one that exists on the landscape for no more than 5 years (U.S. Forest Service 2020, p. 27).

The Travel Management Plan (section 1.3) administratively changed the travel status of certain routes across the action area. Some of the changes will require site-specific NEPA analysis and have not yet been completed. These changes are in the minority of Travel Management Plan actions. For instance, an upcoming project is proposing to decommission over 35 miles of routes. Once NEPA is complete, these routes will be obliterated or made impassable, and in certain instances, may slightly increase grizzly bear secure habitat. Other obliterated or routes made impassable will not affect the total acres of grizzly bear secure habitat because the remaining route density and associated buffers exclude secure habitat. Therefore, the potential for displacement and risk of mortality for any grizzly bears that may be attempting to move into or through the action area would remain largely the same, although a slight reduction may be realized in the future as remaining Travel Management Plan actions are implemented.

The proposed Forest Plan Amendment would replace certain standards as they relate to elk habitat management and road density. Because this amendment does not authorize or prohibit future route construction, and the effects of the existing route density are analyzed above related to grizzly bear secure habitat, the Amendment will have no additional effect to motorized access on grizzly bears.

The Forest estimates that the amount of *linear miles of motorized routes* in each GBAU would be expected to remain more or less static over time. However, both permanent and temporary route construction will likely occur in the foreseeable future, and depending on where these actions occur spatially on the landscape, this construction and resulting buffers as described above may reduce total acres of secure habitat available on the Forest.

There will be no change in secure habitat in the portion of the Bitterroot Ecosystem inside the action area, as this area is wilderness, no road construction is permitted, and the area was appropriately buffered in the analysis to capture effects of routes that may be constructed up to the boundary. Therefore, the Forest will continue to provide secure habitat for grizzly bears in 100% of the portion of the Bitterroot Ecosystem Recovery Zone that is within the action area (i.e. the portion of the Recovery Zone that is on the Bitterroot National Forest in Montana). This equates to 244,737 acres of secure habitat, enough to provide completely secure home ranges for multiple female grizzly bears.

To estimate how much secure habitat could be affected outside of the Recovery Zone, the Forest calculated that there are approximately 51,441 acres of secure habitat outside of Wilderness, WSAs, and IRAs that could be affected by future route construction (U.S. Forest Service 2020, Appendix G). This calculation does not incorporate feasibility of construction or Forest Plan management areas in the action area that may limit route construction; it only provides a rough metric for how much area is potentially available for future route construction. Thus, this an overestimate of what could feasibly occur, and thus a very conservative look at the "worst case scenario" in terms of effects to secure habitat for grizzly bears.

Table 3. Baseline amounts of secure habitat per GBAU, and estimates of future effects to secure habitat within GBAUs on the Bitterroot National Forest under the Forest Plan.

	Total Size of GBAU (acres)	Baseline Amount of Secure Habitat (acres)	Baseline Amount of GBAU Providing Secure Habitat	Secure Habitat Outside Restricted Areas[1] (acres)	% of Baseline Secure Habitat That Could Be Affected In Future	Min. Amount of Secure Habitat In Future[2] (% of GBAU)	% Change from Baseline (total amount secure in GBAU)
Burnt Fork Bitterroot River	100,140	32,580	33%	3,804	12%	29%	4%
Lost Horse Creek	88,114	50,150	57%	2,601	5%	54%	3%
Lower Bitterroot River	48,107	20,135	42%	1,678	8%	38%	3%
Lower East Fork Bitterroot River	88,665	12,662	14%	8,145	64%	5%	9%
Lower West Fork Bitterroot River	101,437	35,032	35%	6,150	18%	28%	6%
Skalkaho Creek	65,126	29,548	45%	5,310	18%	37%	8%
Sleeping Child Creek	96,619	13,568	14%	5,061	37%	9%	5%
Upper East Fork Bitterroot River	105,094	62,356	59%	4,796	8%	55%	5%
Upper West Fork East Bitterroot River	105,946	46,621	44%	5,744	12%	39%	5%
Upper West Fork West Bitterroot River	92,892	57,980	62%	4,461	8%	58%	5%
Warm Springs	58,175	21,836	38%	3,690	17%	31%	6%
Total for all GBAUs	950,315	382,468	40%	51,440	13%	35%	5%

[1] Outside of Wilderness, Wilderness Study Areas, Inventoried Roadless Areas
[2] Assuming all acres of existing secure habitat outside of Restricted Areas are affected by motorized routes

The Forest estimated that new route construction (permanent or temporary) may realistically affect up to a maximum of 5% of secure habitat Action Area-wide, which roughly equates to 31,400 acres or 2.6% of the total Action Area acreage. There would be no effect to secure habitat in the portion of the action area that is within the Recovery Zone. It would occur in

GBAUs where route construction could occur outside of restricted areas (i.e. Wilderness, WSAs, and IRAs (Table 3). Outside of restricted areas, no GBAU contains more than 1% of total secure habitat across the entire action area that would be reduced if all secure habitat was eliminated.

The estimates in Table 3, derived from information provided in the BA (U.S. Forest Service 2020, Appendix G) present the "maximum impact scenario" for grizzly bears, assuming that every acre of existing secure habitat within GBAUs would be affected by motorized routes in the future. Under this scenario, individual GBAUs, which represent potential home ranges for female grizzly bears, could have secure habitat reduced by at most 3-9% from the baseline amounts that currently exist. Given this scenario, a few GBAUs would retain enough secure habitat to potentially support a female grizzly bear living and reproducing in the GBAU, while others would retain moderate amounts that would still likely allow for male and female grizzly bears to move through the GBAUs. A few GBAUs, namely the Lower East Fork and Sleeping Child, could see secure habitat reduced to less than 10% of the GBAU. These GBAUs would likely be the most difficult for a grizzly bear to live in, but we would expect that grizzly bears could still move through these GBAUs.

Reducing secure habitat may or may not affect potential connectivity for grizzly bears moving into the Bitterroot Ecosystem Recovery Zone (BE). While some researchers have shown that grizzly bear survival and reproduction is higher in areas with higher secure habitat (Schwartz et al. 2010, Proctor et al. 2020), there is no known threshold for how much secure habitat is needed for connectivity. Peck et al. (2017; p. 10) identified some of the more likely routes for male grizzly bears to travel from the GYE to the NCDE. These models show likely movement pathways in the vicinity of the Lower East Fork and Sleeping Child GBAUs, as well as the Lost Horse GBAU. Similar modeling has not been conducted for female grizzly bears, nor has modeling been conducted to specifically look at potential areas for movement into the Bitterroot Ecosystem Recovery Zone from the NCDE, GYE, and/or CYE. However, a few bears have begun making their way towards the BE and Bitterroot National Forest from other areas. Based on expansion trends and movement that bears have exhibited coming out of the NCDE and GYE, it is reasonable to expect that some grizzly bears will be able to move through, if not live in, GBAUs on the Bitterroot National Forest.

Currently, the number of grizzly bears using the Forest is very low and numbers are expected to increase slowly over time. This is especially true for female grizzly bears. As mentioned earlier, Proctor et al. (2012) found males move more frequently and over longer distances than females. Males have large home ranges and establish home ranges nearly three times further away from their mother's home ranges than do female offspring. Females usually establish smaller home ranges than males that overlap with their mother's home range (Waser and Jones 1983; LeFranc et al. 1987; Schwartz et al. 2003). In doing so, they generally disperse over much shorter distances than male grizzly bears (McLellan and Hovey 2001; Proctor et al. 2004). Therefore, female dispersal is a multi-generational process where females must live year-round in an area, successfully reproduce, and offspring disperse into adjacent, unoccupied habitat. Thus, female grizzly bear presence on the Forest is likely to increase slowly, only if and when population pressure from the NCDE and/or the GYE grows. The earliest detections of grizzly bears from the NCDE found in the intervening area between the NCDE and the GYE were male, and males make up most of the known occurrences in this region (Mace and Roberts 2012).

Effects from high road densities and low amounts of secure habitat in some areas of the action area may result in the displacement of individual grizzly bears, the avoidance of suitable habitat, and/or the reduction of habitat to an unsuitable condition. These changes would only affect bears during the "bear year," or non-denning season, which is roughly April 1 thru November 30. The effects of displacement and under-use of habitat are tempered by local resource availability, resource condition, seasonal use, and the number of grizzly bears using an area. Under-use of habitat in proximity to Forest roads by grizzly bears does not necessarily preclude use or form a barrier to dispersal and movement across the landscape. Until numbers substantially increase, grizzly bears now occupying the Forest and moving into the Forest in the near future would not likely face significant competition for habitat and resources from other grizzly bears. Thus, displacement from quality habitat is not as likely to result in adverse effects to individuals, as they are likely to have options to move to other areas to find resources.

Male grizzly bears have larger home ranges than females, and males and subadults are independent, more mobile and do not have the same energetic needs as adult females. While displacement may affect behavioral patterns of males and subadults, such as feeding or sheltering, we do not anticipate such effects to be significant to subadult or male grizzly bears.

Displacement effects have more significant impacts on adult female grizzly bears than males or subadults because adult females have higher energetic needs to sustain fitness prior to and during gestation and lactation and when rearing. As such, adult females can less afford the additional energy expended to find high quality foods and shelter if displaced, especially during the early spring or late summer to fall hyperphagia season. During some years, due to poor climatic conditions and resulting food scarcity and/or high levels of forest management activity or recreational activity, displacement effects from areas with high road densities could be more frequent and intense.

Based on the lack of verified female grizzly bear or potentially very low number of female grizzly bears using the action area, and considering the low levels of intra-specific competition, we do not expect that adult female grizzly bears would be affected to levels of injury (through displacement) by high route densities at this time. However, the effects of displacement may increase somewhat as grizzly bear numbers increase over the life of the Forest Plan. Existing road densities and low amounts of secure habitat in some areas and continued presence of these roads under the Forest Plan may at some time over the next 10 years result in adverse effects to some individual female grizzly bears attempting to establish or maintain home ranges in roaded areas. Some adult females may be displaced from key habitats and under certain conditions they may be displaced to levels that impair their normal ability to readily find food resources needed to sustain fitness necessary for breeding and producing cubs, and find shelter.

In sum, not all actions related to access under the Forest Plan, Amendment, and Travel Plan will result in adverse effects. Very few grizzly bears have been verified on the Forest and most, if not all, have been males. We only expect adverse effects to grizzly bears related to access management if, and when, female grizzly bears begin using the action area. We anticipate that the adverse effects from motorized route densities and secure habitat would affect only few adult females over the life of the Forest Plan because few grizzly bears occupy the action area at this time, and as explained earlier, female grizzly bear numbers would grow only slowly over time. Further, we do not expect that all adult females exposed to disturbances related to motorized route densities would suffer significant effects, nor would the effects persist throughout an individual female's life span. We expect that effects would vary substantially depending upon the wariness of the individual bear, the size of and habitat quality within her home range, the number of other grizzly bears using the particular area, climate conditions, annual food resources, and the nature, intensity and duration of human activity during any particular year. All of these are factors that may affect options available to adult females if displaced. Further, conditions the following year may be considerably different.

Overall, existing motorized routes and any new routes constructed in the future within action area, temporary or permanent, may affect grizzly bears. These effects may be insignificant in some situations or adverse in others. Adverse effects may significantly impact an adult female grizzly bears' ability to find food resources, breed and raise young, and find adequate shelter at some time over the life of the Forest Plan.

2. Over-the-Snow Motorized Access

General Effects

Available information regarding the effects of snowmobiles[1] on grizzly bears is generally anecdotal, based on grizzly bear responses to various stimuli other than snowmobiles collected during research. Such reports typically lack information related to the timing of disturbance, type of den, winter conditions or other important factors necessary to assess the significance of disturbance to grizzly bears, if any. Some information collected on black bears or other Ursids may have some relevance, but even the data on these species is incidental and largely theoretical. Regarding effects on bears during denning, snow is an excellent sound barrier (Blix and Lentfer 1992) and impacts to denning bears would likely be less in deep snow situations than in shallow snow conditions. It is likely that hibernating bears exposed to meaningless noise, with no negative consequences to the bear, habituate to this type of disturbance (Knight and Gutzweiler 1995).

Den abandonment has been documented in association with industrial activity and direct approach (Reynolds et al. 1986, p. 174; Harding and Nagy 1980, p. 278; Jonkel 1980, p. 3; Craighead and Craighead 1972, p. 31). Harding and Nagy (1980, p. 278) found that one grizzly bear abandoned its den after having the den driven over by a seismic vehicle. On the other hand, other events with seemingly similar levels of disturbance have not led to den abandonment (Jonkel 1980, p. 2; Reynolds et al. 1986, p. 174; Mace and Waller 1997, p. 41; Linnell et al. 2000, pp. 407-408). We are not aware of any primary-source reports in the literature of grizzly bear den abandonment directly attributed to snowmobile activity, nor have other adverse effects on bears from snowmobile use been substantiated. In fact, Mace and Waller (1997, p. 41) reported no abandonment of dens by grizzly bear even though snowmobiles were often seen within 2 kilometers of den sites. Likewise, the Interagency Grizzly Bear Study Team has intensively researched grizzly bear ecology in the Yellowstone Grizzly Bear Ecosystem from the 1970's to present, but this research has never documented den abandonment attributed to snowmobiles.

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[1] "Snowmobile" is the generic term we are using for all types of over-the-snow motorized vehicles, including true snowmobiles, snow coaches, snow bikes, and any other non-wheeled motorized vehicles.

Disturbance from snowmobiles may be most consequential shortly before or after den emergence of a female with cubs (Graves and Reams 2001). Females and their cubs remain in the den site area for several weeks after emergence from dens (Haroldsen et al. 2002, p. 33; Mace and Waller 1997, pp. 37-38). Females with cubs have high energetic needs, and cubs have limited mobility for several weeks after leaving the den. Disturbance levels that cause a female to prematurely leave the den in spring or move from the den area could impair the fitness of the female and safety of the cubs. If cubs attempt to follow their mother, they will likely experience decreased fitness and the family group may be pushed to less suitable habitat. After den emergence in spring, grizzly bears seek sites that melt snow early and produce green vegetation (Kasworm et al. 2010, p. 65). There is limited potential for snowmobiles to occur in these areas and overlap spring grizzly bear habitat for a short period of time after den emergence.

Therefore, it is the Service's opinion that snowmobile-related impacts on post-den emergence females with cubs are more likely to impart serious consequences than any potential impacts to denning grizzly bears. To summarize, we have found no primary-source reports in the literature of grizzly bear den abandonment directly attributed to snowmobile activity (Hegg 2010 pp. 26-27; Servheen 2010 pers. comm. as cited in U.S. Fish and Wildlife Service 2011b, p.34), nor has other substantive adverse effects on bears from snowmobile use has been substantiated (Mace and Waller 1997, p.41; U.S. Forest Service 2006, pp.3-263 3-373).

Effects in the Action Area

Some large, higher elevation areas that contain potential denning habitat does occur within the action area, but 85% of the potential denning habitat occurs in areas where over-snow motorized access is prohibited. The remaining 15% of denning habitat does occur in areas where over-the-snow motorized use may occur, as described in the BA (U.S. Forest Service 2020, p. 28).

At this time, denning of grizzly bears has not been documented in the action area and the likelihood of grizzly bears denning in the action area anytime soon is low. Furthermore, in the near future, it is probable that any grizzly bears that move into or through the action area will be males. The likelihood that an adult female bear will den and have cubs in the action area is very low over the life of the Plan. Given that the overlap between late spring over-the-snow motorized use and potential denning habitat is also very small in both space and time in the action area, the chances of a bear-snowmobile encounter are expected to be very low. Therefore, the effects to grizzly bears due to late season over-the-snow motorized use are discountable, or very unlikely to occur.

3. Non-Motorized Access and Recreation

General Effects

The potential exists for non-motorized activities to result in disturbance effects to grizzly bears. Multiple studies have documented displacement of individual grizzly bears from nonmotorized trails to varying degrees (Schallenberger and Jonkel 1980; Jope 1985; McLellan and Shackleton 1989; Kasworm and Manley 1990; Mace et al. 1996; White et al. 1999). As reviewed in Mattson 2019, the effects can be of shorter or longer duration, and result in varying responses, generally flight, displacement, or avoidance. In most situations, such impacts would likely be short-term and would range from no response from a grizzly bear to a grizzly bear temporary fleeing the area. Grizzly bears may adapt to consistent, predictable activity and may notice the activity but not flee from it (Jope 1985; Mattson 2019). This reaction is more likely to occur on trails with regular use. On non-motorized trails that receive low amounts of human use, human activity may result in a grizzly bear temporarily fleeing from the disturbance, expending extra amounts of energy (McClellan and Shackleton 1989; Mattson 2019b).

Due to varying skill levels and speed of travel of mountain bikers, they are less likely to travel in close groups and maintain verbal contact with other riders, resulting in minimizing the amount of noise and reducing the potential for early detection and avoidance by grizzly bears. Thus, mountain biking may elicit greater flight response from grizzly bears than other non-motorized use due to the higher potential for sudden encounters (Quinn and Chernoff 2010, Mattson 2019, Herrero and Herrero 2000 *in* Servheen et al. 2017). Sudden surprise encounters can also result in human-grizzly bear conflicts, depending on whether the bear flees or charges. Often, grizzly bears disturbed by non-motorized use will exhibit increased nocturnal activity and decreased daytime activity when non-motorized use is most likely to occur (Mattson 2019).

Effects in the Action Area

Non-motorized activities such as mountain biking, horseback riding, and hiking do and will continue to occur throughout the action area. Due to the low number of grizzly bears in the action area, it is unlikely that many, if any, will experience disturbance effects as a result of non-motorized recreation. If any grizzly bears do experience disturbance from non-motorized use, we expect effects will be insignificant, as grizzly bears that are moving in to the action area will likely adapt to such use or choose other use areas. Such impacts are not likely to significantly affect an individual grizzly bear's ability to breed or find food or shelter. Grizzly bears are habitat generalists and would be able to shift their use to low disturbance areas within their home ranges during activity, or establish home ranges in areas with very little non-motorized use. As such, we do not anticipate adverse effects to grizzly bears as a result of non-motorized access under the Forest Plan at this time. Any future proposals for specific high-use or high-speed non-motorized use would be subject to site-specific review at the time of the proposal.

B. Livestock Grazing

General Effects

Effects of livestock grazing on grizzly bears are generally related to depredations of livestock by grizzly bears, disposal of livestock carcasses, storage of human food and stock feed, and grizzly bear habituation, food conditioning, and mortality risk associated with these activities. Depredating bears may become food conditioned resulting in management actions that remove bears from the population. Although grizzly bear conflicts with cattle do exist, the more significant problems have been with sheep (Orme and Williams 1986). The adverse effects of domestic sheep grazing on grizzly bears are well documented (Knight and Judd 1983, Johnson and Griffel 1982). Sheep grazing in occupied grizzly bear habitat poses substantive risks to grizzly bears since bears kill sheep much more readily than other livestock and because sheep are often closely tended by herders typically armed and protective of their flock. In one study in the YGBE, of 24 grizzly bears known to use livestock allotments, 10 were known to kill livestock (Knight and Judd 1983). Of these bears, 7 killed sheep, 5 of which were trapped and fitted with radio transmitters. All but one radio collared grizzly bear cub that had the opportunity to kill sheep did so. Grizzly bears that kill livestock include a range of ages and both sexes (Johnson and Griffel 1982).

Being an opportunistic feeder, any individual grizzly bear can learn to exploit livestock as an available food source just as easily as they habituate to other human food sources (Johnson and Griffel 1982). Knight and Judd (1983) reported several differences between cattle and sheep conflicts with grizzly bears. They found that all radio-collared grizzly bears known to have come in close contact with sheep killed sheep, but most grizzly bears that encountered cattle did not make kills. They also found that all known cattle kills were carried out by adult bears 7 years or older, while both adults and subadults from 1 to 13 years old killed sheep. Grizzly bears that killed sheep, usually took multiple sheep over several days. However in each instance when the sheep were moved out of the area the predation ended (Johnson and Griffel 1982).
Livestock carcasses may also attract grizzly bears. Grizzly bears have a strong tendency to return to a carcass for two or more feedings (Johnson and Griffel 1982). Therefore, proper treatment or disposal of livestock carcasses greatly reduces the potential attractants for grizzly bears.

Effects in the Action Area

The Forest has 18 cattle allotments and no domestic sheep allotments within the action area. The amount of cattle grazing on these allotments have been decreasing over time (U.S. Forest Service 2020, p. 28). As reported in the BA, eight permittees grazed 1,634 animal unit months (AUMs) on eight allotments in 2014, and six permittees grazed 892 AUMs on six allotments in 2015 (U.S. Department of Agriculture 2016c). The amount of grazing is not limited to existing levels and could increase in the future during the life of the Forest Plan, although stocking levels are not expected to increase. Horses and mules may be permitted for use on NFS lands, primarily in support of outfitter and guide operations or Forest Service administrative use in wilderness areas. There is no evidence of conflicts with bears due to depredation or forage competition, so horse and mule grazing permits are expected to have no effect on any grizzly bears occurring in the action area. No effects from either the Travel Management Plan or the Amendment would alter livestock grazing on the Forest, and therefore no additional effects are expected related to the Amendment or Travel Management Plan.

No grizzly bear conflicts related to grazing or depredations on livestock have been documented in the action area. Based on the information for livestock grazing in the action area (no sheep allotments, very low amount of grizzly bear use, and the history of no livestock depredations), the likelihood of adverse impacts to grizzly bears related to livestock grazing in the action area during the life of the Forest Plan is low. If the number of grizzly bears using the action area increases, the risk of conflicts with or depredations on livestock may also increase over time. The most likely effects would be related to food conditioning or habituation of a bear, resulting in the potential need for management removal or relocation. For now and over the life of the Forest Plan (roughly 10 years), we expect that the likelihood of a grizzly bear becoming habituated or food conditioned related to grazing are so unlikely, given the very few number of bears and the very small grazing program, such that the effects to grizzly bears are discountable, or extremely unlikely to occur.

C. Food and Attractant Storage and Site Development

General Effects

Improperly stored food, garbage, and/or livestock or pet foods can lure grizzly bears to areas near people and pose a significant risk of habituating bears to human presence and/or conditioning grizzly bears to seek out anthropogenic foods and attractants. Food conditioned grizzly bears enter unsecured garbage receptacles, sheds, and other buildings in search of a reward. Accessibility to human related attractants and conditioning to those rewards can lead to management removal of grizzly bears and additionally, mortality of grizzly bears by people defending their life and property.

Incidence of property damage or conflicts associated with human related foods is inversely proportional to the availability of high quality grizzly bear foods found in the wild; during periods of poor natural food production incidences of human-grizzly bear conflicts typically increase. When poor seasonal bear foods exist in part of or through the entire non-denning season in the GYE and NCDE, the incidences of bears causing property damage and obtaining anthropogenic foods increased significantly over average or good years (Gunther et al. 2004, Manley 2005). The conflict relationship is magnified when the availability of late season natural foods such as whitebark pine seeds is insufficient to meet the high energy requirements during hyperphagia (Mattson et al. 1992).

Numerous studies in the NCDE elucidate the importance of late-season frugivory, especially globe huckleberries (*Vaccinium globulare*), by grizzly bears (Martinka and Kendall 1986, Weaver et al. 1990). Berry failure due to drought or destruction of plants by fire would force grizzly bears to range more widely than in normal periods of seasonal availability (Blanchard and Knight 1991). Therefore, grizzly bears face an increased risk of encounters with humans and ultimately human-caused mortality during the autumn season. Grizzly bears in some areas that avoided trails with human activity during part of the year changed this avoidance behavior when a favored berry resource came into season (Donelon 2004). Although grizzly bears still had a low tolerance for trails with high human activity, the tendency to approach areas of human activity when nutritional and energy needs are high could put individual bears at an increased risk of immediate conflict or condition them to the presence of people, which could lead to conflicts later in time.

Effects in the Action Area

The Forest has 27 developed sites in the action area that provide for recreational and/or administrative overnight stays. Developed sites can pose risks of unsecured attractants and food left by campers, hunters, and people using the sites. Habituated grizzly bears learn to seek out developed sites for food rewards. Habituation and food conditioning of grizzly bears is a concern in all grizzly bear populations. Throughout the distribution of grizzly bears, habituation/food conditioning remains a fairly serious risk to individual grizzly bears.

Attractant management is currently not required within the action area with the exception of the Anaconda-Pintler Wilderness area. Although not required elsewhere, the Forest can and sometimes does incorporate food storage requirements into proposed project alternatives. Food storage orders substantially reduce the potential for adverse effects to bears as a result of food conditioning and habituation at developed sites as well as dispersed human use. Without a food storage order within the action area (with the exception of the Anaconda-Pintler wilderness), there is potential for conflicts to occur between humans and any grizzly bears moving into or through the action area, possibly resulting in adverse effects to some individual grizzly bears. No grizzly bear-human conflicts have been reported to date within the action area. However, the potential for conflict between grizzly bears and humans is likely to increase, albeit slowly, as the density of grizzly bears increases within the action area.

In summary, no grizzly bear mortalities associated with improper food storage or site conflicts have been reported within the action area. However, improper storage of attractants and foods can present a risk of food conditioning grizzly bears. Thus, throughout the distribution of grizzly bears, habituation/food conditioning remains a risk to individual grizzly bears. Therefore, it is reasonable to expect that some risk of adverse impacts, though low (based on grizzly bear numbers, bear numbers are likely to increase slowly over time, and history of no attractant related conflicts in the area), to some grizzly bears related to attractant management exists over the life of the Forest Plan.

D. Vegetation Management

General Effects

Vegetation management may impact grizzly bears as a result of the short-term disturbance. Longer-term effects related to vegetation management include impacts to grizzly bear cover and forage. A decrease in the amount of cover may result in different effects to grizzly bears and their habitat. If cover is limiting in the project area, either by the amount or distribution, vegetation management may result in negative impacts (Ruediger and Mealy 1978). Reduced cover may increase the visibility of grizzly bears, which may potentially increase their vulnerability to illegal human-caused mortality and/or contribute to displacement from preferred habitats. However, if cover is not limited in a project area, timber harvesting may have either no effect or a positive effect in those situations where food abundance or distribution is improved. By removing or reducing overstory vegetation through harvesting, slashing and/or burning, sunlight reaches the forest floor or clearing and grizzly bear food production may be increased (Ruediger and Mealey 1978). This includes foods such as berries and succulent forbs.

In a study on use of harvested stands, Waller (1992) found that use of these stands increased during the berry season, due to some harvested stands having high berry production. If food production or distribution is improved but human activity is not controlled after the completion of harvest activities, negative impacts on grizzly bears may occur due to an increase in the potential for conflicts between humans and grizzly bears (Ruediger and Mealey 1978). Waller (1992) found that of the harvested stands that he studied, those with the highest grizzly bear use had limited access for people due to closed gates and/or over-grown roads. Grizzly bears within his study area that used harvested stands were found at higher elevations and spent little time in lower elevation stands where harvest was most common. Waller attributed this to human use of those lower, more accessible harvested stands. Waller also found that grizzly bears avoided stands where the vegetation had not recovered enough to provide security cover and preferred to use stands that were 30 to 40 years post-harvest.

Zager (1980) found that differences of shrub responses depended on the type of treatment that occurred post-harvest. Among the key shrub grizzly bear foods on clearcut sites where slash was bulldozer-piled before burning, Zager found a consistent decline in canopy coverage when compared to old burns. This is likely due to the extreme heat created by burning slash piles which may kill rhizomes and root crowns and bulldozer use which may also destroy rhizomes and root crowns. In those areas where slash was either broadcast burned or not treated, key grizzly bear shrub foods were generally found throughout the sites, except on skid roads and other severely disturbed areas. On relatively mesic sites, globe huckleberry, mountain-ash and serviceberry generally increased in cover.

Vegetation management activities that would occur during the grizzly bear denning season are not likely to impact grizzly bears. Snow is an excellent sound barrier (Blix and Lentfer 1992) and impacts to denning bears would likely be less in deep snow situations than in shallow snow conditions. It is likely that hibernating bears exposed to meaningless noise, with no negative consequences to the bear, habituate to this type of disturbance (Knight and Gutzweiler 1995).

Often, temporary roads are constructed and/or restricted roads are used in order to access harvest units. The impacts of roads are discussed above in the '*General Effects of Roads on Grizzly Bears*' and the '*Effects of Motorized Access in the Action Area*' sections above.

Helicopters may also be used in vegetation management projects, and in general reduce impacts to grizzly bears where they reduce or eliminate the need for new roads. Helicopter use may elicit a response in grizzly bears. Effects may range from a simple awareness of the helicopter, short-term disturbance or flight response, or displacement from an area. In timbered habitats, McLellan and Shackleton (1989) found that an overt avoidance or displacement response required high intensity helicopter activity, such as carrying equipment within 200 meters of a grizzly bear. Helicopter use that is short in duration and low in frequency, would not likely result in significant affects to grizzly bears. Extended helicopter use with multiple passes could interfere with the normal behavior patterns of grizzly bears. However, when considering long-term habitat effects, helicopter use does not use or require roads and may not pose the same chronic displacement effects or mortality risks that roads-based operations do. Helicopter use is a temporary event, whereas roads are typically chronic features on the landscape that facilitate access for people into bear habitat long after a project is complete. Consequently, while short-term helicopter activities may impact grizzly bears, they do not impart the same chronic habitat effects as roads. If repeated, low altitude flights continue into multiple seasons, the effects upon grizzly bear behavior (i.e., avoidance and more than just temporary displacement) may become more substantial.

The effects to grizzly bears of repeated, low altitude flight paths that follow open roads may be partially offset by the existing under-use of habitat in the immediate vicinity of the roads due to the "avoidance" by grizzly bears of habitat in close proximity to open roads. In many cases, the effects of helicopter logging that occurs in roaded habitat would have insignificant effects to grizzly bears. However, helicopter logging in areas that are not highly roaded could result in adverse effects to grizzly bears adapted to the use of more secure habitat. Thus, the effects of helicopter use on grizzly bears can vary significantly; effects will be determined through an analysis of site-specific activities and conditions in the area.

Effects in the Action Area

The Forest Plan identified 364,176 acres as suitable for timber production within the action area (approximately 30% of the action area). Site specific project analysis will determine the type and extent of harvest and potential effects to grizzly bears. Every proposed vegetation management project within the action area would consider potential effects to grizzly bears during the site specific project analysis process. Based on our history of consultation on vegetation management projects, information in our files, and the analysis under the '*General Effects of Vegetation Management*' section above, we do not anticipate that vegetation management activities by themselves would result in effects to grizzly bears that would be so significant as to impact breeding, feeding or sheltering.

Activities that occur along with vegetation management activities such as temporary road construction, restricted road use, or helicopter use may result in additional effects to grizzly bears. Such effects could range from insignificant to significant depending on site-specific information. The effects of temporary roads are discussed in the effects of motorized access section above. General effects of helicopter use are discussed above in the '*General Effects of Vegetation Management*' section. Potential effects that may occur as a result of temporary road use and/or helicopter use associated with vegetation management would be considered in a site-specific analysis. Although we anticipate more grizzly bears will inhabit the action area in the future, the number of bears is likely to be small relative to the size of the action area and numbers would increase slowly. Grizzly bears that may be affected by helicopter use or temporary roads over the life of the plan are likely to have options to move out of the area, given the low level of intra-specific competition for habitat.

In summary, with the exception of related motorized access management or helicopter use, we do not anticipate adverse effects as a result of vegetation management within the action area. Related motorized access and helicopter use may or may not result in adverse effects to grizzly bears and any effects would be considered in a site-specific analysis.

E. Fire Management

General Effects

Fire management may result in disturbance and displacement impacts to grizzly bears. Fire suppression activities involve the presence of humans and often include the use of motorized equipment. We expect that grizzly bears would likely leave an area on their own accord in advance of an approaching fire and therefore be out of the area associated with fire suppression activities. However, if suppression activities were to take place prior to an approaching fire, grizzly bears may still be in the vicinity. Some effects from disturbance may be caused by the overall increase in human activity in a particular area. These activities may include increased vehicular traffic, aerial support and fire camps, any of which may affect a grizzly bear prior to their leaving the area. The possibility of a direct encounter with a grizzly bear by a person or group of people involved in fire management activities is remote.

Indirect effects from fire suppression activities may result from opening previously closed roads, constructing new roads or temporary roads, constructing firebreaks, and/or constructing machine lines. These actions may temporarily contribute to the open and total road densities or may result in effects to grizzly bears similar to effect of roads on grizzly bears. Research has confirmed the adverse impacts of roads on grizzly bears (see the '*General Effects of Roads on Grizzly Bears'* section above). In addition, food and garbage storage at activity sites and camps may attract grizzly bears and contribute to risks. Such effects are also discussed above (see the '*Effects of Food and Attractant Storage and Habituation*' section above).

Wildland fires for resource benefit are typically allowed to burn where there is some degree of certainty that the fire would go out naturally or could be contained within predefined lines. These types of fires, when allowed to burn, can result in short-term negative effects and/or long-term beneficial effects depending on the vegetation species and fire severity. Some foraging habitat and/or cover may be affected in the short-term. However, natural fire often stimulates the understory and/or increases the vegetative diversity (forbs, grasses, berry-producing shrubs) in high quality grizzly bear habitat, benefitting grizzly bears in the long-term.

Fuels treatments could include prescribed fire, mechanical treatment, and/or chemical treatment. Refer to the '*General Effects of Vegetation Management'* section above for potential effects to grizzly bears.

Effects in the Action Area

Suppression efforts and use of prescribed burning would continue under the Forest Plan. The acres available for these activities and locations vary across the action area. The effects on grizzly bears associated with fire suppression and/or wildland fire for resource benefit would be analyzed in emergency consultation after the suppression activities are complete. A site-specific analysis of effects on grizzly bears and grizzly bear habitat as a result of fuel treatments, including prescribed burning, would occur prior to implementation of a project. Refer to the '*Effects of Vegetation Management in the Action Area*' section above for potential effects to grizzly bears. As mentioned above, such treatments by themselves would not likely result in adverse impacts to grizzly bears.

In summary, with the exception of related access management or helicopter use, we do not anticipate adverse effects as a result of fire management in the action area. Related access management and helicopter use may or may not result in adverse effects to grizzly bears and any effects would be considered in a site-specific analysis.

F. Energy and Mineral Development

General Effects

Energy and mineral development encompasses the location and extraction of mineral materials (e.g., sand, gravel, rock), the location and extraction of locatable minerals (e.g. gold, silver, copper), and mineral leasing for oil, gas, coal, geothermal resources, potassium, sodium, phosphates, oil shale, and sulfur, which includes exploration and surface occupancy (extraction). These types of development projects may result in loss of habitat within the footprint of the mine or development site, or associated roads. Disturbance to grizzly bears from road use and mining or energy development activities and displacement from habitat from road use or mine development may also occur as well as impacts to habitat connectivity. New roads leading to mining or energy development sites may provide access to grizzly bear habitats.

Effects in the Action Area

At this time no gas or oil developments occur within the action area. Although there are many active mining claims on the Forest, at this time there are no active mining operations. Minor activities such as surveying and collecting samples on a claim on NFS lands are allowed at any time, but no activities such as construction of roads, building cabins, or caching of food or equipment are authorized without further review. Before an active operation could begin, the claimant would have to file a notice of intent and a plan of operations with the Forest Service. A plan of operations would trigger the NEPA process and ESA Section 7 consultation. At this time there are no notices of intent or plans of operation on the Forest. The Forest also receives numerous requests for riprap material, sand, gravel, and decorative/landscaping stone. Pit or collecting areas open to the public do occur within the action area as well as gravel pits and roadside borrow areas used to provide rock for administrative use.

Given the small footprint and overall low level of mineral and energy development activity in the action area and the very low grizzly bear use of the action area, any grizzly bears that occur in the vicinity of activity related to mineral and energy development activities would likely have options to move to more undisturbed, available habitat. Any effects related to access management are covered in the access management section above. If grizzly bears are using the area in the vicinity of a proposed activity related to mineral development, we would expect some level of short-term disturbance from areas of activity. The effects of such are not likely to be adverse to grizzly bears.

G. Effects Summary for Proposed Action

In reviewing the effects of the Forest Plan, proposed Amendment, and Travel Plan on grizzly bears in the action area, Forest management that may have the potential to adversely impact grizzly bears include both wheeled motorized access and attractant storage. We do not anticipate adverse effects as a result of the Forest Plan, proposed Amendment, or Travel Plan as they guide general practices for over-the-snow motorized access, non-motorized access, livestock grazing, vegetation management, fire management, or energy and mineral development (except where these actions include access management or attractant storage). However, specific projects proposed under the Forest Plan with the proposed Amendment will need to undergo project-specific consultation, at which time additional information can be considered.

Effects related to access management and food and attractant storage will vary depending on site-specific information. Not all actions related to motorized access proposed under the Forest Plan will result in adverse effects. Very few grizzly bears have been verified on the Forest and most, if not all, have been males. We only expect adverse effects to grizzly bears related to motorized access management if, and when, female grizzly bears begin using the action area for reasons stated above.

If female grizzly bears begin to use the action area, specific areas with higher motorized route densities and/or lower amounts of secure habitat may lead to the under-use of suitable habitat by grizzly bears and may significantly impact some grizzly bears' ability to find food resources, breed and raise young, and find shelter. However, grizzly bears moving into the action area may be able to tolerate the existing amount of secure habitat, move through the action area, and possibly establish home ranges that optimize available resources, even outside of the Recovery Zone. Thus, not all female grizzly bears that may use the action area during the life of the Forest Plan will experience significant effects related to access management.

Human access into grizzly bear habitat can lead to the habituation of grizzly bears to humans. Habituation to human foods and attractants in turn increases the potential for conflicts between people and grizzly bears. Habituated grizzly bears often obtain human food or garbage and become involved in nuisance bear incidents, and/or threaten human life or property. These grizzly bears are considered food conditioned and generally experience high mortality rates as they are eventually destroyed or removed from the population through management actions.

Currently, no food and attractant storage order is in place within the action area with the exception of the Anaconda-Pintler wilderness area. No grizzly bear mortalities have been reported within the action area related to improper food storage. However, proper food and attractant storage is learned behavior and requires public cooperation. As grizzly bears increase in numbers and expand across the action area, we cannot rule out the potential risk that grizzly bears may become habituated and food conditioned and be subject to potential management removal at some time during the life of the Forest Plan. Therefore, it is reasonable to expect that some risk, albeit low (based on grizzly bear numbers and history of conflicts in the area), of adverse impacts to grizzly bears related to attractant management exists over the life of the Forest Plan.

Although the Forest's management of grizzly bear habitat may result in direct and indirect adverse effects on individual grizzly bears, we do not anticipate that these effects will have appreciable negative impacts on the grizzly bear populations at the range-wide scale. Nor will the effects appreciably affect recovery of grizzly bears in the Bitterroot Ecosystem, given the vastly remote nature of the Recovery Zone.

While few to no grizzly bears are currently known to exist in the action area, the cumulative interaction of the Forest Plan, Travel Management Plan, and Amendment serve to enhance connectivity between known grizzly bear populations and potential future grizzly bear populations that may inhabit the Bitterroot Ecosystem and the action area. The NCDE, Selkirk, and Cabinet-Yaak populations could serve as a source of grizzly bears for the Bitterroot Ecosystem. It would require movement of both male and female grizzly bears to establish a population in the Bitterroot Ecosystem, and because females disperse less often and for shorter distances than males, occupancy by female bears is likely to take much longer to achieve than the movement by male bears.

Several likely potential movement corridors exist on the Forest. Researchers have identified the northern end of the Sapphire Mountains as well as the southern end of the Bitterroot National Forest as potential areas for connectivity (Walker and Craighead 1997). Peck et al. (2017) modeled potential paths for male-mediated gene flow to and from an isolated grizzly bear population and also showed the potential for male grizzly bears to move through the action area though the Sapphire and Bitterroot Mountains. The Forest Plan, proposed Amendment, and

Travel Management Plan provide the opportunity for conditions that are compatible with supporting the movement of grizzly bears in many parts of the Forest, particularly given the extensive areas that provide secure habitat for grizzly bears in the action area.

The Forest has managed and will continue to manage the lands in such a way that has allowed grizzly bears to begin slowly expanding into the action area. Thus, although individual grizzly bears may be adversely affected at times over the life of the Forest Plan, including the proposed Amendment, and implementation of the Travel Plan, we anticipate that grizzly bear use will continue to increase within the Forest into the future.

VI. CUMULATIVE EFFECTS

The implementing regulations for section 7 of the Act define cumulative effects as those effects of future state, tribal, local, or private actions that are *reasonably certain to occur* in the action area considered in this biological opinion. According to section 7 regulations (402.17(a)), conclusion of *reasonably certain to occur* must be based on clear and substantial information, using the best scientific and commercial data available. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Due to the broad geographic scope of the Forest Plan and, therefore, the action area, it is difficult to comprehensively assess all of the future, non-Federal activities reasonably certain to occur in the action area that may affect the grizzly bear. This analysis of cumulative effects is based on an assessment of land ownership and use patterns, and the patterns of grizzly bear mortality caused by non-Federal activities, as discussed above in the *Status of the Species* and *Environmental Baseline* sections.

Within the action area, the Department of Natural Resources and Conservation (DNRC) manages the Sula State Forest as well as numerous small parcels scattered throughout the Bitterroot Valley. State lands within the action area were mostly burned during the fires of 2000 and were salvage logged shortly thereafter. Effects to grizzly bears were analyzed and consulted on for DNRC's Habitat Conservation Plan (Montana Department of Natural Resources 2010, Department of Interior, Fish and Wildlife Service 2018). The DNRC's state forest land management plan emphasizes intensively managing for healthy and biologically diverse forests to provide a reliable and sustained income. The state forest land management plan also directs the transportation system to be planned for the minimum number of road miles. DNRC will only build roads that are needed for current and near-term management objectives, as consistent with the other resource management standards. DNRC would determine the appropriate road density to meet Threatened and Endangered Species, Big Game, Sensitive Species, and Biodiversity Resource Management Standards, as well as road surface protection and other resource needs. (Montana Department of Natural Resources and Conservation 2010). State lands were not considered in the analysis above regarding secure habitat for grizzly bear. Any secure habitat that is provided would be in addition to the existing baseline previously analyzed

Montana Department of Fish, Wildlife and Parks (FWP) manages two Wildlife Management Areas (WMA) within the action area (Threemile and Calf Creek). The primary management goal of both WMAs is to provide winter range for elk and compatible recreational opportunities for the public. Public recreation in these areas may increase the likelihood of grizzly bear human interactions or displace grizzly bears, similar to the effects discussed for Forest lands. FWP has also completed a grizzly bear management plan for western Montana and southwestern Montana. These plans establish goals and strategies to manage and enhance grizzly bear populations and to minimize the potential for grizzly bear-human conflicts. A long-term goal is to allow the populations in western and southwestern Montana to reconnect through the intervening, currently unoccupied habitats. FWP is also very active in providing public information and education about conserving grizzly bears and their habitat. This includes bear management specialists, including one in Missoula near the action area, who provide information and assistance to landowners on appropriate ways to secure food and bear attractants and respond to reports of conflicts with bears. These specialist positions have a proven track record of resulting in a reduction of human-caused grizzly bear mortalities.

The State of Montana regulates hunting for black bears and other wildlife species. Hunting of grizzly bears has not been allowed in Montana since 1991. There is a potential for grizzly bear mortality by hunters to occur as a result of mistaken bear identification or self-defense, especially in proximity to the carcasses of harvested animals. MFWP provides a variety of public information and education programs, including a mandatory black bear hunter testing and certification program, to help educate hunters in distinguishing the two species, reducing the potential for mistaken identity. The potential exists, however, for grizzly bear mortality due to mistaken identity or defense of life from bear hunters or other hunters in the action area.

Private lands occur within and adjacent to the Forest. The human population within the action area has been growing over the past few decades and growth is expected to continue. Such growth is expected to result in an increase of residential development of private lands within the action area and can result in habitat loss, habitat fragmentation, and increases in human-grizzly bear conflicts. Recreation, livestock grazing, ranching and farming, and food and attractant storage issues on private land can create grizzly bear-human conflicts by providing attractants to grizzly bears. Once grizzly bears become habituated and a nuisance, they are typically removed. Human population growth could also result in additional grizzly bear attractants and further increase the potential for grizzly bear-human conflicts. As more people use private land and adjoining federal land for homes, recreation or business, the challenge to accommodate those uses in ways that continue to protect the grizzly bear population increases.

Recreation, livestock grazing, and attractant issues on private land will likely continue to create grizzly bear-human conflicts. However, large federal land ownership and large blocks of Wilderness, Wilderness Study Areas, and Inventoried Roadless Areas on the Forest within which human access is restricted by regulation and topography serve to reduce the impacts of larger residential human populations on grizzly bears. While federal land management cannot entirely compensate for such impacts on private land, management under the Forest Plan would continue to provide habitat for grizzly bears on Forest Service lands.

Any private individual's non-compliance with the Forest's access management restrictions is an illegal activity. While future illegal use of the Forest via motorized access in areas unauthorized for such use may occur within the action area, such illegal use is not considered a Forest (federal) action. Given past experiences on the Forest (as described in the *Environmental Baseline* section above), the Service believes some instances of illegal motorized use are reasonably certain to occur in the action area in the future. Therefore, we acknowledge cumulative effects to grizzly bears may occur as a result of illegal motorized access, but the information as to the length, duration, amount of use, type of use, and location, among other conditions, is and will continue to be unknown until such time that illegal use is discovered. The probability of long-term illegal motorized access and probability of illegal access coinciding with the presence of grizzly bears is anticipated to be low but is unknown. As such, the potential consequences to grizzly bears are uncertain. Illegal motorized access is expected to be spatially disparate and temporary and is not likely to collectively cause an adverse effect because most users follow travel regulations and when illegal use is observed or when user-created roads become apparent the Forest corrects the situation as soon as they are able.

VII. CONCLUSION

After reviewing the current status of grizzly bears, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our biological opinion that the effects of the continued implementation of the Forest Plan is not likely to jeopardize the continued existence of the grizzly bear. No critical habitat has been designated for this species therefore none will be affected. Implementing regulations for section 7 (50 CFR 402) define "jeopardize the continued existence of" as to "engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." Our conclusion that the Forest Plan is not likely to jeopardize the continued existence of grizzly bears is based on the information presented in the 2020 biological assessment (U.S. Forest Service 2020), correspondence during this consultation process, information in our files, and informal discussions between the Service, the Forest, and other personnel.

Forest Plan direction may occasionally result in adverse effects to individual grizzly bears over the life of the plan, particularly as a result of access management direction and inadequate food and attractant storage. Based on the best available scientific information reviewed in this consultation, adverse effects on grizzly bears as a result of the Forest Plan will not negatively impact the recovery of grizzly bears. Further, we expect the Forest Plan direction will result in conditions that support grizzly bear use of the Forest for dispersal or exploratory movements, and potentially some home range establishment at some point in the future, albeit at densities lower than those in the recovery zones. Such use of the Forest by grizzly bears may, over time, benefit grizzly bears. It is our opinion that the proposed action would not appreciably reduce the likelihood of both the survival and recovery of the grizzly bears as a species. Below we summarize key factors related to the effects of the Forest Plan on grizzly bears as detailed and analyzed in this biological opinion. Key points of our rationale for this non-jeopardy conclusion include, but are not limited to, the following factors:

- In 1993, the Recovery Plan articulated the conservation needs for the recovery of grizzly bears. The Recovery Plan stated that recovery zones include areas large enough and of sufficient habitat quality to support recovered grizzly bear populations, and that although grizzly bears are expected to reside in areas outside the recovery zones, only habitat within the recovery zone is needed for management primarily for grizzly bears. The action area lies outside of the recovery zones.

- The recovery plan strategy has been successful and has resulted in growth of the grizzly bear populations. Grizzly bears in the GYE, NCDE, and CYE populations have expanded into areas outside of the recovery zones. Based on the best available information, the Service concludes that the status of the both the GYEE and NCDE grizzly bear populations are robust and have reached or are nearing recovery. The population trend for the CYE has changed from declining to slightly increasing.

- The best information indicates that grizzly bear densities are currently low on the Forest. Grizzly bears have low reproductive rates, long generational times (about 10 years), and are slow to disperse across landscapes and so sufficient habitat is likely to be available to individual bears as intra-specific competition for resources would be low.

- Motorized routes in some portions of the action area may result in displacement of some female grizzly bears, if and when they occur in the action area, from key habitat at some time over the life of the Forest Plan. However, some grizzly bears are able to persist in areas with higher levels of human pressure, as documented by verified reports of grizzly bears, including females with cubs (indicating home range use), outside of the recovery zones. Based on the Forest Plan and decisions that have occurred to date and are anticipated to occur, the overall levels of open motorized routes within the action area will likely be reduced over the life of the Forest Plan. Most new road construction would be temporary. Most new permanent road construction is not expected to be open to the public (U.S. Forest Service 2020, p. 26).

- At this time, denning of grizzly bears has not been documented in the action area and the likelihood of grizzly bears denning in the action area anytime soon is low. Furthermore, in the near future, it is probable that any grizzly bear that moves into or through the action area will be males. The likelihood that an adult female bear will den and have cubs in the action area is low. As such, effects to denning grizzly bears within the action area would likely be discountable and/or insignificant.

- Lack of a food storage order in the action area may result in grizzly bear-human conflicts and grizzly bear mortalities at some point in the future. No reported grizzly bear conflicts or mortalities related to improper food or attractant storage have occurred to date within this area.

- Based on the number of grizzly bears that occur now and are likely to inhabit the Forest over the life of the Forest Plan, we do not anticipate high levels of conflict and/or grizzly bear mortality within the action area over the life of the Forest Plan. However, as grizzly bears increase in numbers and expand within the action area, we cannot rule out the potential risk that grizzly bears may become habituated and food conditioned and be subject to potential management removal at some time during the life of the Forest Plan. Therefore, it is reasonable to expect that some risk exists, albeit low (based on grizzly bear numbers and history of conflicts in the area), of adverse impacts to grizzly bears related to attractant management.

- Montana Fish, Wildlife and Parks' bear specialist program is expected to continue to work with the public to reduce risks to grizzly bears on private and public lands. In cooperation with other agencies, this program has made notable strides toward an informed public and reduced the availability of attractants to grizzly bears on private and public lands.

- No grizzly bear conflicts related to grazing or depredations on livestock have been documented in the action area. Based on the information for livestock grazing in the action area (no sheep allotments, very low amount of grizzly bear use, and the history of no livestock depredations), the likelihood of adverse impacts to grizzly bears related to livestock grazing in the action area during the life of the Forest Plan is very low. If the number of grizzly bears using the action area increases, the risk of conflicts with or depredations on livestock may also increase over time. For now and over the life of the Forest Plan (10 years) however, adverse effects related to grazing are unlikely.

- As previously explained, we also do not anticipate adverse effects as a result of vegetation management, fire management, or energy and mineral development, except for the potential effects that may be associated with access management and food and attractant storage discussed above.

- Even though much of the action area is outside of Grizzly Bear Recovery Zones, the Forest has managed and will continue to manage the lands in such a way that has allowed grizzly bears to expand into the action area. Thus, although individual grizzly bears may be adversely affected at times over the life of the Forest Plan, we anticipate that grizzly bears use will continue to increase within the Forest into the future.

- We do not anticipate any adverse effects to grizzly bears within the Bitterroot Ecosystem Recovery Zone related to access management, since the entire portion of the Recovery Zone in the action area is secure habitat, unaffected by roads.

Recovery zones were established to identify areas necessary for the recovery of a species and are defined as the area in each grizzly bear ecosystem within which the population and habitat criteria for recovery are measured. Recovery zones are areas adequate for managing and promoting the recovery and survival of grizzly bear populations (USFWS 1993). Areas within the recovery zones are managed to provide and conserve grizzly bear habitat. The recovery zones contain large portions of wilderness and national park lands, which are protected from the influence of many types of human uses occurring on lands elsewhere. Multiple use lands are managed with grizzly bear recovery as a primary factor. As anticipated in the Recovery Plan, grizzly bear populations have responded to these conditions, have stabilized, and are increasing or at or near recovered levels in some recovery zones. In addition, the grizzly bears have been expanding and continue to expand their existing range outside of the recovery zones, as evidenced by the verified records of grizzly bears in or near the action area.

Grizzly bears outside the recovery zones probably experience a higher level of adverse impacts due to land management actions than do grizzly bears inside. Currently, the number of grizzly bears on the Forest is very low. As anticipated in the recovery plan, we expect more grizzly bears will inhabit the Forest in the future, albeit slowly. We expect grizzly bears will occur in GBAUs on the Forest at much lower densities than within the Recovery Zone portion of the Forest, and at much lower densities than within other Recovery Zones. While the Forest Plan direction may have adverse effects on some of the individual grizzly bears that may use the action area now and into the future, considering the large size of the recovery zones, favorable land management within the recovery zones, and the robust status of the NCDE and GYE grizzly bear populations, adverse effects on grizzly bears as a result of continued implementation of the Forest Plan would not have negative effects on the status of grizzly bears. Therefore, we conclude that the Forest Plan is not likely to reduce the numbers, distribution, or reproduction of grizzly bears. Because the Forest Plan would not reduce the reproduction, numbers, or distribution of grizzly bears, and is located outside of the grizzly bear recovery zones, we conclude that the Forest Plan is not reasonably expected to reduce appreciably the likelihood of both the survival and recovery of grizzly bears. It is the Service's opinion that the effects of the Forest Plan on grizzly bears are not likely to jeopardize the continued existence of the grizzly bear.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations pursuant to section 4(d) of the Act, prohibit the take of endangered and threatened species, respectively without special exemption. *Take* is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. *Harm* is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. *Harass* is defined by the Service as an intentional or negligent act or omission that creates the likelihood of injury to listed wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. *Incidental take* is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement. This incidental take statement applies to the effects of access management and sanitation/food storage under the implementation of the Forest Plan.

The measures described below are non-discretionary and must be undertaken by the Forest so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Forest (1) fails to assume and implement the terms and conditions or (2) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Forest must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 C.F.R. § 402.14(i)(3)].

Amount or Extent of Take Anticipated

Access Management

Based on research detailed earlier in this biological opinion, the Service has defined harm of grizzly bears in terms of adverse habitat conditions caused by high motorized route densities, and thus the lack of secure habitat, which displace individuals from key habitat to the extent that significant under-use of habitat by grizzly bears may occur. Using the best information on the effects of roads on grizzly bears, we conclude low amounts of secure habitat in portions of the action area are likely to result in a level of adverse effects to some female grizzly bears at some point in the future, primarily those that attempt to establish and maintain home ranges in the action area during the life of the Forest Plan. Future road construction, permanent or temporary, may add to or increase the likelihood of such adverse effects. These adverse effects would result from displacement of grizzly bears from essential habitat. Displacement may result in significant under-use of key habitat when high linear road densities exist on the landscape or when secure habitat is low. The Service maintains that such under-use of otherwise suitable habitat within a grizzly bear's home range may constitute incidental take of grizzly bears through "harm" as a result of significant habitat alteration that impairs breeding, feeding and/or sheltering.

Based on information provided by the Forest and considered in this biological opinion, it reasonable to assume that the amount of secure habitat in the will not substantially decrease in the next decade. However, some construction of and use of new permanent and/or temporary roads may be required for projects, and these roads may affect secure habitat. Temporary or permanent effects to secure habitat may increase the likelihood of disturbance or displacement to grizzly bears in or near the project area. The Forest has estimated that over the next 10 years, new motorized route construction and use (permanent or temporary) may affect up to a maximum of 5% of secure habitat Action Area-wide, which roughly equates to 31,400 acres or 2.6% of the total Action Area acreage. The Forest anticipates a maximum amount of net change of no more than 5% for the proportion of any given GBAU that provides secure habitat. Most new permanent routes are not expected to be open to the public. Some temporary roads may be very short in duration while other temporary roads may remain on the landscape for several years and receive a more substantial amount of vehicular use.

Based on the lack of verified female grizzly bears or potentially very low number of female grizzly bears using the action area, and considering the low levels of intra-specific competition, we do not expect that high route densities or low amounts of secure habitat would result in any take of grizzly bears (through displacement) at this time. However, the effects of displacement may increase somewhat as grizzly bear numbers increase over the life of the Forest Plan (roughly 10 years). Existing road densities in some areas and continued presence of these roads under the Forest Plan, along with new permanent and/or temporary road construction may at some point over the next 10 years result in incidental take of some individual female grizzly bears attempting to establish or maintain home ranges in the action area.

We anticipate that in a limited number of circumstances, over the life of the Forest Plan given the proposed Amendment and continued implementation of the Travel Plan, site specific conditions may result in significant displacement of adult females from key seasonal habitat. Such displacement may impair their ability to find adequate food resources, breed and raise young, and/or find shelter. We do not anticipate any take of subadult or male grizzly bears. Male grizzly bears have larger home ranges than females, and males and subadults are more mobile and do not have the same energetic needs as adult females. We also do not anticipate take of grizzly bears that are transient (moving through areas outside of home range use). Such individuals are highly mobile and not restricted to finding food and shelter within a home range. Thus, while displacement may affect behavioral patterns such as feeding or sheltering, we do not anticipate such effects would cause injury to transient, subadult, or male grizzly bears.

As detailed in this biological opinion, we anticipate that existing access management as well as future motorized route construction, including permanent and/or temporary roads, would affect only a very few adult females over the life of the Forest Plan because grizzly bears occur at very low densities in the action area, and females are expected to occur and possibly increase only slowly over time in the action area. Also, substantial increases in road densities are not expected. If during the life of the Forest Plan, subadult females move into the action area seeking to establish a home range, they would be exposed to levels of roading that would factor in to home range selection, and that level of roading would not likely significantly increase over the life of the plan. Therefore, the take we anticipate would be harm to only a very low number of female grizzly bears inhabiting the action area over the life of the plan. We expect harm would be caused by significant under-use of key habitat in areas affected by high road densities to levels that result in decreased fitness and impaired reproductive potential. In other words, infrequently and in site-specific circumstances, an adult female grizzly bear wary of humans and human-generated disturbance may not breed at its potential frequency or may fail to complete gestation due to decreased fitness. We do not expect all adult female grizzly bears to suffer impairment of breeding, feeding, and/or sheltering, nor would we expect any female to experience permanent effects (lasting more than one reproductive cycle). Variables such as annual climate and resulting habitat and food resource conditions, the level of roading, and the number of grizzly bears using an area may change over time and are all factors influencing the displacement within a home range.

The effects of high road densities and lower amounts of secure habitat on individual female grizzly bears are difficult to quantify in the short term and may be measurable only as long-term effects on the species' habitat and population levels. The amount of take is difficult to quantify for the following reasons:

1) The amount of take would depend on the number of adult female grizzly bears impacted by the Forest Plan. We lack specific information on the precise number of adult female grizzly bears that will use the action area, but due to the location, number, and known-gender of verified grizzly bear occurrences in and near the action area, we reasonably assume very few adult females would be affected.
2) Individual grizzly bears would react differently to the disturbance. Not all adult female bears that are exposed to disturbances from high road densities would be adversely impacted to the point of take. Low numbers of grizzly bears would likely decrease intra-specific competition for habitat, allowing more options for individuals to move within home ranges, in many cases.
3) Some individual female grizzly bears that initially may be sensitive to disturbances may, over time, adjust to the routine disturbances generated by human activity over time.

Therefore, determining the precise amount of take, as defined by impaired reproductive potential (as affected by feeding and sheltering), is difficult. The amount of take would be also difficult to detect for the following reasons:

1) Grizzly bears are not easily detected or observed in the wild.
2) Reproductive rates of female grizzly bears vary naturally due to environmental and physiological causes.
3) A reduction in "normal" reproductive success is not discernable in the wild.
4) The reasons a grizzly bear fails to breed and/or failure to complete gestation are not discernable in the wild.

According to Service policy, as stated in the Endangered Species Consultation Handbook (March 1998) (Handbook), some detectable measure of effect should be provided, such as the relative occurrence of the species or a surrogate species in the local community, or amount of habitat used by the species, to serve as a measure for take. Take also may be expressed as a change in habitat characteristics affecting the species (Handbook, p 4-47 to 4-48). In instances where incidental take is difficult to quantify, the Service uses a surrogate measure of take. The number of grizzly bears that use the action area is unknown and female grizzly bears have yet to be verified within the action area. The mechanism of female grizzly bear dispersal makes it likely that in most of the action area, only relatively few female grizzly bears would occupy the action area during the life of the Forest Plan. Therefore, for reasons explained above, the Service anticipates that incidental take of adult female grizzly bears would be very low and occur only infrequently over the life of the Forest Plan in the form of harm related to the displacement effects of high road densities and temporary road construction and use.

We use the existing amounts of secure habitat in the action area, along with an additional 5% net reduction in secure habitat within the entire action area and a 5% net change in the proportion of any given GBAU that is secure habitat as our **first surrogate measures of incidental take**. These effects to secure habitat could be permanent reductions, due to construction of permanent roads, or they could be temporary reductions in the effectiveness of secure habitat due to construction or temporary use of roads or motorized routes. Thus the changes are thus anticipated as a net change from the baseline at any given point in time.

Table 4. Baseline secure habitat, and proportion of each GBAU that provides secure habitat for grizzly bears on the Bitterroot National Forest, Baseline and 5% reduction.

	Total Size of GBAU (acres)	Baseline Amount of Secure Habitat (acres)	Baseline % of GBAU Providing Secure Habitat	% of GBAU that is secure, given a 5% decrease from baseline %	Secure habitat acres in the GBAU given a 5% decrease from baseline % of GBAU that is secure
Bitterroot Ecosystem Recovery Zone in MT	245,677	244,737	100%	n/a[1]	n/a[1]
Burnt Fork Bitterroot River	100,140	32,580	33%	28%	28,039
Lost Horse Creek	88,114	50,150	57%	52%	45,819
Lower Bitterroot River	48,107	20,135	42%	37%	17,800
Lower East Fork Bitterroot River	88,665	12,662	14%	9%	7,980
Lower West Fork Bitterroot River	101,437	35,032	35%	30%	30,431
Skalkaho Creek	65,126	29,548	45%	40%	26,050
Sleeping Child Creek	96,619	13,568	14%	9%	8,696
Upper East Fork Bitterroot River	105,094	62,356	59%	54%	56,751
Upper West Fork East Bitterroot River	105,946	46,621	44%	39%	41,319
Upper West Fork West Bitterroot River	92,892	57,980	62%	57%	52,948
Warm Springs	58,175	21,836	38%	33%	19,198

[1]The Forest does not anticipate any net changes in secure habitat in the portion of the action area that is in the Bitterroot Ecosystem Recovery Zone in Montana. Therefore the 5% reduction does not apply.

Error! Reference source not found.4 displays the first surrogate measures of incidental take for the action area, using existing amounts of secure habitat in each GBAU. If the amount of secure habitat available in the action area is reduced by more than 31,400 acres (i.e. if the total amount of available secure habitat is less than 595,805 acres) in any given “bear year” over the life of the Forest Plan (10 years), then the level of incidental take we anticipated in our first surrogate measure of take would be exceeded and therefore the level of take exempted would be exceeded. Likewise, incidental take would be exceeded if the available amount of secure habitat is reduced by more than the amount shown in Table 4 such that the Forest reduces by more than 5% the proportion of the GBAU that is secure habitat in any given “bear year.” The “bear year” is defined as April 1 thru Nov 30. If the amount of secure habitat is reduced, permanently or temporarily, more than the amounts listed above at any point in the bear year, the incidental take will be exceeded.

We do not anticipate that motorized access management in all portions of the action area would result in incidental take as some areas within an analysis area may have relatively low open motorized route densities and/or relatively high amounts of secure habitat. We anticipate that the likelihood of incidental take of females would be highest in those areas with a higher amount of motorized routes and/or lower amounts of secure habitat. We also do not anticipate that all new permanent and/or temporary roads constructed in the action area would result in incidental take. This would depend on such things as location and length of the road and the duration it would be on the landscape, its effects on secure habitat, as well as the potential for female grizzly bear occurrence.

Over the life of the Forest Plan (10 years) if the Forest decreases secure habitat by more than a 5% net decrease (31,400 acres), then the level of incidental take we anticipated in our first surrogate measure of take would be exceeded and therefore the level of take exempted would be exceeded. Under CFR 402.16 (1), reinitiation of consultation would be required.

Food and Attractant Storage

Human access into grizzly bear habitat can lead to the habituation of grizzly bears to humans. Developed sites can pose risks of unsecured attractants and food left by campers, hunters, and people using the sites. Habituated grizzly bears learn to seek out developed sites for food rewards. Habituation to human foods and attractants in turn increases the potential for conflicts between people and grizzly bears. Habituated grizzly bears often obtain human food or garbage and become involved in nuisance bear incidents, and/or threaten human life or property. These grizzly bears are considered food conditioned and generally experience high mortality rates as they are eventually destroyed or removed from the population through management actions.

As the number of grizzly bears increase and the number of people residing in and visiting the Forest increases, the Service assumes that the potential for grizzly bear-human conflicts related to food and attractant storage will increase as well. Therefore, habituation/food conditioning of grizzly bears may occur in the action area over the life of the Forest Plan. The potential remains for the incidental take of grizzly bears in the form of harm through uses of the Forest where grizzly bears may become habituated to people and food conditioned to anthropogenic foods. Such habituation/food conditioning results in the modification and significant impairment of natural feeding behavior. This impairment is significant in that it may ultimately result in the removal or death of grizzly bears due to necessary management removal for defense of human life or property. Thus, the potential for incidental take of grizzly bears through habituation and food conditioning will remain.

Incidental take such as habituation and/or modification of natural feeding behavior is difficult to quantify or detect. As explained earlier, in such cases the Service uses a surrogate measure of take. In this case, we anticipate that **the second surrogate measure of incidental take** resulting from the Forest Plan in the form of harm is proportional to the number of grizzly bears that are removed or killed within the action area for defense of human life or property, as a result of obtaining anthropogenic food or other attractants due to inadequate storage. We base this surrogate on the fact that both the level of take through harm and grizzly bear mortalities will be related to level of bear use in an analysis area, the level of human use, and whether a food storage order is in place or not.

The Forest Plan does not include a food and attractant storage order except in the Anaconda-Pintler wilderness area. No grizzly bear-human conflicts have been reported to date in the action area. However, without a Forest-wide order that includes the entire action area, the potential for conflicts between grizzly bears and humans remains more elevated than in areas with a food storage order.

Grizzly bears occur at very low numbers across the action area. As explained previously, we expect the number of grizzly bears to increase, but only slowly, over time during the life of the Forest Plan. As more grizzly bears begin to move through or frequent areas within the action area, we cannot rule out the possibility of conflict between grizzly bears and people as a result of inadequate food and attractant storage. Based on this information, we anticipate that **no more than one grizzly bear will be removed from the action area** during the life of the Forest Plan for management purposes related to food and attractant storage issues on National Forest System lands administered by the Bitterroot National Forest. This represents our surrogate measure for incidental take of grizzly bears in the form of harm through habituation and/or modification of natural feeding behavior in the action area due to Forest actions or lack of an order to require food and attractant storage. Bears removed for purposes other reasons would not be subject to this measure of take.

Therefore, should more than one grizzly bear be killed or removed from the action area at any time during for the life of the Forest Plan because it has become habituated in relation to food and attractant storage on National Forest System lands administered by the Bitterroot National Forest, incidental take will be exceeded and the Forest must reinitiate consultation with the Service. Additionally, should the level of incidental take associated with food and attractant storage reach, but not exceed, the anticipated incidental take level for either area, the Forest should informally consult with the Service regarding the adequacy of existing mechanisms to minimize potential take.

Effect of the take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. The amount of incidental take described above is low. As detailed in this opinion, and according to the 1993 recovery plan (U.S. Fish and Wildlife Service 1993), the Forest Plan covers actions on lands outside of the recovery zones. Further, considering the grizzly bear recovery strategies (U.S. Fish and Wildlife Service 1993), incidental take of grizzly bears in the action area would not affect the recovery of grizzly bears. Finally, we expect that the Forest Plan direction would support at least a low number of grizzly bears that move through or live within the action area, which may benefit these grizzly bear populations over the long term. Critical habitat has not been designated for the grizzly bear, therefore none would be affected.

Reasonable and Prudent Measures

Biological opinions provide reasonable and prudent measures that are expected to reduce the amount of incidental take. Reasonable and prudent measures are those measures necessary and appropriate to minimize incidental take resulting from proposed actions. Reasonable and prudent measures are nondiscretionary and must be implemented by the agency in order for the exemption in section 7(o)(2) to apply. The Service has determined that the continued implementation of the Forest Plan adequately reduces the potential for and minimizes the effect of any incidental take that may result. Therefore, no reasonable and prudent measures are necessary.

Terms and Conditions

As explained above, the Forest Plan will reduce the potential for or minimize the effect of incidental take. No additional reasonable and prudent measures are necessary, therefore no terms and conditions are needed with the exception of the reporting requirements.

Reporting Requirements

To demonstrate that the Forest Plan is adequately reducing the potential for and minimizing the effect of any incidental take that may result, the Forest shall complete a biennial monitoring report and submit it to the Service's Montana Field Office by March 1 of each odd-numbered year for the life of the Plan. The report shall include:

1. A bi-annual report detailing current access management parameters within the action area, as related to metrics used to assess access management in this biological opinion. In particular, the report should include:
    - acres of secure habitat within each GBAU
    - total acres of secure habitat in the action area

2. An up-to-date record of grizzly bear-human conflict and/or the management removal of a grizzly bear resulting from improper storage of food or attractants. Notify the Service's Montana Field Office, within 72 hours of any grizzly bear-human conflict resulting from improper storage of food or attractants and/or the management removal or human-caused death of a grizzly bear due to food or attractant storage issues on the Forest.

Closing Statement

The Service is unable to precisely quantify the number of grizzly bears that will be incidentally taken as a result of the Forest Plan. Therefore, we use surrogate measures for the amount of incidental take we anticipate. We use the existing levels of access management as well as future potential changes in secure habitat as our surrogate measure of incidental take related to access management. We anticipate that no more than one grizzly bear will be removed from the action area related to food and attractant storage for the life of the Forest Plan.

We determined that the Forest Plan, with its incorporated objectives, goals and standards, adequately reduces the potential for and minimizes the effect of any incidental take that may result. Therefore, reasonable and prudent measures, with their implementing terms and conditions, were not provided. However, reporting requirements were included in order to demonstrate that the Forest Plan is adequately reducing the potential for and minimizing the effect of any incidental take that may result. If, during the course of the action, the level of take occurring exceeds that anticipated in this incidental take statement, such incidental take represents new information requiring reinitiation of consultation and review of the incidental take statement. The federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Sections 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility for the species.

1. Continue to manage access on the Forest to achieve lower road densities and high secure habitat, particularly in areas important for connectivity for grizzly bears. By managing motorized access, several grizzly bear management objectives could be met including: (1) minimizing human interaction and potential grizzly bear mortality; (2) minimizing displacement from important habitats; (3) minimizing habituation to humans; and (4) providing relatively secure habitat where energetic requirements can be met (Interagency Grizzly Bear Committee 1998). Additionally, lower road densities and higher secure habitat would also benefit other wildlife and public resources.

2. The presence of attractants is a major factor leading to the food conditioning and habituation, and the eventual direct mortality or management removal of grizzly bears. The Service recommends that the Forest add food storage requirements to permits and contracts when planning projects and pursue a Forest-wide food storage order. As grazing permits are evaluated, the Service recommends the Forest discuss with permittees their plans for timely removal of livestock carcasses and consider adding prohibitions on feeding supplemental grains or other livestock feed on grazing allotments. Management of garbage, food and livestock feed storage benefits grizzly bears as well as black bears and other carnivores. Human/carnivore and livestock/carnivore interactions would also be reduced, leading to a public safety benefit.

3. Grizzly bears concentrate in certain areas during specific time periods to take advantage of concentrated food sources or because the area provides a high seasonal food value due to diversity in vegetation and plant phenology (e.g., important spring for fall range). As grizzly bears begin using the Forest more regularly, where grizzly bear use is discovered or likely to occur and where practicable, delay disturbing activities during the spring in spring habitats to minimize displacement of grizzly bears.

4. Education for Forest visitors (including hikers, bikers, hunters, campers, and snowmobilers, among others) as well as Forest staff and contractors, continues to be an important part of reducing disturbance to bears and reducing the chances of negative human-bear interactions. Continue to work collaboratively with the IGBC, MT Fish Wildlife and Parks bear management specialists, U.S. Fish and Wildlife Service grizzly bear specialists, and non-government organizations to promote training in the use of bear spray, bear identification, and other ways to reduce conflicts with and mortality of grizzly bears.

REINITIATION NOTICE

This concludes consultation on the effects of the continued implementation of the Forest Plan, including the proposed Elk Amendment and implementation of the Travel Management Plan, on grizzly bears. As provided in 50 C.F.R. § 402.16, reinitiation of formal consultation is required and shall be requested by the federal agency or by the Service, where discretionary federal involvement or control over the action has been retained or is authorized by law and: (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat designated that may be affected by the identified action.

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Matthew Anderson
Forest Supervisor Bitterroot National Forest
Main Street
Hamilton, MT 59840
CC: Jodi Bush USFWS

RE: Grizzly Bear Consultation

Supervisor Anderson,

This letter is in response to persistent grizzly bear sightings on the Bitterroot National Forest (BNF) and adjacent lands going back to 2004, including two in 2021 (one at St Mary's Lookout and another in the East Fork). We urge you to initiate and complete a forest-wide amendment for grizzly bears that develops BMUs, establishes an Incidental Take Statement and limit on the Forest, and adopts Amendment 19 from the Flathead Forest Plan as the motorized access standard. The Endangered Species Act applies not just to the entire population of the grizzly bear, but to individuals as well, wherever they go. The current Forest Plan fails to protect these individuals.

In the recent ruling on the Flathead Forest Plan (Attachment 1), forests must consider the direct, indirect, and cumulative effects of proposed actions on the entire population of grizzly bears in the lower 48. The recent five-year review (Attachment 2) published by United States Fish and Wildlife Service (FWS) emphasizes the importance of connectivity to grizzly bear recovery. "The uncertainty associated with the stressors of human-bear conflicts, human population growth, and potential **reductions in connectivity** further represent a possible reduction in overall viability of the grizzly bear in the lower-48 States in the foreseeable future." (Attachment 1 at 21, emphasis added).

The current BNF Forest Plan does not recognize the presence of grizzly bears on the Bitterroot National Forest or its role in connectivity to the Bitterroot Recovery Area and its eventual recovery. It does not include bear management units (BMUs) or secure core habitat and road density standards.

In regards to the Bitterroot Ecosystem (BE), the review states, "Approximately 98 percent of the BE recovery zone is designated Wilderness, but the condition of large intact blocks of land is moderate because **motorized access standards have not been developed for the recovery zone or for adjacent areas to the north and east,** where female occupancy is necessary for natural recolonization of the BE." And, "Despite its relative isolation from other ecosystems, recent sightings suggest that **inter-ecosystem connectivity is possible**, although currently very low for the BE" (Attachment 2 at 9, emphasis added).

In contrast to the Bitterroot Ecosystem, habitat for bears in the other Recovery Areas is delineated by forest plans into BMUs where total and open road densities are limited in order to reduce human caused bear mortality and increase habitat security. Recent sightings, recent court decisions, and an emphasis on connectivity in the five-year status review call for BNF to now consider its role as a linkage zone and recognize its importance in the reentry of the grizzly bear into the Bitterroot Recovery Area.

If BNF does not wish to go the route of Amendment, it is still obligated to initiate re-consultation on the impacts of the Forest Plan on grizzly bears in light of the new information. The Lolo National Forest is currently updating their grizzly bear consultation of 2017 due to grizzly bear presence on the Forest and a recent court decision (Attachment 3). BNF should do the same."

We look forward to hearing your response on this matter.

Thanks for your time and consideration.

Jim Miller, President
Friends of the Bitterroot

GRIZZLY BEAR IN THE LOWER-48 STATES

(*Ursus arctos horribilis)*

5-Year Status Review:
Summary and Evaluation

Photo Credit: Jennifer Fortin-Noreus, USFWS

U.S. Fish and Wildlife Service
Upper Colorado Region
Denver, Colorado

March 2021

U.S. FISH AND WILDLIFE SERVICE
5-YEAR STATUS REVIEW for
GRIZZLY BEAR IN THE LOWER-48 STATES
(*Ursus arctos horribilis*)

Species Reviewed: Grizzly bear (*Ursus arctos horribilis*) in the conterminous United States (lower 48-States)

Federal Register Notice of Listing Determination:
- July 28, 1975. Amendment Listing the Grizzly Bear of the 48 Conterminous States as a Threatened Species (40 FR 31734).

Federal Register Notice Announcing Initiation of this Review:
- January 14, 2020. Initiation of 5-Year Status Review of Grizzly Bear (*Ursus arctos horribilis*) in the conterminous United States; request for information (85 FR 2143).

Lead Region: Legacy Region 6, Interior Regions 5 and 7, Grizzly Bear Recovery Office, Hilary Cooley, Grizzly Bear Recovery Coordinator, 406–243–4903; hilary_cooley@fws.gov.

Classification: Threatened

Methodology used to complete this review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973 (16 U.S.C Section 1531 *et seq.*), as amended (Act), the purpose of a 5-year status review is to assess each threatened and endangered species to determine whether its status has changed and it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. Status reviews are to be completed in accordance with Sections 4(a) and 4(b) of the Act (16 U.S.C. Section 1533(c)). We solicited data for this 5-year status review, and the associated Species Status Assessment (SSA) report, from interested parties through a January 14, 2020, *Federal Register* notice announcing this review (85 FR 2143). We reviewed all information that we received and incorporated information relevant to our analysis in our SSA report (Service 2021, entire). Information that we received from this data call relevant to our analyses included: summaries of conservation actions by the U.S. Forest Service (USFS), Idaho Department of Lands, and Washington Department of Fish and Wildlife (WDFW); monitoring information from Idaho's Office of Species Conservation, Idaho Department of Fish and Game (IDFG), and WDFW; and information from non-governmental organizations (NGOs) and other interested parties on potential threats. We did not consider or incorporate comments that were outside the scope of our SSA or 5-year status review, such as comments related to our authorities under the Act.

The grizzly bear is listed as threatened under the Act in the conterminous United States, which comprises the lower-48 States, and this listed entity is the subject of our SSA report and this 5-year status review. Unless specified otherwise, throughout this document, we use the term "the grizzly bear in the lower-48 States" to refer to the entity currently listed as a threatened species under the Act. In other words, we use the term "lower-48 States" synonymously with "conterminous United States." Additionally, we use the term "ecosystem" to refer to individual populations of this listed entity; these two terms are synonymous.

REVIEW ANALYSIS

Overview of the Species Status Assessment Process

The SSA report provides the U.S. Fish and Wildlife Service's (Service's) comprehensive biological status review for the grizzly bears in the lower-48 States, including a thorough account of the grizzly bear in the lower-48 States' current and future viability, or the "ability of a species to sustain populations in the wild over time" (Service 2016, p. 21; Service 2021, entire). Scientific experts contributed to our analysis, and the draft SSA report was independently peer reviewed and reviewed by partners, including those from State wildlife agencies, Federal agencies, and Tribal wildlife agencies. The results of the independent peer review of the draft SSA report are available online on the Service's Science Peer Review webpage (*https://www.fws.gov/mountain-prairie/science/peerreview.php*). We incorporated the results of the peer and partner review into our SSA report. The SSA report is available online on the Service's grizzly bear webpage (*https://www.fws.gov/mountain-prairie/es/grizzlybear.php*) or at *https://ecos.fws.gov/ecp/species/7642*. For informational purposes, the SSA report also provides a summary of recovery planning and recovery progress for the grizzly bear in the lower-48 States (Service 2021, pp. 73–94).

The SSA report provides the best available biological information to inform our recommendation on the status of the grizzly bear in the lower-48 States under this 5-year status review. This includes resource needs and current and future conditions, which we describe in terms of the conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 307–310; Wolf *et al.* 2015, entire; Smith *et al.* 2018, entire; Service 2021, pp. 31–33). The SSA therefore provides the scientific analysis for the 5-year status review. The following discussion presents a summary of the results and conclusions of the SSA report (Service 2021, entire).

For this SSA, we defined viability as the ability of the grizzly bear in the lower-48 States to sustain populations in natural ecosystems over a biologically meaningful timeframe, which, in this case, we defined as the middle of the 21st century (2050 to 2065), or 30 to 45 years into the future. This timeframe is a period that captures approximately two to three grizzly bear generation intervals (10 to 15 years each), a period of time over which the effects of any stressors on the population would be detectable.(Service 2021, p. 228). This timeframe is also a period that allows us to reasonably project conservation efforts, actions, and the potential effects of various stressors (Service 2021, p. 228).

To assess the viability of the grizzly bear in the lower-48 States, we used the three conservation biology principles of resiliency, redundancy, and representation, collectively known as the 3Rs (Shaffer and Stein 2000, pp. 307–310; Wolf *et al.* 2015, entire; Smith *et al.* 2018, entire; Service 2021, pp. 31–33). In short:

- Resiliency is the ability for populations to persist in the face of stochastic events, or for populations to recover from years with low reproduction or reduced survival, and is associated with population size, growth rate, and the quality and quantity of habitats;

- Redundancy is the ability for the species to withstand catastrophic events, for which adaptation is unlikely, and is associated with the number and distribution of populations; and
- Representation is the ability of a species to adapt to changes in the environment and is associated with its diversity, whether ecological, genetic, behavioral, or morphological.

For our analysis, we identified the grizzly bear in the lower-48 States' ecological requirements for survival and reproduction at the individual, population, and lower-48 States levels, and described the factors, both positive and negative, that influence the viability of the grizzly bear in the lower-48 States, currently and into the future. We then evaluated the listed entity's current levels of resiliency, redundancy, and representation, and projected plausible changes to these 3Rs into the future; considered together, the current and future levels of resiliency, redundancy, and representation characterize the viability of the grizzly bear in the lower-48 States (Service 2021, pp. 31–33).

Summary of Species Status Assessment for Grizzly Bears in the Lower-48 States

Summary of Life History, Ecology, Range, and Distribution from the SSA

Our SSA report provides our full account of the life history, ecology, range, and historical and current distribution for the grizzly bear in the lower-48 States (Service 2021, pp. 40–72), which we summarize here. The grizzly bear is a large, long-lived mammal that occurs in a variety of habitat types in portions of Idaho, Montana, Washington, and Wyoming. Grizzly bears hibernate in the winter, typically in dens, feed on a wide variety of foods, weigh up to 363 kilograms (800 pounds), and live more than 25 years in the wild. Grizzly bears are light brown to nearly black and are so named for their "grizzled" coats with silver or golden tips. Grizzly bears are a member of the brown bear species (*U. arctos*) that occurs in North America, Europe, and Asia. The subspecies *U. a. horribilis* is limited to North America, and is the subspecies that occurs in the lower-48 States (Rausch 1963, p. 43; Servheen 1999, pp. 50–53). Grizzly bears have three life stages: dependent young, subadults, and adults.

Historically, the grizzly bear occurred throughout much of the western half of the contiguous U.S., central Mexico, western Canada, and most of Alaska. An estimated 50,000 grizzly bears were distributed in one large contiguous area throughout all or portions of 18 western States (i.e., Washington, Oregon, California, Idaho, Montana, Wyoming, Nevada, Colorado, Utah, New Mexico, Arizona, North Dakota, South Dakota, Minnesota, Nebraska, Kansas, Oklahoma, and Texas) (Servheen 1990, pp. 1–2; Servheen 1999, pp. 50–51). Populations declined in the late 1800s with the arrival of European settlers, government-funded bounty programs, and the conversion of habitats to agricultural uses. When the Service listed the grizzly bear in the lower-48 States as threatened under the Act in 1975, grizzly bears had been reduced to less than two percent of their former range in the lower-48 States; at the time, the estimated population in the lower-48 States was 700 to 800 individuals. In 1975, only five areas in mountainous regions, national parks, and wilderness areas contained populations. These five areas were the Northern Continental Divide in northwest Montana; the Greater Yellowstone area in northwest Wyoming, eastern Idaho, and southwest Montana; the Cabinet-Yaak Mountains in northeast Idaho and northwest Montana; the Selkirk Mountains in northwest Idaho and northeast Washington; and the North Cascades range in northcentral Washington. At the time of listing, grizzly bears were believed to also exist in two additional areas: the Bitterroot Mountains in central Idaho and western Montana, and the San Juan Mountains in Colorado (Service 2021, pp. 52–54). The Grizzly Bear Recovery Plan refers to these areas as grizzly bear ecosystems (Service 1993, p. 10). In 1993, the Service designated six of these areas as recovery areas, and recommended further evaluation of the seventh, the San Juan Mountains, to determine recovery potential (Service 1993, p. 121).

Grizzly bear populations in the lower-48 States have expanded considerably, both in terms of size and range, since the time of listing in 1975 and now occupy approximately 6 percent of their historical range in the lower-48 States (Haroldson *et al.* 2020a, *in press*). Currently, grizzly bears primarily exist in four ecosystems: the Northern Continental Divide (NCDE), Greater Yellowstone (GYE), Cabinet-Yaak (CYE), and Selkirk (SE) ecosystems (see Figure 1 below). Current populations in the NCDE, CYE, and SE extend into Canada to varying degrees. Although there is currently no known population in the North Cascades, it constitutes a large block of contiguous habitat that spans the international border with Canada. There is also no known population in the Bitterroot (BE), nor are there known populations outside the six defined ecosystems, although we have documented bears, primarily solitary, between the six ecosystems. As illustrated in Table 1 below, current estimates, as of 2019, suggest there are at least 1,913 individuals in the lower-48 States (737 in the GYE Demographic Monitoring Area (DMA), 1,068 in the NCDE, 55–60 in the CYE, and a minimum of 53 in the U.S. portion of the SE, although some bears have home ranges that crossed the international border) (Service 2021, p. 63; Costello 2020, *in litt.*; Haroldson *et al.* 2020b, p. 13; Kasworm *et al.* 2020a, p. 40; Kasworm *et al*. 2020b, p 19).

Table 1. Current population estimates of grizzly bears in the six ecosystems in the lower-48 States (NCDE = Northern Continental Divide Ecosystem; GYE = Greater Yellowstone Ecosystem; CYE = Cabinet-Yaak Ecosystem; SE = Selkirk Ecosystem; and BE = Bitterroot Ecosystem).

Ecosystem	Estimated Number of Bears	Citation
GYE (as measured in the Demographic Monitoring Area)	737	Haroldson *et al.* 2020b, p. 13
NCDE	1,068	Costello 2020, *in litt.*
CYE	55-60	Kasworm *et al.* 2020a, p.40
SE	Minimum of 53 in U.S. portion, B.C. estimate in progress	Kasworm *et al.* 2020b, p. 19
BE	No known population	
North Cascades	No known population	

For the purposes of our SSA, we refer to populations of the grizzly bears using the names of their respective ecosystems in the lower-48 States (Service 2021, pp. 34–37). As described in our recovery planning documents for grizzly bears, ecosystems are areas that have the potential to provide adequate space and habitat to maintain the grizzly bear as a viable and self-sustaining species (Service 1993, p. 33). The Service has not defined ecosystem boundaries for any of the ecosystems across the lower-48 States but, for the purposes of our analysis, ecosystems are generally the larger area surrounding the recovery zone in which grizzly bears may be anticipated to occur as part of the same population (Figure 1). For the GYE and NCDE, the ecosystems also include the DMAs outlined in Figure 1 below. For our SSA, we evaluated resiliency, redundancy, and representation at the scale of the six ecosystems identified in the 1993 Recovery Plan (Service 1993) and illustrated in Figure 1 below. Our SSA report provides additional detail regarding these recovery areas and summarizes recovery planning and recovery progress for the grizzly bear in the lower-48 States (Service 2021, pp. 73–94).

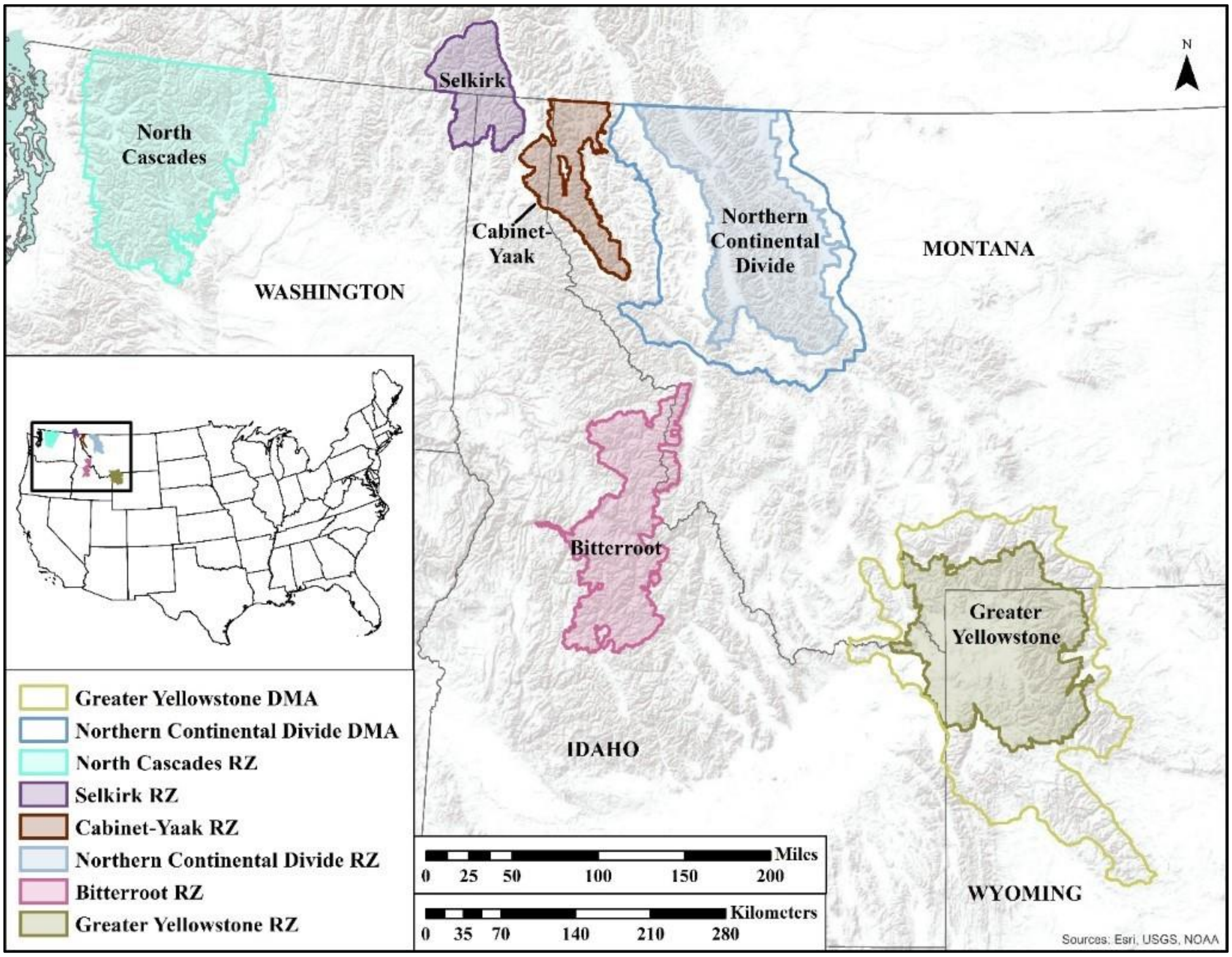

Figure 1. Recovery zones (RZ) and demographic monitoring areas (DMA), where applicable, for the six ecosystems identified in the Recovery Plan: the Northern Continental Divide (NCDE), Greater Yellowstone (GYE), Cabinet-Yaak (CYE), Selkirk (SE), Bitterroot (BE), and North Cascades ecosystems. DMAs surround and include the recovery zones in the GYE and NCDE. The SE recovery zone includes part of Canada because the habitat in the U.S. portion was thought to not be of sufficient size to support a minimum population (Service 1993, p. 12) and the biological population (comprised of contiguous occupied habitat) extends into Canada up to B.C. Highways 3 and 3A (Proctor et al. 2005, p. 2410; Proctor et al. 2012, p. 14).

Summary of Needs from the SSA

Here we summarize what individual grizzly bears in the lower-48 States need to breed, feed, and shelter. We also summarize the results of our analysis regarding the factors that ecosystems need to be resilient and the factors that the grizzly bear in the lower-48 States need to be redundant and representative, with greater detail provided in our SSA report (Service 2021, pp. 7, 95–98).

In general, food, water, mates, cover, security, and den sites drive a grizzly bear's habitat needs and daily movements. Grizzly bears in the lower-48 States need access to large, intact blocks of land with limited human influence that provide cover, high-caloric foods, dens, and areas for dispersal. The specific quality and quantity of these resources influence the ability of individual grizzly bears to reproduce, grow, and survive at different life stages (Service 2021, pp. 96–97). These resources support resilient ecosystems, which may be characterized generally by grizzly bear abundance, population trends, survival rates, fecundity, and connectivity levels sufficient to withstand environmental stochasticity (Service 2021, p. 97). The grizzly bear in the lower-48 States needs to occur in multiple, resilient ecosystems distributed across a broad geographic range in order to meet redundancy requirements and withstand catastrophic events (Service 2021, pp. 97–98). Specific quantities or qualities needed for each of these factors may vary by ecosystem. Additionally, the grizzly bear in the lower-48 States needs genetic and ecological diversity in order to preserve variation and the ability to adapt to changing conditions (Service 2021, p. 98).

Summary of Cause-and-Effects from SSA: Stressors and Conservation Efforts

As documented in our SSA report, we evaluated stressors and other actions that can positively or negatively affect grizzly bears at the individual, ecosystem, or lower-48 States levels, either currently or into the future (see Figure 3 in Service 2021, p. 9; Service 2021, pp. 99–211). A wide variety of stressors may influence the resiliency of the listed entity, either by directly affecting individuals or by reducing the quality and quantity of habitats. The stressors, or negative factors, we evaluated fit into three broad categories: those with habitat-related effects, sources of human-caused mortality, and other stressors. These stressors are interrelated to varying degrees; for example, motorized access influences both habitat availability and human-caused mortality. Positive actions, in the form of conservation efforts such as land protections and regulations, have reduced sources of habitat degradation and human-caused mortality. These efforts have improved resiliency from levels at the time of listing in four of the six ecosystems, and will be important to the viability of the grizzly bear in the lower-48 States in the future.

Stressors with potential habitat-related effects that we analyzed include: motorized access and its management; developed sites; livestock allotments; mineral and energy development; recreation; vegetation management; habitat fragmentation; development on private lands; and activities that may disturb dens. Sources of human-caused mortality that we evaluated include: management removals; accidental killings (e.g., train and vehicular strikes); mistaken identity kills; illegal killings; and defense of life kills. We also evaluated other stressors including: natural mortality; connectivity and genetic health; changes in food resources; effects of climate change; and catastrophic events, such as widespread wildfires, earthquakes, and volcanic eruptions.

There are a variety of conservation efforts and mechanisms that either reduce or ameliorate stressors or improve the condition of habitats or demographics for the listed entity. These conservation efforts or mechanisms include: Federal land protections, such as the Wilderness

Act and Inventoried Roadless Areas (IRAs); State and private forestlands with motorized restrictions; habitat improvements/vegetation management; attractant removal and community sanitation measures, such as food storage orders; conservation easements that provide long-term habitat protection; information and education programs; effective law enforcement; and augmentation or translocation programs. Our SSA report provides our full analysis of stressors and conservation efforts (see Figure 3 in Service 2021, p. 9; Service 2021, pp. 99–211).

Summary of Current Condition from the SSA

In our SSA report, we evaluate current condition by examining current levels of resiliency in the six grizzly bear ecosystems and their contributions to redundancy and representation to the grizzly bear in the lower-48 States. Below, we summarize our evaluation of current condition for each of the 3Rs, with additional detail regarding our analysis provided in the SSA report (Service 2021, pp. 212–227).

Summary of Current Resiliency

We describe the resiliency for each of the six ecosystems in terms of the habitat and demographic factors needed by the grizzly bear in the lower-48 States (Service 2021, pp. 37–39, 212–215). We developed a categorical model to calibrate resiliency based on a range of conditions for two habitat factors (natural, high-caloric foods and large intact blocks of land) and six demographic factors (adult female survival, abundance as measured by population targets and number of bears, population trend, fecundity, inter-ecosystem connectivity, and genetic diversity) (Service 2021, pp. 212–215). We selected these habitat and demographic factors based on their importance to resiliency and because we could evaluate them relatively consistently across all six ecosystems. We then used this categorical model as a key to evaluate resiliency for each ecosystem by systematically evaluating the current condition of each habitat and demographic factor. To calculate an overall score for resiliency, we assigned weighted values to the resiliency categories and then calculated a weighted average of the habitat and demographic factor ranking (Service 2021, p. 214). Populations in higher resiliency categories are at less risk from potential stochastic events, such as extreme weather events, than populations in lower resiliency categories (Service 2021, p. 214). Our SSA report provides additional detail regarding the methodology we used to evaluate resiliency for each of the six ecosystems (Service 2021, pp. 212–215).

Table 2 summarizes our evaluation of current resiliency for each ecosystem. Of the six ecosystems, two ecosystems currently have high resiliency, the GYE and NCDE; one ecosystem has moderate resiliency, the SE; and one ecosystem has low resiliency, the CYE (Service 2021, pp. 218–222). Two ecosystems have no resiliency, the BE and North Cascades (Service 2021, pp. 217, 222–224).

Table 2. Current condition for six ecosystems for grizzly bear in the lower-48 States, evaluated using the condition category table for resiliency. We calculated an overall score for resiliency as the weighted average of all factors, with "number of bears" weighted three times due to its importance to resiliency. High=4, Moderate = 3, Low=2, Very Low=1, and Functionally Extirpated (X) = 0, with score thresholds as Moderate= 2.4–3.19, Low= 1.6–2.39, Very Low=0.8–1.59; and less than 0.79 = Functionally Extirpated (X) Condition. An X in number of bears results in an overall condition of X, regardless of the other factors. In general, ecosystems with higher resiliency have greater viability over the next 30 to 45 years, based on their ability to withstand stochastic events, than ecosystems with lower resiliency.

CURRENT CONDITION										
Ecosystem	**Habitat Factors**		**Demographic Factors**							**RESILIENCY**
	Natural, High-Caloric Foods	**Large, Intact Blocks of Land**	**Adult Female Survival**	**Abundance: Population Target**	**Abundance: Number of Bears (3x)**	**Population Trend**	**Fecundity**	**Inter-Ecosystem Connectivity**	**Genetic Diversity**	
GYE	High	High	High	High	Moderate	High	High	X	Moderate	**High**
NCDE	High	High	High	High	High	High	Moderate	High	High	**High**
CYE	Moderate	Moderate	High	Low	Very Low	High	Low	Moderate	Low	**Low**
SE	Moderate	Moderate	Moderate	Moderate	Very Low	High	Moderate	Moderate	Moderate	**Moderate**
BE	Moderate	Moderate	X	X	X	X	X	Very Low	X	**X**
North Cascades	Moderate	Moderate	X	X	X	X	X	X	X	**X**

Currently, the GYE and NCDE are the only ecosystems that have high resiliency (Table 2, above). A variety of land protections, particularly those that have reduced motorized access, and the availability and diversity of natural foods contribute to the high ranking for habitat factors in these two ecosystems (Service 2021, pp. 217, 218–219). State, Federal, Tribal, and non-governmental organization partners have implemented conservation activities and land protections in the GYE and NCDE that help reduce human-caused mortality and contribute to large population sizes in these two ecosystems (Service 2021, pp. 218–219). In the GYE, the demographic factors of genetic diversity and inter-ecosystem connectivity could improve if natural immigration into the GYE occurs in the future (Service 2021, p. 218).

The grizzly bear population in the CYE currently has low resiliency (Table 2, above). Despite high population trends and high and moderate adult female survival, the CYE currently has a very low numbers of bears, although this factor could improve as bears reproduce and expand in the future (Table 2, above). The CYE is a smaller ecosystem that is still slowly recovering from being close to historical extirpation, particularly in the Cabinets portion of the ecosystem. This portion of the CYE has recently benefitted from an augmentation program (Kasworm *et al*.

2020a, pp. 24–25; Service 2021, pp. 178–179). Recent data also suggest that the number of grizzly bears in the Cabinet portion of the CYE has increased from fewer than 15 individuals to 55 to 60 bears (Kendall *et al.* 2016, p. 314; Kasworm *et al.* 2020a, p. 40), almost exclusively through the augmentation program and reproduction from those individuals (Kasworm *et al.* 2020a, p. 31). This ecosystem also has a less diverse assortment of foods, particularly in the form of ungulate protein, although body fat levels indicate that individuals are relatively healthy (Kasworm *et al.* 2020a, pp. 55–56). Large intact blocks of land are also somewhat limiting in the CYE due to its overall smaller size. Even though there are large protected areas within the CYE (with 44 percent designated as Wilderness or IRAs), as well as additional protections outside the CYE recovery zone and conservation efforts on private lands that improve security for grizzly bears, habitat standards for motorized route densities have not yet been met in the CYE recovery zone, which limits the availability of large intact blocks of land in the CYE (Service 2021, pp. 220–221).

The grizzly bear population in the SE currently has moderate resiliency (Table 2, above). Despite high population trends and high and moderate adult female survival, the SE currently has a very low number of bears, although this factor could improve as bears reproduce and expand in the future (Table 2, above). This ecosystem also has a less diverse assortment of foods, particularly in the form of ungulate protein, though body fat levels indicate that individuals are relatively healthy (Kasworm *et al.* 2020b, p. 38). The SE contains a limited amount of protected areas inside the recovery zone (3 percent designated or recommended Wilderness) and motorized route densities do not yet meet applicable habitat standards, although they are close, which limits the availability of large intact blocks of land in the SE (Service 2021, pp. 219–220).

Despite the moderate condition of habitats, due in part to considerable amounts of protected areas, the BE does not contain any known populations, so it is currently in a functionally extirpated condition and therefore has no resiliency. Approximately 98 percent of the BE recovery zone is designated Wilderness, but the condition of large intact blocks of land is moderate because motorized access standards have not been developed for the recovery zone or for adjacent areas to the north and east, where female occupancy is necessary for natural recolonization of the BE (Service 2021, pp. 222). Despite its relative isolation from other ecosystems, recent sightings suggest that inter-ecosystem connectivity is possible, although currently very low for the BE (Service 2021, p. 223).

The North Cascades ecosystem currently has moderate habitat conditions, due in part to protected areas within the ecosystem but, without a known population, the grizzly bear population is functionally extirpated, and therefore has no resiliency (Service 2021, pp. 223–224). Approximately 63 percent of the North Cascades ecosystem is designated Wilderness or IRAs.

Our SSA report provides a full account of our evaluation of resiliency for each ecosystem, including the assessment of each habitat and demographic factor for each ecosystem. Please see the SSA report for our full analysis of current resiliency (Service 2021, pp. 212–226).

Summary of Current Redundancy and Representation

Redundancy describes the number and distribution of ecosystems, such that the greater the number and the wider the distribution of the ecosystems, the better the grizzly bear in the lower-48 States can withstand catastrophic events, such as widespread wildfire. Grizzly bears in the lower-48 States currently occupy four ecosystems, two with high resiliency, one with moderate resiliency, and one with low resiliency (Table 2, above). Grizzly bears within two ecosystems are functionally extirpated, with no resiliency, so do not contribute to redundancy (Table 2, above). The four ecosystems are currently distributed from north to south and east to west as illustrated in Figure 2; this geographic distribution further characterizes the current spread of catastrophic risk, or current levels of redundancy. Representation of the grizzly bear in the lower-48 States is currently captured by the ecological diversity inherent within the four resilient ecosystems (Figure 2). For example, the GYE, contained in the Middle Rockies ecoregion, is dominated by forested, mountainous habitat, and dry sagebrush to the east and south, and includes hydrothermal features and other unique geologic features. The NCDE includes parts of the Great Plains, Middle Rockies, and Northern Rockies ecoregions, and habitat varies from wet forested lands west of Glacier Park to much drier habitat to the east, including prairie grasslands. The CYE and SE are both contained within the Rocky Mountains, and are characterized by wet, forested mountains. While currently functionally extirpated, the BE and North Cascades represents two additional ecoregion types. The BE is primarily contained in the Idaho Batholith ecoregion, and contains mountainous regions, dry partly wooded mountains, grasslands, high glacial valleys, and hot dry canyons. The North Cascades is composed of high, rugged mountains, and has a high concentration of active glaciers (Service 2021, pp. 226–227).

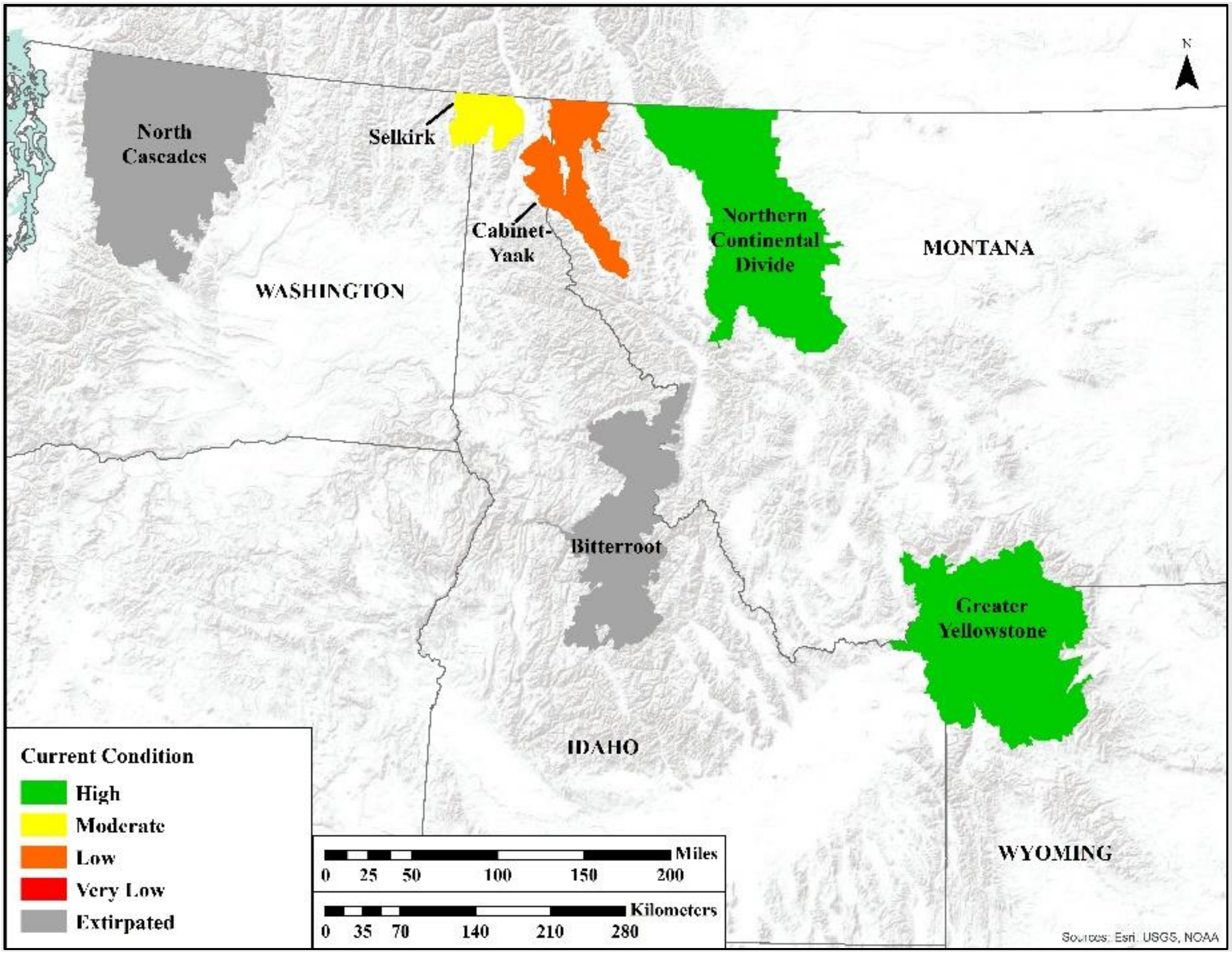

Figure 2. Map of the overall current condition for the six grizzly bear ecosystems in the lower-48 States, in terms of resiliency, redundancy, and representation. Colors represent the current resiliency for each ecosystem, based on the current condition of two habitat factors and six demographic factors for each ecosystem. Ecosystems with higher levels of resiliency are at less risk from environmental and demographic stochasticity. Currently, the Greater Yellowstone (GYE) and Northern Continental Divide (NCDE) ecosystems have high resiliency, the Selkirk ecosystem (SE) has moderate resiliency, and the Cabinet-Yaak ecosystem (CYE) has low resiliency. The North Cascades and Bitterroot (BE) ecosystems are in an extirpated condition currently, so have no resiliency. Four ecosystems (GYE, NCDE, SE, and CYE), distributed as illustrated on the map, contribute to redundancy and these ecosystems feature a diversity of ecological types used by the grizzly bear for representation.

<u>Summary of Future Condition from the SSA</u>

We evaluated future conditions for the grizzly bear in the lower-48 States using projections for the stressors, habitat factors, and demographic factors that influence resiliency, redundancy, and representation. To evaluate future conditions, we used the same methodology that we used to evaluate current condition, but instead considered the plausible conditions for the two habitat factors and six demographic factors projected into the future under a range of plausible future scenarios. We evaluated future conditions for the grizzly bear 30 to 45 years into the future, a timeframe that captures approximately two to three grizzly bear generation intervals. A generation interval is the approximate time that it takes a female grizzly bear to replace herself in the population. Given the longevity of grizzly bears, two to three generation intervals represent a period during which a complete turnover of the population would have occurred; any positive or adverse changes in the status of the population would be evident. Additionally, this timeframe considers the possibility that land management plans, which may provide important conservation measures to reduce potential stressors, could go through at least one revision (Service 2021, p. 228). Below we summarize the future scenarios and our evaluation of future condition under each scenario, with our full analysis in the SSA report (Service 2021, pp. 228–243).

Summary of Future Scenarios

We used scenario planning to describe plausible futures for the grizzly bear and to capture uncertainty associated with our future projections. Future scenarios allowed us to explore a range of possible future conditions for the grizzly bear in the lower-48 States, given the uncertainty in both the stressors grizzly bears in the lower-48 States may face, their potential response to those stressors, and the potential for possible conservation efforts to influence future conditions. As described in more detail in our SSA report (Service 2021, pp. 228–231), we developed two pessimistic future scenarios, two optimistic future scenarios, and one continuation future scenario, as summarized below:

- **Future Scenario 1 – Significantly Decreased Conservation**: Under this scenario, conservation actions decrease significantly, largely through the termination or non-renewal of plans or regulations, and the rate of private land development increases dramatically;
- **Future Scenario 2** – **Decreased Conservation**: Under this scenario, conservation actions decrease, but not as significantly as Scenario 1, due to decreased effectiveness and implementation of conservation actions and mechanisms, and the rate of private land development increases;
- **Future Scenario 3 – Continuation of Conservation:** Under this scenario, conservation actions continue at their same rate, magnitude, and effectiveness as current condition, and the rate of private land development remains the same;
- **Future Scenario 4 – Increased Conservation:** Under this scenario, conservation actions increase or improve, and the rate of private land development decreases;
- **Future Scenario 5 – Significantly Increased Conservation:** Under this scenario, conservation actions increase significantly, and the rate of private land development decreases dramatically.

Although there are likely different probabilities associated with our future scenarios, we considered all five scenarios to be plausible for the purposes of our SSA analysis (Service 2021, p. 228). We used the same methodology that we used to evaluate current condition to project the resiliency for the six ecosystems 30 to 45 years into the future. We projected the future condition for the two habitat factors and six demographic factors for each of the five future scenarios and then calculated an overall resiliency score for each ecosystem under each scenario using the same weighted average as our current condition evaluation. After evaluating resiliency, we then evaluated redundancy and representation for each future scenario.

Summary of Future Conditions by Scenario

Table 3, below, summarizes our evaluation of future resiliency for each ecosystem; the SSA provides additional detail on this analysis (Service 2021, pp. 232–243).

Table 3. Current and future conditions in terms of overall resiliency for six ecosystems for the grizzly bear in the lower-48 States. NCDE= Northern Continental Divide Ecosystem, GYE= Greater Yellowstone Ecosystem, CYE= Cabinet-Yaak Ecosystem, SE= Selkirk Ecosystem, BE=Bitterroot Ecosystem. Future projections are 30 to 45 years into the future under five plausible future scenarios: Scenario 1= conservation decreases significantly, Scenario 2=conservation decreases, Scenario 3 = conservation stays the same, Scenario 4 = conservation increases, and Scenario 5 =conservation increases significantly.

CURRENT AND FUTURE RESILIENCY						
	Current Condition	***Future Scenario 1*** ↓↓ *Conservation*	***Future Scenario 2*** ↓ *Conservation*	***Future Scenario 3*** *Continuation Conservation*	***Future Scenario 4*** ↑ *Conservation*	***Future Scenario 5*** ↑↑ *Conservation*
GYE	High	Moderate	High	High	High	High
NCDE	High	Moderate	High	High	High	High
CYE	Low	V Low	Low	Moderate	Moderate	High
SE	Moderate	V Low	Low	Moderate	Moderate	High
BE	X	X	X	X	Low	Low
North Cascades	X	X	X	X	Low	Low

Future Scenario 1: With a significant decrease in conservation under Scenario 1, there are subsequent decreases in resiliency across the habitat and demographic factors over the next 30 to 45 years (Table 3). Both the NCDE and GYE decrease in overall resiliency from high to moderate, the SE declines from moderate to very low, and the CYE declines from low to very low. The BE and North Cascades remain in a functionally extirpated condition, with no resiliency (Table 3). While the four ecosystems are still distributed similarly to current condition within their respective ecological types, the resiliency of each ecosystem has decreased under this Scenario; given this decrease in resiliency, the grizzly bear in the lower-48 States is also less able to withstand catastrophic risk and environmental change (Service 2021, pp. 16, 232–235). In other words, as resiliency declines with decreased conservation under Scenario 1, redundancy and representation decrease correspondingly.

Future Scenario 2: With a decrease in conservation efforts under Scenario 2, potential decreases in overall resiliency are less severe than under Scenario 1. Under Scenario 2, both the NCDE and GYE remain in high overall resiliency, the CYE remains in low resiliency, but the SE drops from moderate to low overall resiliency (Table 3). The BE and North Cascades remain in a functionally extirpated condition, with no resiliency (Table 3). While the four ecosystems are still distributed similarly to current condition within their respective ecological types, the resiliency of one ecosystem decreases under this Scenario; given this decrease in resiliency, the grizzly bear in the lower-48 States is also slightly less able to withstand catastrophic risk and environmental change (Service 2021, pp. 17, 235–237). In other words, as resiliency declines with decreased conservation under Scenario 2, redundancy and representation decrease correspondingly.

Future Scenario 3: Under Scenario 3, the continuation scenario, all stressors and conservation efforts continue at their same rate and magnitude 30 to 45 years into the future. The current levels of funding, effectiveness, and implementation of conservation actions and mechanisms stay the same under this scenario. As a result, the NCDE and GYE remain in high resiliency, the SE stays moderate resiliency, but the CYE improves in overall resiliency from low to moderate (Table 3). The BE and North Cascades remain in a functionally extirpated condition, with no resiliency under the continuation scenario (Table 3). Redundancy and representation stay the same as current conditions under this scenario (Service 2021, pp. 17, 237–239).

Future Scenario 4: With an increase in conservation under Scenario 4, redundancy and representation improve, as both the BE and North Cascades shift from functionally extirpated condition with no resiliency to low resiliency, due to human-facilitated restoration of the North Cascades and increased natural recolonization in the BE. The NCDE and GYE remain in high resiliency, the SE remains moderate, and the CYE improves from low to moderate resiliency (Table 3). Risk from potential catastrophic events is now spread across six instead of four ecosystems (redundancy) with additional ecological diversity gained at the northwestern and central extents of the overall range (representation) (Service 2021, pp. 17, 239–241).

Future Scenario 5: Future Scenario 5 is an optimistic scenario under which conservation increases significantly. As a result, resiliency, redundancy, and representation for the grizzly bear improve. Under this scenario, the NCDE and GYE stay in high resiliency, but the CYE and SE improve to high resiliency. The BE and North Cascades shift from functionally extirpated condition with no resiliency, to low resiliency under this scenario, due to human-facilitated restoration of the North Cascades and augmentation of the BE (Table 3). Four ecosystems have high resiliency under this scenario, and catastrophic risk is spread across six ecosystems (redundancy) with additional ecological diversity gained at the northwestern and central extents of the overall range (representation) (Service 2021, pp. 17, 241–243).

Summary of Viability from SSA

Viability is the "ability of a species to sustain populations in the wild over time" (Service 2016, p. 21). Taken together, current and future levels of resiliency, redundancy, and representation characterize the viability of the grizzly bear in the lower-48 States. Currently, there are two ecosystems with high resiliency, one ecosystem with moderate resiliency, one ecosystem with low resiliency, and two ecosystems that are functionally extirpated (Table 2, above). Within 30 to 45 years in the future, there are improvements or reductions in resiliency across the ecosystems, depending on the scenario. Under Scenario 1, the most pessimistic scenario, there are reductions in resiliency where conservation efforts decline significantly. Whereas under Scenario 5, the most optimistic scenario, there are improvements in resiliency where conservation efforts increase significantly. If conservation efforts stay the same, as under Scenario 3, the continuation scenario, the CYE improves from low to moderate resiliency. Under this continuation scenario, the GYE and NCDE stay in high resiliency and the SE retains moderate resiliency. Under the optimistic scenarios where conservation efforts increase under Scenarios 4 and 5, the BE and North Cascades improve from functionally extirpated conditions with no resiliency to low resiliency, which also represents an increase in redundancy and representation. To summarize changes in resiliency from current to future conditions, there is less risk from stochastic events if conservation efforts continue or improve, but there is greater risk from stochastic events if conservation efforts decrease (Table 3, above).

Currently, redundancy for the grizzly bear is characterized by four extant ecosystems, the GYE, NCDE, CYE, and SE, as they are distributed from north to south and east to west across Idaho, Montana, Washington, and Wyoming. Catastrophic risk is spread across these four ecosystems and their ecological diversity contributes to representation. Two ecosystems, the BE and North Cascades, have no known populations, and so do not currently contribute to redundancy or representation. In 30 to 45 years, if conservation efforts decrease, as under Scenarios 1 and 2, resiliency decreases, and the four ecosystems are at greater risk from stochastic events. However, if conservation efforts increase, as under Scenarios 4 and 5, resiliency in the BE and North Cascades improves, as does redundancy, as the number and distribution of ecosystems increases from four to six ecosystems. This improvement in redundancy reduces risk to the grizzly bear from catastrophic events (Table 4). To summarize redundancy across the future scenarios: catastrophic risk to the grizzly bear stays the same if conservation efforts continue at their current rate and effectiveness; catastrophic risk decreases with increased conservation as the BE and North Cascades improve from functionally extirpated to low resiliency, and; catastrophic risk increases if conservation efforts are reduced. Representation declines as resiliency of the ecosystems decreases with decreased conservation efforts, and stays the same with a continuation of conservation efforts, but ecological diversity increases if conservation efforts increase, primarily through improving resiliency of the BE and North Cascades (Table 4).

Our SSA characterizes the viability for the grizzly bear in the lower-48 States, or its ability to sustain populations in the wild over time, based on the best scientific understanding of its current and future abundance, distribution, and diversity (Service 2021, entire). Based on our assessment of the 3Rs, currently and 30 to 45 years into the future, viability for the grizzly bear in the lower-48 States improves slightly if conservation efforts continue at their current rate and levels of effectiveness. If conservation efforts decline, viability also decreases. If conservation efforts increase, viability improves (Service 2021, p. 245).

Table 4. Summary of current and future (30 to 45 years) viability, in terms of resiliency, redundancy, and representation, for the grizzly bear in the lower-48 States. Numbers for resiliency represent the number of populations in each condition category.

VIABILITY: CURRENT AND FUTURE 3Rs						
	Current Condition	***Future Scenario 1*** ↓↓ ***Conservation***	***Future Scenario 2*** ↓ ***Conservation***	***Future Scenario 3*** ***Continuation Conservation***	***Future Scenario 4*** ↑ ***Conservation***	***Future Scenario 5*** ↑↑ ***Conservation***
Resiliency	2 High 1 Moderate 1 Low 2 Extirpated	2 Moderate 2 Very Low 2 Extirpated	2 High 2 Low 2 Extirpated	2 High 2 Moderate 2 Extirpated	2 High 2 Moderate 2 Low	4 High 2 Low
Redundancy	4 ecosystems, as distributed	4 ecosystems, as distributed	4 ecosystems, as distributed	4 ecosystems, as distributed	6 ecosystems, as distributed	6 ecosystems, as distributed
Representation	Ecological diversity across 4 ecosystems	Ecological diversity across 4 ecosystems	Ecological diversity across 4 ecosystems	Ecological diversity across 4 ecosystems	Ecological diversity across 6 ecosystems	Ecological diversity across 6 ecosystems

STATUS RECOMMENDATION

Standard for Review

Section 4 of the Act (16 U.S.C. Section 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a listable entity meets the definition of "endangered species" or "threatened species." The Act defines an "endangered species" as a listable entity that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a listable entity that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether a listable entity meets the definition of an "endangered species" or a "threatened species" because of any of the following factors:

> (A) The present or threatened destruction, modification, or curtailment of its habitat or range;
> (B) Overutilization for commercial, recreational, scientific, or educational purposes;
> (C) Disease or predation;
> (D) The inadequacy of existing regulatory mechanisms; or
> (E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a listable entity's continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individual grizzly bears in the lower-48 States, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a listable entity. The term "threat" includes actions or conditions that have a direct impact on individuals, as well as those that affect individuals through alteration of their habitat or required resources. The term "threat" may encompass—either together or separately—the source of the action or condition, or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the listable entity meets the Act's definition of an "endangered species" or a "threatened species." In assessing whether a listable entity meets either definition, we must evaluate all identified threats by considering the effects of the threats and the expected response of the listable entity—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and lower-48 States level. We evaluate each threat and its expected effects on the listable entity, then analyze the cumulative effect of all of the threats on the listable entity as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the listable entity—such as any existing regulatory mechanisms or conservation efforts. The Service recommends whether the listable entity meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the listable entity now and in the foreseeable future.

In our status recommendation, we correlate the threats acting on the grizzly bear in the lower-48 States (the listed entity) to the factors in section 4(a)(1) of the Act. We summarize our 5-year status review for the grizzly bear in the lower-48 States below.

Summary of Analysis

The biological information we reviewed and analyzed as the basis for our findings is documented in the SSA report (Service 2021, entire), a summary of which is provided above. The projections for the future condition of the grizzly bear in the lower-48 States are based on our expectations of the potential stressors that may affect the listed entity. When we listed the grizzly bear as a threatened species on July 28, 1975, we identified the dramatic decreases in historical range (Factor A), certain detrimental land management practices, such as timber harvest, livestock grazing, and building of roads, in formerly secure grizzly bear habitat (Factor A), and excessive human-caused mortality (Factors B and C) as the primary threats (40 FR 31734, July 28, 1975, pp. 31734–31736). The listing rule also discussed the lack of regulatory mechanisms to control take and protect habitat as a contributing factor to grizzly bear population declines (Factor D) (40 FR 31734, July 28, 1975, pp. 31734–31736). Under Factor E, the July 28, 1975, listing identified the genetic isolation of some grizzly bear populations as a potential threat and identified human attitudes toward grizzly bears as the cause of “a continual loss of animals through indiscriminate illegal killing” (40 FR 31734, p. 31734).

In our SSA report, we evaluated these stressors and additional stressors that fall broadly into three categories: those with habitat-related effects (Factor A); sources of human-caused mortality (Factors B and C); and other stressors (Factor E) (Service 2021, pp. 99–211). These stressors are interrelated to varying degrees; for example, motorized access is related to both habitat and human-caused mortality. Specifically, stressors with potential habitat-related effects (Factor A) include: motorized access and its management; developed sites; livestock allotments; mineral and energy development; recreation; vegetation management; habitat fragmentation; development on private lands; and activities that may disturb dens. Sources of human-caused mortality (Factors B and C) that we evaluated include: management removals; accidental killings (e.g., train and vehicular strikes); mistaken identity kills; illegal killings; and defense of life kills. We also evaluated sources of natural mortality (Factor C). We considered the effects of other stressors (Factor E) including: connectivity and genetic health; changes in food resources; effects of climate change; and catastrophic events, such as earthquakes and volcanic eruptions (Service 2021, pp. 8–9, 99–211). Lastly, we evaluated potential cumulative effects of these stressors (Service 2021, pp. 205–206). Our SSA report provides our full analysis of stressors on grizzly bears in the lower-48 States (Service 2021, pp. 8–9, 99–211).

We also evaluated a variety of conservation efforts and mechanisms across the six ecosystems that either reduce or ameliorate stressors, or improve the condition of habitats or demographics (Service 2021, pp. 99–211). These conservation efforts or mechanisms include: Federal land protections, such as the Wilderness Act and IRAs; State and private forestlands with motorized restrictions; habitat improvements/vegetation management; attractant removal and community sanitation measures, such as food storage orders; conservation easements; information and education programs; effective law enforcement; and augmentation or translocation programs (Service 2021, pp. 8–9, 203–205). States, National Forests, National Parks, and Tribes have implemented regulatory mechanisms that help address the stressors we identified under Factors A, B, C, and E. However, these regulatory mechanisms (Factor D) do not yet fully address all of the stressors identified under these factors across the grizzly bear's entire range in the lower-48 States, including motorized access management and human-caused mortality. For some ecosystems, the motorized access management standards and mortality limits have yet to be developed or formally incorporated into regulatory documents. Additionally, some National Forests lack formal food storage orders, which will become increasingly important to grizzly bear conservation as grizzly bear and human populations both expand.

We note that by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have analyzed individual effects of stressors on individuals, ecosystems, and the grizzly bear in the lower-48 States, as well as their potential cumulative effects (Service 2021 pp. 9, 205–206). We incorporate the cumulative effects into our analysis when we characterize the current and future condition of the grizzly bear in the lower-48 States. Our current and future condition assessment is iterative because it accumulates and evaluates the effects of all the factors that may be influencing the grizzly bear in the lower-48 States, including negative influences from stressors and positive influences from conservation efforts. We evaluate potential effects from these influences consistently across the same subset of habitat and demographic needs for the grizzly bear in the lower-48 States, both currently and into the future. Because the SSA framework considers not just the presence of the factors, but also the degree to which they collectively influence risk to the entire listed entity, our assessment integrates the cumulative effects of the five factors and replaces a standalone cumulative effects analysis.

We also consider estimates of population trend to effectively illustrate cumulative impacts to the population. Population trend captures the effects of all of the various stressors on the population and habitat, including impacts to total mortality, fecundity, changes in habitat quality, changes in population density, changes in current range, and displacement effects. Despite the various stressors that we evaluated in our SSA report, the best available data indicate that, due to ongoing conservation efforts that reduce the influence of stressors in the GYE, NCDE, CYE, and SE, grizzly bear population trends in these ecosystems are stable or increasing and range extent has continued to expand. As long as these conservation and management efforts continue into the future, we expect these four ecosystems to further grow in size and range, although stressors may continue to operate.

Application of Analysis to the Status Recommendation

The SSA describes the current and future viability of the grizzly bear in the lower-48 States in terms of the 3Rs, which characterize risk to the grizzly bear in the lower-48 states in the context of stochasticity (resiliency), catastrophes (redundancy), and long-term environmental change (representation) (Service 2021, entire). This analysis forms the basis for our recommendation under the Act. Because of uncertainties regarding the future, we evaluated future condition for five plausible future scenarios designed to capture the relevant uncertainties regarding future conservation efforts. The fundamental question before the Service is whether the projections of extinction risk, described in the SSA report in terms of the resiliency, redundancy, and representation of the grizzly bear in the lower-48 States, under a range of future scenarios, indicate that the listed entity meets the definition of an endangered or threatened species under the Act. Theoretically, if the abundance (resiliency), distribution (redundancy), and diversity (representation) of the grizzly bear in the lower-48 States decreases, thereby decreasing overall viability, the extinction risk of the grizzly bear in the lower-48 States would correspondingly increase.

As described below, we first evaluate whether the grizzly bear in the lower-48 States is in danger of extinction throughout its range now. We then evaluate whether the grizzly bear in the lower-48 States is likely to become in danger of extinction throughout its range in the foreseeable future. We finally consider whether the grizzly bear in the lower-48 States is in danger of extinction in a significant portion of its range (SPR).

Evaluation of Status: In Danger of Extinction Throughout its Range

Under the Act, an endangered species is any listable entity that is "in danger of extinction throughout all or a significant portion of its range" (16 U.S.C. Section 1532(6)). For this 5-year status review, we evaluate the best available scientific information about the listed entity's current levels of demographic and habitat factors (these are described in the SSA report in terms of resiliency, redundancy, and representation) to describe the viability of the grizzly bear in the lower-48 States (Service 2021, entire). We compare our evaluation of the listed entity's current risk of extinction against the definition of an endangered species.

Currently, four of the six ecosystems of the grizzly bear in the lower-48 States are extant (Service 2021, pp. 60–63). Two of these ecosystems have high resiliency, one has moderate resiliency, and one has low resiliency (Service 2021, pp. 13–15, 212–227). The GYE and NCDE currently have high resiliency due to the high conditions of their habitat and demographic factors, such as widely available and protected large, intact blocks of land, positive population growth rates, expanding ranges, and high survival rates of adult females (Service 2021, pp. 12, 218–219). With high resiliency, the GYE and NCDE are currently the best able of the four extant ecosystems to withstand environmental and demographic stochasticity, followed by the SE with medium resiliency and the CYE with low resiliency. Ongoing conservation actions implemented since the time of listing, such as regulatory mechanisms that reduce habitat degradation and sources of human-caused mortality, have significantly improved the resiliency of these four ecosystems over the last several decades (Service 2021, pp. 102–106, 203–205). These levels of resiliency currently reduce extinction risk for the grizzly bear in the lower-48 States. Considered together at the lower-48 States level, the four resilient ecosystems provide ecological diversity and their longitudinal and latitudinal distribution helps reduce current catastrophic risk to the grizzly bear in the lower-48 States (Service 2021, pp. 13–15, 212–227).

The current condition of the grizzly bear in the lower-48 States represents a marked improvement from the conditions when we listed the grizzly bear as a threatened species in 1975. Over the last 45 years, threats to the grizzly bear in the lower-48 States have declined and, in some cases, have been ameliorated. With the end of government-sanctioned programs, population losses from predator control and poisoning declined, and new federally designated wilderness areas and IRAs helped secure large, intact blocks of land and reduce sources of human-caused mortalities. The management of motorized access similarly reduced stressors associated with habitat loss and human access in grizzly bear habitats. Additionally, in four out of the six recovery zones (GYE, NCDE, CYE, and SE), Federal land managers have adopted land management plans that contain legally binding and enforceable science- and research-based measures and management practices designed specifically to conserve the grizzly bear in the lower-48 States, though these measures are not yet fully implemented in the CYE and SE. These regulatory mechanisms also help reduce threats associated with habitat loss and fragmentation on the Federal lands where they apply (Service 2021, pp. 102–106, 203–205). Due to these and many other conservation actions, the number of grizzly bears in the lower-48 States has more than doubled since the time of listing, and grizzly bears have since expanded their range and abundance, growing from occupying approximately only 2 percent of their historical range in 1975 to 6 percent in 2020 (Table 1, above; Costello 2020, *in litt.*; Haroldson *et al.* 2020b, p. 13; Kasworm *et al.* 2020a, p. 40; Kasworm *et al*. 2020b, p 19; Haroldson *et al.* 2020a, *in press*; Service 2021, pp. 60-63). As a result, the 3Rs for the grizzly bear in the lower-48 States have improved since 1975.

Given the current levels of resiliency in four out of six ecosystems, the high resiliency of the GYE and NCDE, and the lack of significant, imminent stressors, we believe that the grizzly bear in the lower-48 States currently has sufficient ability to withstand stochastic and catastrophic events, and to adapt to environmental changes. Therefore, we conclude that the current risk of extinction is low, such that the grizzly bear in the lower-48 States is not currently in danger of extinction throughout all of its range.

Having found that the grizzly bear in the lower-48 States is not in danger of extinction throughout its range, we next evaluated whether the listed entity is likely to become an endangered species within the foreseeable future throughout all of its range.

Evaluation of Status: Likely to Become Endangered Throughout its Range

Under the Act, a threatened species is any listable entity that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” (16 U.S.C. Section 1532(20)). The term foreseeable future extends only so far into the future as the Service can reasonably determine that both the future threats and the entity’s responses to those threats are likely (50 C.F.R. 424.11(d)). The Service describes the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the listable entity’s life history characteristics, threat-projection timeframes, and environmental variability (50 C.F.R. 424.11(d)). The key statutory difference between a threatened species and an endangered species is the timing of when a listable entity may be in danger of extinction, either now (endangered species) or in the foreseeable future (threatened species).

For the purposes of our analysis, we defined the foreseeable future as 30 to 45 years into the future. We chose this timeframe because it is biologically meaningful by accounting for two to three generation intervals, or the average amount of time it takes a female to breed and replace herself in the population. Given the longevity of grizzly bears, up to 37 years in the wild (Kasworm *et al.* 2020a, p. 17), two to three generation intervals represent a period during which a complete turnover of the population would have occurred and any changes in the demographics of the population would be detectable. This timeframe also considers the possibility that conservation measures that reduce and regulate potential stressors, such as land management plans, could be revised at least once by any applicable land management agencies (Service 2021, pp. 15–16, 228). Moreover, it is a timeframe during which we can reasonably project both future threats and the grizzly bears' response.

To assist us in evaluating the status of the grizzly bear in the lower-48 States in the foreseeable future over the next 30 to 45 years, we evaluated the future condition for the six grizzly bear ecosystems in the lower-48 States under five plausible future scenarios: a continuation scenario, two pessimistic scenarios, and two optimistic scenarios (Service 2021, pp. 228–231), as described above. Over the next 30 to 45 years, we anticipate a range of future conditions for the grizzly bear in the lower-48 States, with nearly the same level of the 3Rs as current condition under one future scenario, improved conditions of the 3Rs under two future scenarios, and decreased conditions of the 3Rs under two future scenarios (Service 2021, pp. 15–19, 232–243). In four out of the five future scenarios, the GYE and NCDE remain in high resiliency, including under the continuation scenario. However, if conservation decreases significantly, resiliency declines from high to moderate in both the GYE and NCDE (Service 2021, p. 232–235), which lends increased risk to the grizzly bear in the lower-48 States as a whole. Resiliency in the CYE and SE also decreases as conservation decreases (Service 2021, p. 244), which further represents greater risk to the grizzly bear in the lower-48 States. Into the foreseeable future, the CYE and SE have moderate to very low levels of resiliency, and only achieve high resiliency with the significantly improved conservation under Scenario 5 (Service 2021, p. 244). As a result, the CYE and SE only contribute moderate, to low, to very low levels of resiliency under four out of the five future scenarios (Service 2021, p. 244). Finally, the BE and North Cascades only begin to contribute to the 3Rs if conservation improves under the two optimistic scenarios (Service 2021, p. 244).

Additionally, human populations continue to expand across all six ecosystems, and humans may engage with grizzly bears and their habitats in increasingly unpredictable ways. Scenarios 1 and 2 project that growing human populations could lead to increased private land development, increased recreation, additional habitat loss, and more human-bear conflicts over the next 30 to 45 years. The uncertainty associated with the stressors of human-bear conflicts, human population growth, and potential reductions in connectivity further represent a possible reduction in overall viability of the grizzly bear in the lower-48 States in the foreseeable future.

Given these future projections of the 3Rs 30 to 45 years into the future, the grizzly bear in the lower-48 States could experience increased risk of extinction under two out of the five future scenarios. While the GYE and NCDE populations remain relatively resilient under all but one future scenario, viability for the grizzly bear in the lower-48 States as a whole only increases under the two optimistic future scenarios, which rely on increases in conservation efforts such that the BE and North Cascades support resilient populations. Although these are plausible future outcomes for the grizzly bear in the lower-48 States, there is enough future uncertainty associated with conservation efforts, such that the grizzly bear in the lower-48 States remains likely to become in danger of extinction within the foreseeable future throughout all of its range.

To summarize, under the plausible future conditions discussed in the SSA, the grizzly bear in the lower-48 States as a whole would be less likely to withstand plausible stochastic events, catastrophic events, or retain sufficient adaptive capacity to withstand environmental change 30 to 45 years into the future. Therefore, after assessing the best available information, we conclude that the grizzly bear in the lower-48 States is not currently in danger of extinction throughout all of its range, but is likely to become so in the foreseeable future.

Evaluation of Status Throughout a Significant Portion of its Range

Having determined that the grizzly bear in the lower-48 States is not in danger of extinction, but is likely to become so in the foreseeable future throughout all of its range, we now consider whether the listed entity may be in danger of extinction in a significant portion of its range—that is, whether there is any portion of the listed entity's range for which it is true that both (1) the portion is significant; and, (2) the listed entity is in danger of extinction now in that portion. We can choose to address either question first; if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the listed entity's range.

In undertaking this analysis for the grizzly bear in the lower-48 States, we choose to address the status question first—we consider information pertaining to the geographic distribution of both the listed entity and the threats that the listed entity faces to identify any portions of the range where the grizzly bear in the lower-48 States may be endangered.

For the grizzly bear in the lower-48 States, we considered whether threats are geographically concentrated in any portion of the listed entity's range at a biologically meaningful scale. As summarized above and documented in our SSA report (Service 2021, pp. 99–211), we evaluated a variety of stressors associated with habitat destruction and modification, human-caused mortality, natural mortality, effects due to genetic health, effects due to changes in food resources, effects due to climate change, and cumulative effects (Service 2021, pp. 99–211). Overall, we did not identify any concentrations of threats across the six ecosystems.

We first examined whether there might be a geographic concentration of threats in the CYE and SE, given their lower levels of current resiliency documented in the SSA report. However, rates of human-caused mortality in the CYE and SE are similar to those in the GYE and NCDE (Kasworm *et al.* 2020a, p. 33; Kasworm *et al.* 2020b, p. 23; Servheen *et al.* 2004, p. 21; van Manen 2020, *in litt.*; MFWP, unpublished data). Additionally, the GYE, NCDE, CYE, and SE have all experienced positive population growth rates (Service 2021, p. 216), which suggests that no concentration of threats is influencing resiliency in any portion of these ecosystems that would lead them to have a different status than the entire entity.

We also explored the possibility of a concentration of threats in the areas between the six ecosystems. The areas between the ecosystems can provide for individual grizzly bear movement between ecosystems and these areas can support grizzly bears at lower densities than in the core of the ecosystems. The areas between ecosystems generally lack the same habitat protections, motorized access standards, and food storage orders that help reduce stressors within the six ecosystems. However, even if threats were concentrated in these areas, they lack known populations of grizzly bears (Service 2000, pp. 3-14–15; Service 2021, p. 60), so would not be considered significant for the purposes of our analysis. Effects of stressors in the areas between ecosystems would only impact individual bears and could not have any impacts at the level of a population or the entire entity. Therefore, the areas between ecosystems do not represent significant portions of the range. Similarly, the North Cascades and BE cannot qualify as a significant portion of the range due to the lack of known populations in these ecosystems.

Based on this analysis, we found no concentration of threats in any portion of the grizzly bear's range in the lower-48 States at a biologically meaningful scale. Therefore, no portion of the grizzly bear's range in the lower-48 States can provide a basis for determining that the listed entity is in danger of extinction now in a significant portion of its range, and we find that the grizzly bear in the lower-48 States is not in danger of extinction now in any significant portion of its range. This is consistent with the courts' holdings in *Desert Survivors v. Department of the Interior*, 336 F.Supp.3d 1131 (N.D. Cal. Aug. 24, 2018) and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946 (D. Ariz. 2017).

Summary of Evaluation and Recommendation

Our review of the best available scientific and commercial information indicates that the grizzly bear in the lower-48 States does not meet the definition of an endangered species, but does meet the definition of a threatened species in accordance with Section 3(6) and 3(20) of the Act. Therefore, with this 5-year status review, we recommend that the grizzly bear in the lower-48 States retain its status as a threatened species under the Act.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR STATUS REVIEW FOR
GRIZZLY BEAR IN THE LOWER-48 STATES
(*Ursus arctos horribilis*)

CURRENT CLASSIFICATION: Threatened

RECOMMENDATION RESULTING FROM THIS 5-YEAR STATUS REVIEW:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist:
____ Extinction
____ Recovery
____ Original data for classification in error
_X_ No change is needed

REGIONAL OFFICE APPROVAL:

Approved by: ________________________________ Date: ______________________
Matt Hogan
U.S. Fish and Wildlife Service
Deputy Regional Director
Interior Regions 5 and 7

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Attachment F

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MONTANA
MISSOULA DIVISION

WILDEARTH GUARDIANS, et al., Plaintiffs, and SWAN VIEW COALITION, et al., Consolidated Plaintiffs, vs. KURTIS E. STEELE, et al., Defendants, and DAVID BERNHARDT, et al., Consolidated Defendants, and MONTANA LOGGING ASSOCIATION and AMERICAN FOREST RESOURCE COUNCIL, Defendant-Intervenors.	Lead Case No. CV 19–56–M–DWM Member Case No. CV 19–60–M–DWM OPINION & ORDER

INTRODUCTION

In these consolidated cases, Plaintiffs are environmental organizations that challenge decisions by the United States Forest Service and the United States Fish and Wildlife Service (collectively "Federal Defendants") concerning the Revised Forest Plan for the Flathead National Forest. Plaintiffs allege violations of the Travel Management Rule and related Executive Orders. (Doc. 75 at ¶ 256.)[1] Plaintiffs also claim that the Federal Defendants violated the Endangered Species Act ("ESA") and the National Environmental Policy Act ("NEPA") by issuing and relying on the 2017 Biological Opinion ("2017 BiOp"). (*Id.* at ¶¶ 277, 279.) The Montana Logging Association and the American Forest Resource Council (collectively "Defendant-Intervenors") intervened. Currently pending are the parties' cross-motions for summary judgment. (Docs. 76, 86, 90.) Plaintiffs' motion for summary judgment is granted on the limited grounds set forth below. In all other respects, summary judgment is granted in favor of Federal Defendants and Defendant-Intervenors.

BACKGROUND[2]

I. Flathead National Forest

The Flathead National Forest is cradled in the Rocky Mountains of

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[1] Record citations are to the lead case, CV 19–56–M–DWM, unless otherwise noted.

[2] This case involves two administrative records: the Forest Service administrative record, cited as "FS-[bates page #]", and the Fish and Wildlife Service administrative record, cited as "FWS-[bates page #]." All facts are undisputed unless otherwise indicated. (*See* Docs. 78, 88, 89, 92, 93, 98, 99.)

northwestern Montana, where its 2.4 million acres of public lands stretch between Glacier National Park and British Columbia. FS-054717. The Forest is home to a vast array of aquatic and wildlife species. At the same time, the Forest "has long been the center of a forest products industry" that supports logging and milling, and the Forest is widely used for social and recreational endeavors. FS-054718.

Relevant here, the Forest supports populations of and habitats for grizzly bears and bull trout; both are discussed below.

A. Grizzly Bears

This case concerns the population of grizzlies living in the Northern Continental Divide Ecosystem ("NCDE"), one of six grizzly bear ecosystems in the continental United States. FS-051889. The NCDE population acts as a source for genetic diversity for other grizzly populations within the United States. FWS-002002. Grizzly bears, including those in the NCDE, remain a "threatened species" under the ESA. FWS-001984–85.

Road management poses one of the greatest threats to grizzly bears and their habitats. FWS-002028. Roads increase the likelihood of collision with a vehicle, illegal harvesting, and access to humans; risk bear displacement and avoidance of roads and road activity; and modify or fragment core grizzly habitat. FWS-002028. Additionally, roads may disrupt breeding behaviors by discouraging female bears to travel, feed, or shelter in high-density road areas. FWS-002066.

Relatedly, winter motorized travel poses another significant threat to grizzlies and their habitat. *See* FS-070901. Specifically, snowmobiles may cause den emergence disruption, FWS-002008, loss of young, FS-112043, and avoidance of den-suitable habitat, FWS-002056.

B. Bull Trout

Bull trout are a threatened species under the ESA, FWS-001860, and the Forest includes 12 bull trout core areas of the Columbia Headwaters Recovery Unit, FWS-001865. Bull trout require specific conditions to live and spawn, such as cold, clean water through which the trout can migrate. FWS-001899. Because bull trout require such specific habitat conditions, they are particularly susceptible to habitat loss, fragmentation, and degradation. FWS-001894. Activities that disrupt riparian vegetation, such as logging, can increase soil moisture and surface runoff, which may adversely impact bull trout habitat. FWS-001931–32. Additionally, roads and traffic in areas around bull trout habitat have the potential to contribute to sediment delivery, FWS-001935, which adversely affects water quality and temperature, FWS-001936.

Relatedly, culverts are structures that allow water to flow under a road from one side to the other, FS-083966, and they represent another threat to bull trout and their habitat in the Forest, *see* FWS-030236–37. Though the parties here dispute the inevitability of culvert "failure," (*see* Doc. 93 at ¶ 53), it is undisputed that culverts can trap debris and contribute to sedimentation of streams, which in turn can have adverse effects on water quality and water temperature, FWS-030236–37.

II. Historic Management of the Forest

Forest plans govern the management of national forests, FS-051881, and the National Forest Management Act requires revision of Forest Plans at least every fifteen years, 16 U.S.C. § 1604(f)(5)(A). Until 2018, when the Revised Plan at issue was adopted, the Forest was managed under the 1986 Forest Plan, which was regularly amended and updated with pertinent information from Federal Defendants. FS-054719. Relevant to the development of the Revised Plan are Amendments 19 and 24 to the 1986 Forest Plan, and the Fish and Wildlife Service's 2017 BiOp.

A. Amendment 19

Amendment 19 was adopted in the 1995 Record of Decision ("ROD") and provided objectives for motorized use and route density within bear management units inside the Forest. FS-002015. Pursuant to Amendment 19, in bear management units in which the Forest Service managed at least 75 percent of the land, there would be no net increase in total motorized route density greater than 2 miles per square mile, no net increase in open motorized route density greater than 1 mile per square mile, and no net decrease in the amount of security core area. FS-002015. Amendment 19 also established management directives "reduc[ing] impacts of forest management activities on grizzly bears (especially females) by adopting [certain directives] for subunits where the [Forest Service] managed more than 75 percent of the acres in a subunit." FS-002015. These directives included: (1) limiting high-density open road motorized access (meaning more than one mile per square mile) to no more than 19% per subunit by 1999; (2) limiting high-density total motorized route access (meaning more than two miles per square mile) to no more than 19% of a subunit by 1999; and (3) providing security core areas that equaled or exceeded 60% of each subunit by 1999 and that equal or exceeded 68% by 2005. FS-042259. These ratios are referred to as "19-19-68." (*See* Doc. 87 at 11.) Although enacted with the aim of protecting grizzlies, Amendment 19 indirectly affected bull trout; fewer roads resulted in fewer road crossings and culverts, which in turn decreased sedimentation in bull trout habitat. FWS-001627.

While the parties dispute the extent to which Amendment 19's route density standards required the Forest Service to reclaim existing roads in affected subunits and to compensate for any new road construction by reclaiming other existing roads, (Doc. 93 at ¶ 56), the text of Amendment 19 requires that "Forest Service actions will result in a net gain towards the objectives on National Forest System lands." FS-042259. Further, it is undisputed that the Forest never met the 19-19-68 objectives and standards of Amendment 19. FS-054747; (*see also* Doc. 93 at

¶ 57). To meet the objectives of Amendment 19, approximately 518 miles of existing roads would need to be decommissioned. FS-054747.

B. Amendment 24

In 2006, the Flathead National Forest designated 787,000 acres and 3,000 miles of roads and trails for over-snow vehicle use. FS-110265. The designations were later implemented through Amendment 24 to the 1986 Forest Plan, the Forest's then-governing land management plan. FS-110254. The Revised Plan incorporates Amendment 24's previous over-snow vehicle use designations under the Over-Snow Vehicle Rule's grandfather provision. FS- 54762. It also identifies 567 additional acres as suitable for over-snow vehicle use, but it does not designate any site-specific planning for that acreage. FS-54762.

C. 2015 Bull Trout Recovery Plan

In 2015, the Fish and Wildlife Service issued a "Recovery Plan for the Coterminous United States Population of Bull Trout" ("the Recovery Plan") on the effects to bull trout and their critical habitat from the implementation of proposed action associated with road-related activities, FS-016973–7167, and the Fish and Wildlife Service issued a 2015 BiOp for Bull Trout, *see* FS-174182. Most relevant here, the Recovery Plan and 2015 Bull Trout BiOp established annual requirements for culvert monitoring to identify and remove problem culverts before they failed to preempt stream sedimentation threats. FS-174226–67.

Appendix A and Appendix E of the 2015 BiOp worked in conjunction to guide the method and manner of the Forest Service's inspection, *see* FS-174247, 174273, and Appendix E required the Forest Service to annually inspect all culverts remaining in bull trout habitat that were closed by gate or "guardrail, concrete, earth barrier, or contour at intersection," and, in certain instances, to inspect culverts that are closed by boulders, FS-174280, 174820.

III. Procedural History

In 2015, the Forest Service announced its intention to revise the 1986 Plan pursuant to its 2012 Forest Planning Rules. FS-044923. In response, Plaintiffs submitted comments related to the Forest Service's statement of intent to prepare a draft Environmental Impact Statement ("EIS"). FS-083855, 087455, 094993. Once the Forest Service published its draft EIS for the Revised Plan, Plaintiffs timely submitted comments, FS-070673, 071804, 073636, and when the Forest Service published its draft ROD for the Revised Plan, Plaintiffs timely objected, FS-056011, 056355, 055826.

Upon responding to the eligible objections, FS-045641–43, the Forest Service reviewing office instructed the Forest Service to undertake additional analysis before issuing the Final ROD, FS-045753–55. Three months later, the Forest Service completed the final EIS for the Revised Plan. FS-052283. Then-Forest Supervisor Chip Weber signed the final ROD on December 24, 2018, FS-

054711–76, and the Forest Service published a notice in the Federal Register, *see* 83 Fed. Reg. 66,673 (Dec. 27, 2018).

In 2017, the Fish and Wildlife Service completed its biological assessment of the Forest, FWS-001332, and concluded that the Revised Plan was likely to adversely affect bull trout and designated bull trout critical habitat, grizzly bear, Canada lynx, and Canada lynx critical habitat, FWS-001341–42. In November 2017, the Fish and Wildlife Service issued its 2017 BiOp, FWS-001855, which concluded that the Revised Plan was unlikely to jeopardize the threatened or endangered species above, nor was it likely to adversely modify their critical habitat, FWS-001957–60, 002058–63, 002166–73.

Plaintiffs filed suit in April 2019. Collectively, Plaintiffs raise the following claims: (1) a NEPA violation based on road density; (2) a NEPA violation based on culverts; (3) ESA violations based on road density and reclamation requirements, the relevant grizzly population, access conditions, winterized motor travel, take statements, and reliance on the allegedly flawed BiOp; and (4) violations of the Travel Management Rule. Cross-motions for summary judgment have been filed, (Docs. 76, 86, 90), and the Court heard oral argument on May 27, 2021, (*see* Doc. 115 (Min. Entry).) The matter is now ripe for adjudication.

Summary Conclusion

Though complicated by Plaintiffs' numerous yet discrete claims, this does not appear to be a case in which the agencies cut corners. Rather, with limited exception, the record reflects that Federal Defendants met their statutory obligations in planning for and implementing the Revised Plan. But Plaintiffs do succeed on several aspects of their ESA claims, which are discussed in more detail below. Ultimately, because of the nature of the agencies' errors, remand without vacatur is the appropriate remedy.

LEGAL STANDARDS

The Administrative Procedures Act ("APA"), 5 U.S.C. §§ 706 *et seq.*, governs judicial review of agency actions under NEPA and the ESA. *See San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 601 (9th Cir. 2014). Under the APA, the "reviewing court shall . . . hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). The review is deferential to the agency, and a court should "not [] substitute its judgment for that of the agency." *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

A decision is arbitrary and capricious "only if the agency relied on factors Congress did not intend it to consider, entirely failed to consider an important aspect of the problem, or offered an explanation that runs counter to the evidence before the agency." *Id.* A decision is also arbitrary and capricious if it "is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Id.* On the other hand, an agency's action is valid if the agency "considered the relevant factors and articulated a rational connection between the facts found and the choices made." *Id.* Disagreement with the agency's determinations, while expected, is *not* a reason to overturn the agency's determinations if the agency has acted in accordance with the substantive and procedural mandates of the questioned law. Consistent with the court's obligation not to substitute its judgment for that of the agency, an agency's action may only be upheld on "the basis articulated by the agency itself," and the agency must make plain its course of inquiry, analysis, and reasoning. *Id.* at 50.

ANALYSIS[3]

Plaintiffs prevail on a handful of their claims related to the ESA. Specifically, Plaintiffs succeed on their ESA claims related to grizzly bears: that the Revised Plan is arbitrary and capricious to the extent it did not consider the impacts of its departure from Amendment 19's road density and reclamation standards, did not consider the impact on the entire grizzly population, did not adequately explain the adoption of the 2011 access conditions, and adopted a flawed surrogate in its take statement concerning grizzly bears. Plaintiffs also

[3] In this consolidated action, various claims were brought by various plaintiffs. To avoid confusion, the sponsoring plaintiff is identified only in the headings for each section; the general term "Plaintiffs" is used in the substantive discussion.

succeed on the narrow argument that departing from Amendment 19's culvert removal requirements violated the ESA as it relates to bull trout. Plaintiffs also succeed on their ESA claim that the Forest Service improperly relied on the flawed aspects of the 2017 BiOp. However, Plaintiffs fail on their remaining ESA claims, as well as on their NEPA and Travel Management Rule claims. The NEPA claims are discussed first, followed by the ESA claims, and then the Travel Management Rule claim.

I. NEPA Claims (Swan View Coalition Claims III and IV)

Under NEPA, federal agencies must follow systemic procedures when contemplating actions that will have an environmental impact. 42 U.S.C. § 4332. Consequently, agencies must consider alternatives to the proposed action—including no action—and compare those alternatives against the proposed action. 40 C.F.R. § 1502.14. This comparison and other NEPA considerations are included in an EIS. *Id.* § 1502.1. "An EIS is sufficient so long as it presents a full and fair discussion of significant environmental impacts and [] inform[s] decision makers and the public of reasonable alternatives that would minimize adverse impacts." *Id.* Forest plan revisions require the federal agency to prepare an EIS. 36 C.F.R. § 219.7(c)(1).

"NEPA's 'hard look' obligation requires agencies to consider potential environmental impacts, including 'all foreseeable direct and indirect impacts,' and 'should involve a discussion of adverse impacts that does not improperly minimize negative side effects.'" *WildEarth Guardians v. U.S. Bureau of Land Mgmt.*, 457 F. Supp. 3d 880, 885 (D. Mont. 2020) (quoting *N. Alaska Env't Ctr. v. Kempthorne*, 457 F.3d 969, 975 (9th Cir. 2006)). While NEPA requires federal agencies to take a "hard look" at the consequences of their actions, it does not mandate a particular result. *High Sierra Hikers Ass'n v. Blackwell*, 390 F.3d 630, 639–40 (9th Cir. 2004).

Here, Plaintiffs argue that the Forest Service violated NEPA by failing to abide by its obligation to take a "hard look" at the environmental impact of the Revised Plan in two respects: (1) the Forest Service failed to consider or disclose the consequences of the Revised Plan's road density requirements on grizzly bears, and (2) the Forest Service failed to consider or disclose the Revised Plan's impacts on bull trout. (Doc. 77 at 49–51.) Neither argument is persuasive.

A. Grizzly Bears

Plaintiffs allege that the Forest Service "failed to consider or disclose" that the Revised Plan would not use Amendment 19's road density standards or road reclamation requirements, and it did not seriously consider the negative effects that might result from the departure from Amendment 19's prohibition on high-use non-motorized routes in secure core grizzly habitats. (Doc. 77 at 49–50.) These contentions are belied by the record.

Plaintiffs claim that the Forest Service failed to disclose and consider the Revised Plan's departure from Amendment 19 during the EIS process. That argument fails because the Forest Service followed NEPA processes at both the draft and final EIS stages. Before issuing the final EIS, "[t]he NEPA process requires the agency to first prepare a draft EIS to submit for public review and comment." *Helena Hunters & Anglers Assoc. v. Marten*, 470 F. Supp. 3d 1151, 1161 (D. Mont. 2020) (citing 40 C.F.R. § 1502.9(a)). The Forest Service complied with this requirement and published a notice of availability of a draft EIS for the Revised Plan in June of 2016. FS-044935. The Draft EIS specifically stated that the Revised Plan "would replace A[mendment] 19 and other 1986 Flathead [Forest] plan direction related to grizzly bears in its entirety." FS-046497. Plaintiffs submitted comments in response to the draft EIS, (*see* Doc. 78 at ¶ 8), raising concerns that departing from the road density requirements under Amendment 19 would harm grizzly bear populations and habitat. *See* FS-070679, 070681–82, 071805–06. That Plaintiffs expressed their opposition to the Forest Service's proposed departure from Amendment 19's road density standards indicates that the Forest Service properly disclosed its proposal.

At the final EIS stage, the Forest Service fulfilled its "hard look" obligation because the Final EIS "consider[ed] all foreseeable and direct impacts" and "involve[d] a discussion of adverse impacts that [did] not improperly minimize negative side effects." *N. Alaska Env't Ctr.*, 457 F.3d at 975. The Final EIS also included an explanation of why the Forest Service believed a change from Amendment 19 was warranted. *See, e.g.*, FS-054724. Additionally, the Final EIS contemplated the negative effects of implementing the "baseline" road requirements instead of maintaining the Amendment 19 requirements. *See* FS-052416. The Final EIS acknowledged that, among the Forest Service's potential alternatives, the alternative selected for the Revised Plan "would provide the most opportunity for wheeled motor vehicle use" within the Forest. FS-053067.

Lastly, the Final EIS considered the potential consequences, including adverse impacts, of high-use non-motorized routes in secure core habitat. The Forest Service directly responded to "concern[s] about effects of nonmotorized trails on grizzly bears or grizzly-bear human conflicts." FS-052866. The Forest Service cited multiple studies, ranging from 1985 to 2017, that considered the effect of use on non-motorized routes in core habitat area. FS-052866–67. In addition, as Defendant-Intervenors point out, the evidence on which Plaintiffs rely to show that high-use of nonmotorized routes in secure core will adversely impact grizzly bears is not compelling insofar as it considered Alaskan brown bears and did not distinguish between motorized and nonmotorized use. (*Compare* Doc. 97 at 49 ("Scientific evidence suggests a [negative reproductive] impact from high-use nonmotorized routes") *with* FS-153872–73 (analyzing impacts of human recreation on Alaskan brown bears).) Thus, though Plaintiffs disagree with the conclusion the Forest Service reached, the Forest Service properly followed the NEPA framework to consider the environmental impacts and potential negative consequences of moving away from Amendment 19's standards.

B. Bull Trout

While Amendment 19 most directly affects grizzly bears, the Forest Service had an obligation to consider the effects any departure would have on bull trout because "NEPA's 'hard look' obligation requires agencies to consider potential environmental impacts, including 'all foreseeable direct and indirect impacts.'" *Wildearth Guardians*, 457 F. Supp. 3d at 885 (quoting *N. Alaska Env't Ctr.*, 457 at 975). In addition, "general statements about 'possible' effects and 'some risk'" are insufficient to satisfy NEPA's "hard look" requirement. *Id.* at 887 (quoting *Or. Nat. Desert Ass'n v. Rose*, 921 F.3d 1185, 1191 (9th Cir. 2019)). Thus, Plaintiffs argue that the EIS for the Revised Plan is insufficient because it did not take the requisite "hard look" at the Revised Plan's departure from Amendment 19's road density requirements and its impact on bull trout. More specifically, Plaintiffs assert that the Revised Plan abandoned previous strict culvert management and removal requirements, inexplicably replacing them with weaker, discretionary standards in Guideline FW-GDL-CWN-01.

Plaintiffs are correct that the portion of the final EIS that generally discusses the habitat threats to bull trout, *see* FS-052374–75, is insufficient alone to satisfy NEPA's "hard look" requirement, *see Or. Nat. Desert Ass'n*, 921 F.3d at 1191. But Plaintiffs' challenge is ultimately unavailing. First, the final EIS includes a section that specifically considers the effects of "motorized trails, travel management, and roads" on aquatic species, including bull trout. FS-052433–34. The final EIS also considers the effects of the Revised Plan's road management on aquatic species. *See* FS-052433–34. And, the Biological Assessment analyzed the general effects of the proposed action, and it analyzed the potential impacts of specific activities. *See* FS-107623–32.

Further, while Plaintiffs take umbrage with Guideline FW-GDL-CWN-01 because it has limited application and is discretionary, the Forest Service offered an adequate explanation of its decision to implement that Guideline. The Forest Service acknowledged that while guidelines are discretionary, their purpose must be met. FS-051886. The Forest Service explained that the management flexibility inherent in the guidelines was intended to further protections for aquatic species, including bull trout. FS-051898. The Forest Service envisions that in most circumstances this aim will be accomplished without a net increase in roads, FS-054989, but Guideline FW-GDL-CWN-01 allows the Forest Service to achieve the overall aim of reduced sedimentation in situations where an increase in road length may be necessary, such as where an existing road in a watershed area can be moved away from a stream, FS-054208; *see also* FS-054223. This explanation indicates that the Forest Service considered the possibility that a strict requirement prohibiting any net increases would be *less* beneficial to the aim of reducing sedimentation in the streams.

Moreover, the record shows that the Forest Service considered the impact of its change to the scope of the conservation watershed network under the Revised Plan. Plaintiffs argue that the Forest Service's analysis is deficient because the "geographic scope of the 'conservation watershed network' is narrower than the scope of pre-existing protections for bull trout habitat." (Doc. 77 at 51.) However, Plaintiffs do not cite any part of the record for this argument, and their position seems to largely take issue with the Forest Service's reduction in culvert monitoring within the conservation watershed network. (*See id.*; *see also* Doc. 78 at ¶ 98.) But the Forest Service explained that choice. The record shows that the Forest Service considered multiple alternatives to the Culvert Monitoring Plan, FS-054216–05420, and explained how an adaptive approach to monitoring would work, including consideration of a scenario in which the Plan could not be implemented, FS-107735–36.

In sum, the Forest Service adequately considered the bull trout-related impacts of the Revised Plan.

II. ESA

When a proposed agency action may affect a species protected by the ESA, the agency must consult with either the Fish and Wildlife Service or the National Marine Fisheries Service. *See* 16 U.S.C. § 1536(a)(2). Where the proposed action is "likely to adversely affect" listed species or critical habitat, the agencies must engage in formal consultation. 50 C.F.R. § 402.14. Such consultation results in the issuance of a biological opinion by the consulting agency—here, the Fish and Wildlife Service. *Id.* § 402.14(h). Under the ESA, the Fish and Wildlife Service must make a jeopardy determination to ensure that the proposed action is not likely to jeopardize protected species or adversely affect designated critical habitat. 16 U.S.C. § 1536(a)(2). The jeopardy determination must be based on "the best scientific and commercial data available." *Id.*

A biological opinion violates the ESA if it "fails to consider[] the relevant factors and articulate a rational connection between the facts found and the choice made." *Ctr. For Biological Diversity v. U.S. Bureau of Land Mgmt.*, 698 F.3d 1101, 1121 (9th Cir. 2012) (internal quotation marks and alternations omitted). The Forest Service's reliance on a deficient biological opinion violates the ESA. *Id.* at 1128. Further, the Fish and Wildlife Service must also issue an incidental take statement if the proposed action will result in the "take" of a protected species. 16 U.S.C. § 1536(b)(4). A "take" occurs if the species will be harassed, harmed, pursued, hunted, shot, wounded, killed, trapped, captured, or collected, or there will be an attempt to engage in any such conduct, as a result of the action. *Id.* § 1532(19). Take statements must contain reasonable and prudent measures with implementing terms and conditions that minimize take and with which the action agency must comply. *See* 50 C.F.R. § 402.14(i).

In relation to the ESA, Plaintiffs present seven arguments, six against the Fish and Wildlife Service and one against the Forest Service. They are discussed in turn.

A. Road Reclamation Requirements Claims (WildEarth Claim II, Count I; Swan Valley Coalition Claims I and II)

1. Effects on Grizzly Bears

The 2017 BiOp states that "the presence of roads and associated human activities has detrimental impacts to grizzly bears." FWS-002005. The BiOp then explains that secure habitat is important to the survival of grizzly bears, and "[g]rizzly bear habitat security is primarily achieved by managing motorized access." FWS-002005. This is important because "grizzly bears that experience [] negative consequences learn to avoid the disturbance generated by roads and may not choose to use these habitats even long after road closures." FS-002029. While Federal Defendants attempt to refute this point, the study they cite indicated that the selection towards roads "was partially due to bears utilizing cutting units, or avalanche chutes which often terminated near roads. Few bears exhibited positive selection towards areas near roads having >60 vehicles/day." FS-182183. The science supports Plaintiffs' argument that, generally, bears avoid roads, particularly motorized ones.

Since roads are "an important aspect of the problem" of maintaining grizzly bear populations, the Fish and Wildlife Service was obligated to consider the road reclamation and density standards of the Revised Plan. *See Save Our Cabinets v. U.S. Fish & Wildlife Serv.*, 255 F. Supp. 3d 1035, 1063 (D. Mont. 2017) (concluding that FWS's failure to consider "an important aspect of the problem" violated the ESA). The parties dispute the nature and scope of that consideration.

First, the parties disagree about whether the Fish and Wildlife Service had to "compare" Amendment 19 to the Revised Plan. Ultimately, Federal Defendants are correct that, under § 7 of the ESA, the Fish and Wildlife Service was not required to consider the environmental baseline against the proposed action. *See* 50 C.F.R. § 402.14(g). But, as Plaintiffs note, the baseline was established in 2011 while Amendment 19 was in effect. FS-052052. Consequently, though the Fish and Wildlife Service did not need to directly compare Amendment 19 with the Revised Plan, it did need to consider whether the Revised Plan would have an effect on the 2011 baseline, which was the product of the 1986 Forest Plan and its amendments, including Amendment 19.

Second, at the heart of the parties' conflict is whether the Fish and Wildlife Service was required to expressly consider the role of "closure devices" in road density and management. In other words, are "closure devices" an "important aspect of the problem" to be addressed by the Revised Plan? The answer is yes.

Amendment 19 required the Forest Service to reclaim and render a road inaccessible to motor vehicles before excluding the road from road-density calculations. FS-178392. A reclaimed road was defined as a road that "ha[d] been treated in such a manner so as to no longer function as a road or trail and has a legal closure order until reclamation treatment is effective. This [could] be accomplished through one or a combination of treatments including: recontouring to original slope, placement of natural debris, or revegetation with shrubs or trees." FS-178392. This "reclaimed road" standard is the standard underlying the 2011 baseline. *See* FS-052052. The Revised Plan replaced the "reclaimed road" standard with an "impassable road" standard. An "impassible road" is

> a road that has been treated in such a manner that the road is blocked and there is little resource risk if road maintenance is not performed on a regular basis (self-maintaining).. . . Roads may become impassable due to a variety of causes, including but not limited to one or more of the following: natural vegetation growth, road entrance obliteration, scarified ground, fallen trees, boulders, or culvert or bridge removal. Impassible roads may remain on the inventoried road system if use of the road is anticipated at some point in the future. Some, but not all, roads placed in intermittent stored service may be impassible.

FS-052079. Impassible roads do not count in the total motorized route density as long the first 50 to 300 feet of the road "has been treated to make it inaccessible to wheeled motorized vehicles during the non-denning season." FS-052079. The problem as it relates to grizzly bears, according to Plaintiffs, is that the "reclaimed road" standard from Amendment 19 "ensured the integrity of road closures and created a substantial disincentive for new road construction in grizzly habitat," while the mere "blocking" required under the Revised Plan will not have the same effect. (Doc. 77 at 27.)

In support of their argument, Plaintiffs insist that Federal Defendants knew that ineffective road closures could lead to motorized use of decommissioned roads. One of the studies Plaintiffs cite was performed by Plaintiff Swan View Coalition in 2004. FS-065784–97. That study found that in the Swan Lake Ranger District—an area encompassed by the Revised Plan—53 of the 169 routes (31.4%) showed no signs of use. FS-065788. The study concluded that roughly 68% of the remaining roads showed use because of ineffective road closures. FS-065788. Of those 116 ineffective closures, 67 were "permanent barriers" that showed signs of detour. FS-065788.

Federal Defendants argue that road closures are not an important part of the problem related to road use and density because a 1996–2005 Forest Service study demonstrated "that only 3 to 15% of gates, barriers, and signs were deemed ineffective, with the average at 7%." (Doc. 91 at 21 (citing FS-176296–97).) Because the overall grizzly bear population in the NCDE was increasing during the time of the study, Federal Defendants concluded that the level of road closure effectiveness was not problematic. (*Id.*) However, the Forest Service's study only considered road closures ineffective if they could not be fixed by the inspector before leaving the inspection site, FS-176296, which means that some of these closure devices were allowing use before being remedied by inspection.

Thus, the science indicates that, even where "permanent barriers" are used, road closures may be ineffective and use may occur or continue. Both the Swan View Coalition Study and the Forest Service Study support that argument. Because the 2017 BiOp identified use management as the primary method of protecting grizzly bear habitat, which in turn maintains and protects grizzly bear populations, *see* FWS-002005, the Fish and Wildlife Service's failure to consider the effect of ineffective road closures was arbitrary and capricious. This conclusion is also bolstered by the fact that the 2017 BiOp cites at least one study that determined "that the leading cause of human-cause mortality [of NCDE grizzly bears] was management removals." FWS-002001; *but see id.* (noting that poaching and malicious kills may be underreported). Additionally, Federal Defendants' explanation in its summary judgment briefing about why it apparently did not consider road closure devices is impermissible post hoc rationalization. *See Motor Vehicle Mfrs.*, 436 U.S. at 50 (explaining that an agency's action may only be upheld on "the basis articulated by the agency itself," and the agency must make plain its course of inquiry, analysis, and reasoning).

In this case, the Fish and Wildlife Service violated the ESA by not considering the impact of ineffective road closures in its 2017 BiOp.

2. Bull trout

The ESA prohibits federal agencies from taking direct or indirect action that will "result in the destruction or adverse modification of [designated] critical habitat." 16 U.S.C. § 1536(a)(2); *see also* 50 C.F.R. § 402.02. The 2017 BiOp acknowledges that the Revised Plan's effects on bull trout are indirect, and notes that "activities that disturb the soil surface adjacent to or in occupied habitat have the greatest potential to result in adverse effects to bull trout and bull trout critical habitat." FWS-001930–31. The BiOp states that roads can adversely affect bull trout and bull trout habitat, and one way to mitigate potentially damaging sedimentary runoff is culvert management. FWS-001934–45.

Plaintiffs argue that the 2017 BiOp runs counter to the evidence that roads harm bull trout in two ways: (1) it abandons Amendment 19's culvert removal requirements, and (2) it implements a less protective Culvert Monitoring Plan. Though both of Plaintiffs' bull trout-related ESA challenges deal with Amendment 19's culvert monitoring and removal standards, the challenges are distinct enough to warrant separate discussion. As explained below, Plaintiffs succeed on the first part of their challenge. The scientific evidence does not support the Revised Plan's shift away from mandatory culvert removal, particularly since the Fish and

Wildlife Service endorsed culvert removal as one of the most effective bull trout protection tools just two years prior to the 2017 BiOp. *See* FS-017013. Plaintiffs fail on the second part of their challenge, however, because the sort of programmatic approach the Service takes is authorized under the ESA and is not contrary to the evidence.

a. Culvert Removal

The Fish and Wildlife Service's historic position on culvert removal—including as recently as 2015—and its lack of explanation for moving away from that position undercuts its argument that the Revised Plan's culvert removal standards are based on the best available science. In a previous biological opinion prepared for the Moose Post-Fire Project within the Flathead National Forest in 2002, the Fish and Wildlife Service noted that "any crossing structure would have a 100% chance of failure over its installation life if it is not removed after the road is abandoned." FWS-030236–37. That same opinion also found that "[a] culvert that is designed for a 100-year event that would remain in for 10 years would have a 9.6% chance of failure. The same culvert designed to stay in for 20-years would have a 19.2% chance of failure." FWS-030236 (internal citation omitted).

Over a decade after acknowledging these findings, in 2015, the Fish and Wildlife Service promulgated the Recovery Plan. The Recovery Plan identified "culvert removal or redesign at stream crossings" as a factor for the success of bull trout conservation efforts since 1999. FS-017008. It also identified sedimentation as a threat to bull trout and suggested that "sediment impacts from roads c[ould] be addressed by," among other things, "maintaining bridges, culverts, and crossings; or decommissioning surplus roads and removing culverts and bridges on closed roads." FS-017013. Notably, Amendment 19 was in effect when the Fish and Wildlife Service published the Recovery Plan, meaning Amendment 19's requirement that roads be "reclaimed," which included the culvert-removal requirement, was in place.

In its 2017 BiOp, the Fish and Wildlife Service noted that "[r]oad networks have been shown to have detrimental effects on water and aquatic resources in forested landscapes," FWS-001935, and "[t]he potential for roads to have detrimental effects on aquatic resources exists as long as the road is retained," FWS-001936. But, the BiOp also noted that proper design and maintenance of roads can effectively disperse sedimentation. FWS-001936. The Fish and Wildlife Service concluded that "[r]oad decommissioning reduces the long-term risk of sediment delivery to streams from roads and roadside ditches through reducing culvert failures and landslides," FWS- 001936–37, but road decommissioning under the Revised Plan does not include mandatory culvert removal, *see* FS-052079 (defining "impassable" road).

With this emphasis on the relationship between bull trout population and habitat conservation and culvert management and removal, it is inexplicable why, two years after the Recovery Plan, the Fish and Wildlife Service determined that culvert removal is no longer required. Both Defendant-Intervenors and Federal Defendants point to guidelines within the Revised Plan that ostensibly function in the aggregate to remove problem culverts, but these guidelines do not address the root of the problem. For example, one of the Revised Plan's objectives is to decommission or place into storage 30 to 60 miles of road over roughly the next 15 years, which the Fish and Wildlife Service avers will have the effect of improving watershed conditions by decreasing road density. FWS-001937 (citing Guideline FW-OBJ-IFS-01). This Guideline does not mention culverts.

Defendant-Intervenors also point to Guidelines FW-OBJ-WTR-02 and 03 as guidelines that "help to remove or mitigate risk factors associated with roads," though neither mentions culverts specifically. *See* FWS-001937. In response to public comments, the Fish and Wildlife Service explained that FW-OBJ-WTR-02 emphasizes "stormproofing," to "either upgrade or decommission the road" to reduce the risk of future sediment delivery. FS-054201. The response identifies "reducing hydrologic connectivity" as a means through which stormproofing could be accomplished, FS-054201, and though Federal Defendants say that the Guideline would reduce "stream crossing failures" and these failures "include damaged culverts," (Doc. 91 at 23 n.7), this clarification is not in the record. The

Fish and Wildlife Service also explained that FW-OBJ-WTR-03 would emphasize reconnecting stream habitat to provide for fish passage. FS-054201. But the Fish and Wildlife Service's response makes clear that this Guideline is concerned with providing routes for fish spawning, not with mitigating sedimentation. *See* FS-054201.

Because the 2015 conclusion that road decommissioning, which included culvert removal, was an effective sedimentation reduction measure, the Fish and Wildlife Service has not explained its conclusion just two years later that culvert removal was not required on decommissioned roads. While the Service did conclude that non-motorized roads posed less of a threat for culvert failure and, consequently, sedimentation, this conclusion rests on the assumption that road closures are effective. Nonetheless, the evidence undermines this assumption. *See also All. for Wild Rockies v. Probert*, 412 F. Supp. 3d 1188, 1195 (D. Mont. 2019) (concluding that Fish and Wildlife Service's failure to consider impact of ineffective road closures constituted a violation of the ESA). Therefore, the record supports Plaintiffs' arguments that the Fish and Wildlife Service's abandonment of the culvert removal requirement was arbitrary and capricious.

b. Culvert Monitoring Plan

The Culvert Monitoring Plan adopted in the Revised Plan provides for monitoring of culverts remaining on a subset of closed roads only once every six years. FS-054755. Under Amendment 19, culverts were monitored annually and culverts that failed or were in the process of failure were removed. FS-107731. While Amendment 19 was in place, Federal Defendants expected that one or fewer culverts would fail each year. FS-107731. Plaintiffs maintain that the 6-year rotating inspection schedule under the Culvert Monitoring Plan did not consider the threats a reduction in monitoring would pose to bull trout habitat. Plaintiffs are wrong.

Pursuant to the Culvert Monitoring Plan, groups of bull trout habitats would be monitored on a six-year rotating panel. FS-107733. "The groups were developed based on the logistics of monitoring and the relative miles of system road and historic road." FS-107733. The Plan noted that in most cases, "roads that had been decommissioned (historic roads) had stream culverts removed." FS-107733. The Plan also clarified that the six-year schedule was not static: "For example, if crews complete all culverts in a given panel before the season is over, they may move to the next panel." FS- 107736.

The Fish and Wildlife Service's implementation of an adaptive Culvert Monitoring Plan is reasonable and responsive to the reality of the culvert situation in the Forest. Indeed, under Amendment 19, it was anticipated that one or fewer culverts would fail each year. FS-107731. The Culvert Monitoring Plan explained that an adaptive plan would avoid duplicative monitoring, FS-107736, and, since most culverts had been removed from historic roads, the number of culverts at risk of failing had been reduced, FS-107733–34. Thus, the Fish and Wildlife Service did not violate the ESA in implementing the Culvert Monitoring Plan.

B. Relevant Population Claims (WildEarth Claim II, Count I)

The parties agree that the NCDE grizzly population plays a significant role in genetic diversity in the region. (Doc. 93, ¶ 21.) The ESA's implementing regulations at 50 C.F.R § 402.14(g) articulate the requirements of the Fish and Wildlife Service during formal consultation. In this case, the Service complied with § 402.14(g)(2), which required it to evaluate the current status and environmental baseline of the listed species. The 2017 BiOp identified the range-wide status of grizzly bears and provided statistics on their status within each of the six (five populated)[4] grizzly bear recovery zones in the lower 48 states. *See* FWS-001992–2004. Even so, the Service did not comply with § 402.14(g)(3), which requires more than mere recitation of statistics and instead obligates the Service to "[e]valuate the effects of the action and cumulative effects on the listed species or critical habitat." While the Service did provide a thorough overview of the status of the grizzly bear species in the United States, it failed to analyze how the Revised Plan would affect grizzly bears outside of the NCDE.

[4] The record indicates that the Bitterroot Ecosystem was not populated with grizzlies at the time this case was filed, but at oral argument the parties indicated that grizzlies have recently been identified in the Bitterroot Ecosystem.

In an effort to refute this point, Defendant-Intervenors argue that the BiOp considered the effect of the Revised Plan on grizzly bears because it established two demographic connectivity areas. However, these connectivity areas only consider the effect of the NCDE population on the populations of the Cabinet-Yaak Ecosystem and the Bitterroot Ecosystems. FWS-001982. Moreover, defendants point to the Service's conclusion that "[c]onnectivity among ecosystems will support a more robust grizzly bear population in the lower U.S. as a whole" as evidence that the Service satisfied its obligation to consider the effects of the Revised Plan on the grizzly population nationwide. (*See* Doc. 87 at 23 (quoting FWS-002061); Doc. 91 at 27 (same).) In this case, the portion of the BiOp that discusses connectivity in greater depth does so only as it relates the Cabinet-Yaak population, despite the fact that earlier in the BiOp the Service emphasized the connectivity would benefit the Bitterroot Ecosystem as well. FWS-001994. Finally, the BiOp does not consider whether the Revised Plan will have an effect on the GYE population, a fact the Service should have considered given the Ninth Circuit's recent emphasis on the relationship between the NCDE population and the GYE population.[5] *See Crow Indian Tribe v. United States*, 965

[5] When the 2017 BiOp was published, the Fish and Wildlife Service found that the GYE grizzly bear population had sufficiently recovered so that it was no longer listed under the ESA. (*See* Doc. 87 at 21.) However, the Ninth Circuit since affirmed the district court's ruling that the decision to delist the GYE population was arbitrary and capricious. *Crow Indian Tribe*, 965 F.3d at 680.

F.3d 662, 678–80 (9th Cir. 2020).

Defendant-Intervenors also attempt to argue that the Forest Service considered the effects on the NCDE population and extrapolated those effects onto the grizzly bear population at-large in a permissible "hierarchical" analytical technique. For support, Defendant-Intervenors point to *Rock Creek All. v. United States Forest Service*. 703 F. Supp. 2d 1152, 1205 (D. Mont. 2010) *(Rock Creek III), aff'd in part sub nom. Rock Creek All. v. U.S. Fish & Wildlife Serv.*, 663 F.3d 439 (9th Cir. 2011). In *Rock Creek III*, the Court found the Fish and Wildlife Service's explanation of its no-jeopardy determination for bull trout in an updated biological opinion was sufficient under the ESA. *Id.* The Court held that the no-jeopardy conclusion was rational because the bull trout population at issue was "so relatively small that the damage w[ould] not register at the core area, management unit, or distinct population segment levels." *Id.* But *Rock Creek III* supports Plaintiffs' position. As demonstrated by the discussion above, which emphasizes the impact the NCDE grizzly population has on the species as a whole, the NCDE grizzly bear population represents a more significant segment of the population than did the bull trout in *Rock Creek III.* Consequently, the Fish and Wildlife Service could not properly use the hierarchal analysis it purports to here.

In sum, the Fish and Wildlife Service violated the ESA when it failed to consider the effects of the Revised Plan on the national grizzly population.

C. Access Conditions Claims (WildEarth Claim II, Count I)[6]

The defendants cannot justify the implementation of the 2011 access conditions in the Revised Plan. Under the defendants' theory, because the goal of the ESA is the recovery of listed species, and the population of the NCDE grizzlies was increasing in 2011, the goal of the ESA has been met and the agencies properly pivoted to a different management technique. Federal Defendants point to the BiOp as evidence that they considered the best available science in implementing the 2011 baseline. However, their cited studies do not entirely support their arguments. For example, the 2015 Teisberg study speaks to grizzly bear body condition and food supply, which has no clear bearing on access conditions and grizzly bear population. FWS-002001. While the 2016 Costello study does speak to the relationship between access conditions and grizzly bear population and concluded that "the leading cause of human-caused mortality was management removals," that conclusion is undercut by the recognition that illegal kills may be underreported. FWS-002001.

By contrast, Plaintiffs persuasively argue that the Service cannot arbitrarily

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[6] The parties quarrel over "the 2011 access conditions" but this term is not in the record. Context suggests they are arguing about the 2011 "baseline," *see* FS-053322, which is defined as "conditions as of December 31, 2011, as modified by changes in numbers that were evaluated and found to be acceptable through the [ESA] section 7 consultation with [the Fish and Wildlife Service] while the grizzly bear was listed as threatened." FS-052052.

pinpoint 2011 as the point in time at which to attach significance to the NCDE population. The mere fact that the population was increasing from 2004–2011 does not justify moving away from the existing management requirements of Amendment 19. In effect, by recognizing that Amendment 19 laid the foundation for recovery of the NCDE population and then using that recovery as justification for getting rid of the existing access conditions, the Fish and Wildlife Service eschews Amendment 19 precisely because it was working. This action is arbitrary and capricious. *C.f., Shelby Cty., Ala. v. Holder*, 570 U,S, 529, 590 (2013) ("Throwing out preclearance when it has worked and is continuing to work to stop discriminatory changes is like throwing away your umbrella in a rainstorm because you are not getting wet.") (Ginsburg, J., dissenting). The Fish and Wildlife Service violated the ESA by arbitrarily adopting the 2011 access conditions as a target for protecting grizzly bears.

D. Winter Motorized Travel Claims (WildEarth Claim II, Count I)

Plaintiffs' next ESA claim is based on the Revised Plan's incorporation of Amendment 24. In 2006, Amendment 24 designated 787,000 acres and 3,000 miles of roads and trails for over-snow vehicle use. (Doc. 51 at 4.) The Revised Plan incorporates Amendment 24's over-snow vehicle use designations pursuant to the Over-Snow Vehicle Rule's grandfather provision, identifies 567 additional acres as suitable for over-snow vehicle use, and provides for site-specific planning within three years to determine whether any of the 567 acres should be designated. (*Id.* at 5.) Plaintiffs make the claim that the Fish and Wildlife Service's action related to winter motorized travel violated the ESA in two ways: (1) the Service's action was not "coextensive" because its no-jeopardy determination for grizzlies and lynx relied on a description of the proposed action that omitted winter motorized travel designations, and (2) the Service failed to evaluate winter motorized designations as interrelated actions. Plaintiffs' arguments fail on both counts.

First, the Revised Plan did not actually implement any new over-snow vehicle route designations. Though the Revised Plan identifies an additional 567 acres suitable for use, it does not actually designate any new areas for use. FS-049275; *see also* FS-052309–10. The grandfather provision of the 2015 Over-Snow Vehicle Rule specifically allows national forests that previously designated over-snow vehicle routes to maintain those designations. 36 C.F.R. § 212.80(b); *see also id.* § 212.81(b). Thus, the designations from Amendment 24, which have been in place since 2006, were considered as part of the 2011 baseline in the 2017 BiOp. FWS-002022. The BiOp identified the different percentages of grizzly primary conservation area that was subject to the route designations from Amendment 24. FWS-002022. These percentages were based on the most recent data from the Forest Service and the Montana Fish Wildlife and Parks Service's monitoring of "motorized over-snow use as well as known den locations and bears emerging from their dens." FWS-002022. Similarly, the 2017 BiOp explained that the designated routes from Amendment 24 were incorporated into the Revised Plan's consideration of the Plan's impact on Canadian lynx and their habitat. FWS-002124–25. The 2017 BiOp's explanation of how the Revised Plan would result in a decrease of open snowmobiling routes in lynx habitat, *see* FWS-002125, demonstrates that the Forest Service complied with 50 C.F.R. § 402.14(g)(4), which requires it to consider "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the baseline."

Plaintiffs' reliance on *Conner v. Burford*, 848 F.2d 1441 (9th Cir. 1988), is unpersuasive. In *Conner*, the Court held that "biological opinions must be coextensive with the agency action and [ ] stipulations cannot be substituted for comprehensive biological opinions." *Id.* at 1458 (footnote omitted). *Conner* involved oil and gas leases on national forest land in Montana. *Id.* at 1443. The leases included mitigation stipulations authorizing the government to regulate—and, in some cases, altogether preclude—certain mining activities on the land, but the leases did not contain specific plans for the activities that would be conducted on the land post-lease. *Id.* at 1444. Under the ESA, the Forest Service engaged the Fish and Wildlife Service in formal consultation, requesting a jeopardy determination on the effects of the oil and gas leases on endangered species. *Id.* The Fish and Wildlife Service concluded it had insufficient information about the nature of the post-leasing activities to consider those activities in the biological opinion; as a result, the Fish and Wildlife Service "proposed ongoing consultation and preparation of additional biological opinions at various stages of post-leasing activities." *Id.* This "incremental approach," the court concluded, risked "piecemeal chipping away of habitat." *Id.* at 1454.

The Fish and Wildlife Service's determination of additional acreage here does not raise the same specter. Unlike the mining activity that was sure to follow the leases in *Conner*, the suitability determination does not guarantee that over-snow vehicle use will occur—it merely indicates that such use could occur in the future. And, in *Conner*, the Service improperly concluded that "there [wa]s insufficient information available to complete a comprehensive opinion." *Id.* at 1455. By contrast, in this case, the Fish and Wildlife Service has not claimed it has insufficient information, but rather has asserted it will undertake a programmatic review of any proposed action in the future. *See* FWS-02058. This sort of review is expressly permitted under the ESA. 50 C.F.R. § 402.02.

Plaintiffs' second argument—that the Fish and Wildlife Service violated the ESA because it did not consider "interrelated" actions—is more compelling, but ultimately fares no better. At the time the Revised Plan was implemented, the ESA defined "interrelated actions" as "those that are part of a larger action and depend on the larger action for their justification." 50 C.F.R. § 402.02 (2016). "The test for interrelatedness or interdependentness is 'but for' causation: but for the *federal* project, these activities would not occur." *Sierra Club v. Bureau of Land Mgmt.*, 786 F.3d 1219, 1225 (9th Cir. 2015) (internal quotation marks and alteration omitted). Plaintiffs argue that the 2017 BiOp failed to consider that the Revised Plan "replaced Amendment 24 in its entirety," and so, but for the Revised Plan's adoption of the over-snow vehicle designations, those designations would not have occurred. (Doc. 77 at 38.) The argument misses the point. The over-snow vehicle designations were the status quo before the Revised Plan was implemented. This means, even if the Revised Plan were not implemented, the over-snow vehicle designations would have occurred. As a consequence, the Revised Plan was not the "but-for" cause of the designations. *See Sierra Club*, 786 F.3d at 1225.

E. Grizzly Incidental Take Statement Claims (WildEarth Claim II, Count I)

Plaintiffs next allege that the Fish and Wildlife Service violated the ESA by issuing a flawed incidental take statement for grizzly bears. The ESA requires the preparation of an incidental take statement in situations where the Service concludes that an action will result in the incidental take of a listed species but such take will not violate § 7 of the ESA. 50 C.F.R. § 402.14(i). An incidental take statement must specify the impact of the incidental take upon a species;

however, the Service may use a "surrogate"—a similarly affected species or habitat or ecological condition—to express the extent of the anticipated take so long as the take statement "[d]escribes the causal link between the surrogate and take of the listed species, explains why it is not practical to express the amount or extent of anticipated take or to monitor take-related impacts in terms of individuals of the listed species, and sets a clear standard for determining when the level of anticipated take has been exceed." *Id.* § 402.14(i)(1)(i).

The incidental take statement must also specify "reasonable and prudent measures . . . necessary or appropriate to minimize such impact," establish the terms and conditions with which the federal agency must comply to implement minimization and disposition measures, and specify "the procedures to be used to handle or dispose of any individuals of a species actually taken." *Id.* § 402.14(i)(1), (ii), (iv), (v). Furthermore, neither the reasonable and prudent measures, nor the terms and conditions that implement them, may alter the basic nature of the action and may involve only "minor changes." *Id.* § 402.14(i)(2).

Plaintiffs advance three reasons that the incidental take statement was deficient: (a) the Service employed an inadequate road density and secure core habitat surrogate; (b) the Service employed an inadequate road density and secure core surrogate; and (c) the Service employed an inadequate over-snow motorized use surrogate. The defendants respond that the Service's decisions are reasoned, unambiguous, and comply with the ESA. Each of the Plaintiffs' arguments is addressed in turn. Ultimately the take statement is flawed insofar as the Service employed an inadequate road density and secure core habitat surrogate as argued under (a), but it is valid in all other respects.

1. Inadequate road density and secure core habitat surrogate

Plaintiffs successfully challenge all three deficiencies they identify concerning the road density and secure core habitat surrogate. The surrogate trigger is ambiguous, lacks a deadline, and the supposed requirement to maintain 2011 access conditions is not linked to a requirement in the Revised Plan.

As a threshold matter, the Fish and Wildlife Service identified its road density and secure core habitat surrogate as "the research benchmark levels of [open motorized route density], [total motorized route density], and secure core." FWS-002067. These levels reflect the 19-19-68 ratio embodied by Amendment 19. FWS-002067. The 2017 BiOp states that the Service "anticipate[s] that some level of incidental take of female grizzly bears will occur within individual subunits" as long as the 19-19-68 ratios are not met. FWS-002067.

Plaintiffs' first argument is that the surrogate lacks a proper trigger. "The 'trigger' in an incidental take statement must set a 'clear standard for determining when the authorized level of take has been exceeded.'" *WildEarth Guardians v. U.S. Fish & Wildlife Serv.*, 342 F. Supp. 3d 1047, 1062 (D. Mont. 2018) (citing

Ariz. Cattle Growers' Ass'n v. Fish & Wildlife Serv., 273 F.3d 1229, 1251 (9th Cir. 2001)). According to Plaintiffs, the incidental take statement's trigger is ambiguous because it states that impermissible levels of incidental take will occur when projects result in changes to the 19-19-68 baselines "beyond those permitted by the Revised Forest Plan and analyzed in th[e] biological opinion." (Doc. 77 at 40 (quoting FWS-002067).)

Defendant-Intervenors disagree, insisting that the trigger is sufficient. For support, Defendant-Intervenors point to the portion of the BiOp that states that "[c]hanges are calculated using a 10-year running average as described above and in Appendix 3 of this biological opinion." *See* FWS-002067. But Appendix 3 provides for a six-year running average, not ten. *See* FS-179077. Federal Defendants are more helpful. They identify the portion of the Revised Plan that provides that secure core numbers cannot exceed the following over a ten-year period: 5% temporary increase in open motorized route density in each subunit; 3% temporary increase in total motorized route density in each subunit; and 2% temporary decrease in secure core in each subunit. FS-051945.

While these standards cut against Plaintiffs' argument that the trigger is ambiguous, the trigger suffers from a fundamental flaw that the Service cannot elude with these standards. The BiOp acknowledges that 32 of the 47 subunits in the Forest do not meet the 19-19-68 benchmarks. FWS-002067. Given that the

BiOp indicates that "some level of incidental take will occur" when the 19-19-68 benchmarks are not met, FWS-002067, as Plaintiffs note, "[i]t is especially unclear how the benchmarks provide a clear trigger for the thirty-two subunits that already exceed one or more of the benchmarks," (Doc. 100 at 35.)

Additionally, Plaintiffs persuasively argue that the surrogate is inadequate because there is no requirement in the Revised Plan to return to 2011 access conditions. As explained above, the 2011 access conditions were the result of Amendment 19's road density requirements. The Revised Plan does not incorporate those requirements, so it is unclear how the 2011 access conditions ensure that "temporary changes" will not be indefinite. (*Cf.* Doc. 91 at 36.) As a result, the road density and secure core habitat surrogate violates the ESA.

2. Spatial and temporal surrogates

Plaintiffs are unpersuasive in arguing the spatial and temporal surrogates are inadequate. The allegedly insufficient surrogate provides: "[i]f on-the-ground implementation of a project exceeds five years, or if a project concurrently impacts [open motorized route density], [total motorized route density], or secure core in more than three adjacent subunits, the level of take exempted under this biological opinion would be exceeded." FWS-002067–68. According to Plaintiffs, "on-the-ground implementation of a project" is ambiguous, as is the five-year time limit. (Doc. 77 at 42.) Likewise, "concurrently impacts" is allegedly ambiguous because it may be interpreted to encompass *all* impacts, regardless of whether they are positive or negative, and vague because "concurrently" does not clarify whether it refers to route density or secure core being impacted at one time, impacts to any of the values occurring simultaneously in adjacent subunits, or both. None of these arguments are convincing.

Plaintiffs' first argument fails because the Revised Plan specifically defines "project" "for purposes of the motorized access standards and guidelines in the primary conservation area of the [NCDE]" as "any temporary activity requiring construction of new roads, temporary roads, reconstruction or opening of restricted roads during the non-denning season, if such use exceeds administrative use levels." FS-052075. "Administrative use" is a defined term. FWS-002276. Consequently, these terms are not ambiguous.

Plaintiffs' second argument has more traction, but it, too, fails to carry the day. While Plaintiffs are correct that the terms of a guideline are not mandatory, Guideline FW-GDL-IFS-01 was incorporated as a "non-discretionary" term and condition of the BiOp. (*See* Doc. 91 at 37 (citing FWS-00260–70)). Plaintiffs respond that the Service's comments indicate that the five-year period is ambiguous, (Doc. 100 at 37 (citing FS-051946–47)), but the comment to which Plaintiffs cite explains the exception to the five-year requirement ("agency contracts must allow for the extension of contract term lengths under qualifying conditions"), and thus the five-year period itself is not ambiguous. FS-179031.

Moreover, while Plaintiffs are correct that "impacts" could mean any degree of change, upwards or downwards, if the impact results in a decrease in route density, that decrease would benefit the listed species. Similarly, an impact resulting in an increase in secure core would benefit the listed species. Thus, to the extent an ambiguity exists, that ambiguity seems to favor the species. *See Swan View Coalition v. Barbouletos*, 2008 WL 5682094, *15 (D. Mont. June 13, 2008) ("The ESA requires that protected species be given the benefit of the doubt in management decisions.") (internal quotation marks omitted). Because route density and secure core are related, "impact" may be the most precise term with which to define the triggering event: a decrease in total motorized route density could lead to a decrease in open motorized route density, and would likely lead to an increase in secure core. Under the surrogate, if this combination occurred in three adjacent subunits at the same time, it would trigger reinitiation. *See* FWS-002068.

Relying on *Arizona Cattle Growers'*, Plaintiffs assert that the surrogates fail to articulate a rational connection to the taking of grizzly bears. But *Arizona Cattle Growers'* makes clear that the causal link requirement means "only that [the Service] must establish a link between the activity and the taking of species before setting forth specific conditions." *Id.* at 1250. In the final EIS, the Forest Service explains the temporal surrogate based on two Guidelines, FW-GDL-IFS-01 and -02. FS-054311. The five-year timeline is linked to take of grizzly bears because

> the average age of first reproduction in the NCDE is 5.4 years old, but can vary from 3–8 years of age. The average time between litters in the NCDE is 3.0 years. Thus, at a forestwide scale, a combination of permanent secure core and limitations on temporary reductions in secure core should meet the needs of the grizzly bear population.

FS-054311. The pertinent Guidelines are incorporated into the Revised Plan as mandatory standards. FWS-002070. Given this explanation, the temporal surrogate is not arbitrary nor capricious. *Cf. Ariz. Cattle Growers'*, 273 F.3d at 1250–51.

Similarly, an explanation refutes Plaintiffs' argument that the spatial surrogate is flawed: the no-more-than-three-adjacent-subunits rule "will provide grizzly bears within a project subunit the opportunity to move away from activities into undisturbed subunits." FWS-002067. A map of the grizzly bear security core shows that the spatial surrogate enables grizzly bears to move within the NCDE without being completely displaced. FS-052125. Thus, the spatial surrogate is not arbitrary nor capricious.

Finally, Plaintiffs' argument that the surrogates are inadequate because they lack reporting requirements is unpersuasive. Under § 402.14(i)(3), the relevant federal agency "must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement." This regulation "makes clear that the Service is responsible for specifying in the statement how the action agency is to monitor and report the effects of the action on listed species." *Wild Fish Conservancy v. Salazar*, 628 F.3d 513, 531 (9th Cir. 2010). Plaintiffs concede that the surrogate includes a reporting requirement for the completion time for a project within the NCDE. Consequently, the dispute hinges on whether the reporting requirement for the spatial surrogate is valid. It is. Beyond the plain language of the surrogate, the terms and conditions of the incidental take statement clarify that reinitiation is triggered by "[c]oncurrent, temporary increases" in road density or "concurrent, temporary decreases in secure core for new projects" that occur in more than three adjacent subunits. FWS-002070.

The temporal and spatial surrogates are not arbitrary nor capricious.

3. Motorized over-snow use surrogates

Finally, Plaintiffs argue that the motorized over-snow use surrogates are invalid because they are impermissibly coextensive, ambiguous, and lack a reporting requirement. The surrogate states:

> If late season motorized over-snow vehicle use (i.e., after March 31) occurs on more than three percent of modeled denning habitat within the [primary conservation area] on the [Forest], or more than 19 miles of routes are open to late season motorized over snow vehicles in modeled denning habitat, then the amount of take . . . would be exceeded, and reinitiation or project-specific consultation would be required.

FWS-002069.

On the first argument, the parties agree that the surrogate is coextensive with the project. (Doc. 77 at 45; Doc. 91 at 39.) Their disagreement centers on whether coextensiveness is per se impermissible. Plaintiffs rest their argument on *Oregon Natural Resources v. Allen*, 476 F.3d 1031, 1040 (9th Cir. 2007). In *Allen*, the Court held that the trigger in an incidental take statement was invalid because "the permissible level of take [wa]s coextensive with the project's own scope" such that the "Incidental Take Statement and [biological opinion] [we]re rendered tautological." *Id.* at 1040. Similarly, here, the surrogate reflects the current status of motorized over-snow use during the den emergence period: three percent of over-snow vehicle use during the late season and no more than 19 miles of over-snow motorized routes in denning habitat. FWS-002048. But Federal Defendants argue that the surrogate is permissible pursuant to a final rule the Fish and Wildlife Service promulgated in 2015 that directly refuted the reading of *Allen* that Plaintiffs champion. (Doc. 91 at 39 (citing 80 Fed. Reg. 26,832 (May 11, 2015)).) The rule specifically contemplates surrogates that are "fully coextensive with the anticipated impacts of [a] project," and concludes that so long as the surrogate includes a proper monitoring requirement, such coextensive surrogates are valid. 80 Fed. Reg. at 26,834. Though few courts have addressed this final rule since its implementation, it appears Federal Defendants have the upper hand here. *See Columbia Riverkeeper v. U.S. Army Corp of Eng'rs*, __ F. Supp. 3d __, 2020 WL

6874871, *10 (W.D. Wash. Nov. 23, 2020) (recognizing permissibility of coextensive surrogates based on 80 Fed. Reg. at 26,834); *see also Sierra Club v. U.S. Dep't of the Interior*, 899 F.3d 260, 272 (4th Cir. 2018) (same).

Plaintiffs' arguments concerning alleged ambiguity and lack of a reporting requirement are disingenuous. The plain language of the surrogate establishes to what the three percent refers: reinitiation will be triggered if late season motorized over snow vehicle use occurs on more than three percent of the modeled denning habitat within the primary conservation area. FWS-002069. Even if Plaintiffs' strained reading of "occurs on" as referring to something other than actual use were compelling—which it is not—in the event mere designation constituted an "occurrence" and counted toward the requisite trigger percentage, this reading would favor the bears and result in lower actual use. And, as Federal Defendants note, MON-NCDE-03 is tied to FW-STD-REC-05, which requires no net increase in the percentage of area or route for over-snow vehicles. (Doc. 91 at 40 (citing FS-052039, FS-052046).)

Ultimately, therefore, this surrogate is valid.

F. Omitted Incidental Take Statement for Bull Trout Claim (WildEarth Claim 2, Count I)

Plaintiffs continue by arguing that the Fish and Wildlife Service violated the ESA when it failed to provide an incidental take statement for bull trout or bull trout critical habitat. In response, the defendants argue that the Service fulfilled its obligations under the ESA based on the language in the regulations that,

> [f]or a framework programmatic action, an incidental take statement is not required at the programmatic level; any incidental take resulting from any action subsequently authorized, funded, or carried out under the program will be addressed in subsequent section 7 consultation, as appropriate.

(Doc. 91 at 40 (quoting 50 C.F.R. § 402.14(i)(6)); *see also Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv.*, 378 F.3d 1059, 1068 (9th Cir. 2004) (explaining that "programmatic environmental analysis supplemented by later project-specific environmental analysis" is permissible under the ESA) *superseded by statute on other grounds as recognized in All. for the Wild Rockies v. Savage*, 783 Fed. App'x 756, 757 (9th Cir. 2019).) Because the Revised Plan is programmatic, Federal Defendants have the better argument.

After identifying "future activities that may adversely affect bull trout" and their habitat, the 2017 BiOp states that "[t]he proposed action reduces the potential for incidental take to occur as a result of these actions. The mere potential for future take from these actions is not a legitimate basis for providing an exemption for take." FWS-001960. The BiOp then states that the Service will engage in "[s]ubsequent consultation, as appropriate," and the Service will take any necessary measure "to minimize the impacts of take on bull trout in accordance with 50 C.F.R. 402.14(i)." FWS-001960. Relying on *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891, 1907–10

(2020), Plaintiffs argue that Federal Defendants cannot now look to § 402.14(i)(6) to defend their decision not to include a take statement on the basis that any reliance on the regulation is a "post hoc rationalization that this Court should reject." (Doc. 100 at 41.) But, as Federal Defendants note, § 402.14(i)(6) was specifically referenced in the 2017 BiOp and was in effect at the time the opinion was released. (Doc. 102 at 19 (citing FWS-001960).) It is mistaken to categorize the Federal Defendants' explanation as post hoc rationalization.

Additionally, by definition, Federal Defendants did not have to include an incidental take statement for bull trout. The Revised Plan is programmatic in its approach to bull trout and bull trout critical habitat. *See* 50 C.F.R. § 402.02 (defining "framework programmatic action" in the context of incidental take statements as an "action that approves a framework for the development of future action(s) that are authorized, funded, or carried out at a later time, and any take of a listed species would not occur unless and until those future actions" occur). Thus, under § 402.14(i)(6), Federal Defendants were not required to include a take statement for bull trout.

G. Reliance on Biological Opinion Claim (WildEarth Claim II, Count II; Swan Valley Claims I and II)

Plaintiffs' final ESA claim is directed at the Forest Service and turns on the validity of the 2017 BiOp. They allege that the Service violated the ESA by relying on the flawed 2017 BiOp without satisfying its independent obligation to consider how the Revised Plan could jeopardize grizzly bears, bull trout, and bull trout habitat. (Doc. 77 at 48 (citing *Save our Cabinets*, 255 F. Supp. 3d at 1063).) Plaintiffs are correct in some respects, but only insofar as the 2017 BiOp was invalid based on its determinations that the Revised Plan's shift away from Amendment 19's road closure requirements would not jeopardize grizzly bears, the non-mandatory culvert removal aspect of the Revised Plan would not jeopardize bull trout, the Revised Plan considered its effect on the nationwide grizzly population, the adoption of the 2011 access conditions was reasonable, and the road density and secure core surrogate for grizzly bears was adequate.

As discussed above, the 2017 BiOp did not consider the impact of ineffective road closures on the 2011 baseline population for grizzly bears, nor did it consider the effects of the Revised Plan on the grizzly species as a whole. The BiOp's road density and secure core surrogate concerning grizzly bears is also deficient, as described above. Such failures render the 2017 BiOp faulty in its conclusions concerning grizzly bears. *See All. for Wild Rockies*, 412 F. Supp. at 1204 (finding that biological opinion was flawed because the Service failed to consider temporary increases in motor route density as a result of ineffective road closures).

The BiOp also did not consider the effect on bull trout of withdrawing the mandatory culvert removal requirement. The problem with the Forest Service's reliance on the 2017 BiOp's conclusion that the less stringent culvert removal plan would not significantly adversely affect bull trout is magnified in light of the Recovery Plan, which identified culvert removal as an aspect of successful bull trout recovery just two years before the 2017 BiOp and three years before the Revised Plan. *See* FS-017008. Ignoring "information that would undercut the opinion's conclusions" violates the Forest Service's obligation under § 7 of the ESA. *Ctr. for Biological Diversity*, 698 F.3d at 1127–28. For their part, Federal Defendants argue that there is no information that undercuts the Fish and Wildlife Service's conclusion. But, as mentioned above, it is confusing why the Fish and Wildlife Service made no reference to its own Recovery Plan. Federal Defendants also argue that although certain record documents "may not have been discussed, they were taken into account." (Doc. 91 at 42.) However, an agency's action may only be upheld on the "basis articulated by the agency itself," *Motor Vehicle Mfrs.*, 463 U.S. at 50, and so even if Federal Defendants did "take the documents into account," their assurances are not interchangeable with the duty to consider relevant information and articulate that consideration in their decision.

In conclusion, the Forest Service violated the ESA to the extent it relied on the BiOp's flawed road reclamation determinations and road density surrogate.

III. The Travel Management Rule (WildEarth Claim I, Count I)

A. Executive Orders

In 1972, President Nixon issued Executive Order 11644, directing federal land management agencies to adopt regulations governing the use of off-road vehicles on public lands. 37 Fed. Reg. 2877 (Feb. 8, 1972). The order specifically instructs the agencies "to provide for administrative designation of the specific areas and trails" where off-road vehicle use may be permitted. *Id.* § 3. The agency designations must "be based upon the protection of the resources of the public lands, promotion of the safety of all users of those lands, and minimization of conflicts among the various uses of those lands." *Id.* The designations must also comply with certain enumerated "minimization criteria," including that areas and trails shall be located to minimize "damage to soil, watershed, vegetation, or other resources of the public lands," "harassment of wildlife or significant disruption of wildlife habitats," and "conflicts between off-road vehicle use and other existing or proposed recreational uses." *Id.*

In 1977, President Carter issued Executive Order 11989, amending Executive Order 11644 to "clarify agency authority" and strengthen the protections against adverse impacts from off-road vehicle use. 42 Fed. Reg. 26,959 (May 24, 1977). Executive Order 11989 directs land management agencies to close areas and trails where off-road vehicle use "will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands." *Id.* § 2.

B. Forest Service Rules

Until 2005, the Forest Service regulations implementing Executive Orders 11644 and 11989 allowed each national forest to designate areas and trails open to off-road vehicle use through established land management planning processes. 36 C.F.R. § 295.2 (repealed 2005); *WildEarth Guardians v. Mont. Snowmobile Ass'n*, 790 F.3d 920, 929 (9th Cir. 2015). Under this approach, "many National Forests managers kept their Forests generally open to motor vehicle use unless there was a pressing reason for closure." *Winter Wildlands All. v. U.S. Forest Serv.*, 2013 WL 1319598, at *3 (D. Idaho Mar. 29, 2013). In 2005, recognizing the need to address the growing use and increased capabilities of modern off-road vehicles, the Forest Service issued the Travel Management Rule. 70 Fed. Reg. 68,264 (Nov. 9, 2005) (codified at 36 C.F.R. pt. 212, 251, 261, and 295).

Subpart B of the Travel Management Rule requires each national forest to designate the areas and trails where off-road vehicle use is permitted and prohibits all use not in accordance with those designations. 36 C.F.R. §§ 212.50(a), 212.51(a), 261.13. It establishes procedures the national forests must follow in making designations, such as allowing public comment and coordinating with state and tribal governments. *Id.* §§ 212.52, 212.53. It also codifies the minimization criteria from Executive Order 11644, requiring designations to minimize:

(1) Damage to soil, watershed, vegetation, and other forest resources;
(2) Harassment of wildlife and significant disruption of wildlife

habitats;

(3) Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands; and

(4) Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands.

Id. § 212.55(b). Finally, it requires national forests to identify designations on a "motor vehicle use map" and to monitor the effects of vehicle use on public land. *Id.* §§ 212.56, 212.57.

In 2013, an environmental group challenged the Travel Management Rule's treatment of over-snow vehicles in the District of Idaho, arguing the exemption violated Executive Order 11644. *See Winter Wildlands All.*, 2013 WL 1319598, at *1. The court agreed, reasoning that Executive Order 11644 requires the Forest Service to make designations for all off-road vehicle use, including over-snow vehicle use. *Id.* at *10–12. The court ordered the Forest Service to issue a new rule consistent with Executive Order 11644. *Id.* at *14.

In 2015, the Forest Service issued the Over-Snow Vehicle Rule, amending Subpart C of the Travel Management Rule. 80 Fed. Reg. 4500 (Jan. 28, 2015) (codified at 36 C.F.R. §§ 212.80, 212.81). The rule requires national forests that receive enough snow to designate areas and trails for over-snow vehicle use in accordance with the requirements of Subpart B of the Travel Management Rule. 36 C.F.R. §§ 212.80(a), 212.81. However, the Rule included a grandfather provision, allowing national forests that had previously designated over-snow vehicle routes to maintain those designations without further action. *Id.* at §§ 212.80(b), 212.81(b).

C. Plaintiffs' Claim

According to Plaintiffs, the Forest Service's interpretation of subpart C of the Travel Management Rule is improper for two reasons: (1) it conflicts with the plain language of Executive Order 11644, and (2) it runs afoul of the intent of Subpart C, which was enacted to require designation of trails, roads, and areas on forest service land for over-snow motor vehicle use. But Plaintiffs' broad challenge to the Forest Service's interpretation of Subpart C is unpersuasive because the Forest Service's interpretation of Executive Order 11644 is reasonable, and Plaintiffs fail to identify any *specific* instances in which the Forest Service purportedly violated the Travel Management Rule.

On the first point, Plaintiffs argue that the Forest Service's adoption of the 2006 snowmobile designations "without considering whether they comply with Executive Order 11644 or the Travel Management Rule" was arbitrary and capricious. (Doc. 77 at 51.) Essentially, Plaintiffs argue that the Forest Service's interpretation allows the Service to sidestep compliance with the requirement from Executive Order 11644 that trail designations for off-road vehicles must meet certain minimization requirements. *See* 37 Fed. Reg. 2,877 at § 3. In so arguing, Plaintiffs ignore the plain language of Subpart C, which specifically allows the

Forest Service to rely on previous over-snow vehicle designations so long as those designations were made with the proper authority and included public input. 50 C.F.R. § 212.18(b). In short, Subpart C assumes the legitimacy of previous over-snow vehicle designations that were made with the proper authority and that involved public input; therefore, the Forest Service's decision to incorporate the designations from Amendment 24—which considered minimization criteria, *see* FS-111686–936, and involved public input, FS-046501—was consistent with the language of Subpart C.

More importantly, Plaintiffs cannot identify a specific instance in which the Service violated the Order's requirement not to adopt over-snow vehicle route designations without considering minimization requirements. In the ROD, the Forest Service explained that the "programmatic plan decision does not authorize additional motor vehicle use, or prohibit existing motor vehicle uses," and so existing maps demonstrating motorized vehicle use are unchanged. FS-054761. Therefore, Federal Defendants are correct that "Subpart C does not apply," *see* FS-045677, because there have been no programmatic determinations at this stage. However, to the extent concerns remain about the Service's interpretation of Subpart C, Plaintiffs may raise those concerns in the future if specific route designations are made. In that event, Federal Defendants will have to comply with Subpart C's requirement to consider minimization criteria for new designations.

IV. Remedy

Vacatur is the presumed remedy where an agency has acted unlawfully. *All. for the Wild Rockies v. Savage*, 907 F.3d 1105, 1121 (9th Cir. 2018). But, when equity so requires, underlying agency action may be "left in place while the agency reconsiders or replaces the action, or to give the agency time to follow the necessary procedures." *Id.* (citing *Humane Soc'y of U.S. v. Locke*, 626 F.3d 1040, 1053 n.7 (9th Cir. 2010)). "In determining the appropriate remedy, the Court must weigh the seriousness of the agency's errors against the disruptive consequences of vacatur." *All. for the Wild Rockies v. Savage*, 375 F. Supp. 3d 1152, 1155–56 (D. Mont. 2019) (internal quotations and citation omitted) (*Savage II*). "Put differently, courts may decline to vacate agency decisions when vacatur would cause serious and irremediable harms that significantly outweigh the magnitude of the agency's error." *Se. Alaska Conservation Council v. U.S. Forest Serv.*, 468 F. Supp. 3d 1148, 1150 (D. Alaska 2020) (internal quotation marks omitted). For example, where an agency's error "is limited in scope and severity, and vacatur would result in a disproportionate disruption to the Project," remand without vacatur may be warranted. *Savage II*, 375 F. Supp. 3d at 1156. The circumstances here support remand without vacatur.

A. Seriousness of the Errors

In assessing the seriousness of the error, the Court "consider[s] whether vacating a faulty rule could result in possible environmental harm." *Pollinator Stewardship Council v. E.P.A.*, 806 F.3d 520, 532 (9th Cir. 2015). Another consideration is "whether the agency would likely be able to offer better reasoning or whether by complying with procedural rules, it could adopt the same rule on remand, or whether such fundamental flaws in the agency's decision make it unlikely that the same rule would be adopted on remand." *Id.* Additionally, the Court considers whether the errors are "limited in scope." *Savage II*, 375 F. Supp. 3d at 1156. In this case, the first and third considerations indicate that the harm here is not so serious as to tip the scales in favor of remand, but the second consideration is, admittedly, a closer call.

First, the parties agree that the Revised Plan includes "scores of provisions unrelated to the challenged agency determinations, many of which are environmentally beneficial." (Doc. 77 at 55; *see also* Doc. 87 at 52; Doc. 91 at 50.) In the event the Revised Plan was vacated, the 1986 Flathead Forest Plan would assume its place until a new forest plan could be issued, and the parties agree that the Revised Plan is comparatively more protective than the former Forest Plan. So, though Plaintiffs argue that the components of the Revised Plan that related to grizzly bears and bull trout warrant vacatur, vacating the Revised Plan would likely result in environmental harm.

Additionally, "[w]hile it may be misleading to classify a violation of the law as anything less than 'serious,' the error is certainly limited in scope" in this instance. *Savage II*, 375 F. Supp. 3d at 1156. As explained above, the record reflects that the agencies did not violate NEPA, nor did they violate the Travel Management Rule. Rather, the record supports the conclusion that Federal Defendants violated the ESA to the limited extent they failed to explain the decision to abandon Amendment 19's road reclamation requirements in light of evidence that such abandonment would pose risks to grizzly bears and bull trout populations and bull trout habitat. Federal Defendants also failed to consider the impacts of the Revised Plan on the grizzly population as a whole, failed to explain their decision to implement 2011 access conditions, and implemented a flawed grizzly bear take statement in light of the above. While these errors are not minor, they are analogous to the Forest Service's errors in *Savage II*, where the district court concluded that the agency's defective analysis concerning road-related activities within a project area "d[id] not compromise the integrity of the Project as a whole." 375 F. Supp. 3d at 1156.

However, the second consideration—whether the agency would reach a different rule on remand—does tip in favor of vacatur. Once the agency considers the impact of the Revised Plan on the grizzly bear species as a whole, as well as considers the effectiveness of road closure devices, "a different result may be reached" so that vacatur is more appropriate than remand without vacatur. *See*

Pollinator Stewardship Council, 806 F.3d at 532. At the same time, however, the agency is likely to reach a different result only on the handful of challenged issues identified above, and it is unlikely to reach a different result on the Revised Plan as a whole. Thus, while this factor indicates that the agencies' errors are serious, the other two considerations indicate that the harm is not so serious as to require vacatur, particularly in light of the potential disruptive consequences of vacatur.

H. Disruptive Consequences of Vacatur

The seriousness of the error must be weighed against "the disruptive consequences of an interim change that may itself be changed." *Pollinator Stewardship Council*, 806 F.3d at 532 (quotation marks omitted). "The Project's economic impact is relevant to the question of whether to vacate on remand." *Savage II*, 375 F. Supp. 3d at 1157 (citing *Earth Island Inst. v. Carlton*, 626 F.3d 462, 475 (9th Cir. 2010)). The potential disruptive effects on the environment, local communities, and wildlife are also relevant considerations. *Id.*

Currently, there are six approved projects authorized by the Revised Plan, including the Taylor Hellroaring Project, the Heallroaring Basin Improvements Project, the Crystal Cedar Project, and the March Madness Blowdown Salvage Project. (Doc. 94, ¶ 5.) At oral argument, Federal Defendants represented that all of these projects are related to vegetation and field management, save for the Hellroaring Basin Improvements Project, which addresses recreation in the

Whitefish ski area.

If the Revised Plan were vacated, the economic impact on Defendant-Intervenors and on the local communities that depend on approved projects for employment could be severe. A member of Defendant-Intervenors, Weyerhaeuser-Montana, "provides about 575 important family-wage jobs to the local community with an annual payroll of over $40 million." (Doc. 63-5, ¶ 8.) Without the Revised Plan, eight projects identified by Weyerhauser-Montana could not go forward, which would detrimentally impact its business. (*Id.* ¶¶ 20–21.) This sort of significant economic and community-level impact weighs against vacatur. *See Cal. Cmtys. Against Toxics v. E.P.A.*, 688 F.3d 989, 994 (9th Cir. 2012) (deciding to remand without vacatur in part because remand would be "economically disastrous" due to negative impact on "a billion-dollar venture employing 350 workers").

Finally, the disruptive consequences on the environment and wildlife of vacatur indicate that remand *without vacatur* is appropriate. In their reply, Plaintiffs argue that vacatur is appropriate because it will return the Forest to the "status quo," which would protect the environment and wildlife because none of the new roads envisioned under the Revised Plan will be constructed. (Doc. 100 at 52.) But at oral argument, Federal Defendants emphasized that, in the event of remand without vacatur, any project under the Revised Plan would have to be examined individually; if the project impacted roads, grizzly bears, or bull trout, the project would require a site-specific consultation and a biological assessment with the Fish and Wildlife Service. This sort of site-specific evaluation undercuts Plaintiffs' argument that remand without vacatur would be overly disruptive; indeed, it demonstrates that remand without vacatur in this instance would disrupt the very projects Plaintiffs are concerned about, but allow other projects unrelated to Plaintiffs' concerns to proceed.

CONCLUSION

For the reasons set forth above, IT IS ORDERED that the parties' motions for summary judgment (Doc. 76, 86, 90) are GRANTED IN PART and DENIED IN PART. Plaintiffs' motion (Doc. 76) is GRANTED as to WildEarth's Claim II, Counts I and II, and Swan Valley's Claims I and II to the limited extent explained in this Order. The defendants' motions (Docs. 86, 90) are GRANTED in all other respects.

IT IS FURTHER ORDERED that the provisions of the 2017 BiOp that violate the ESA are REMANDED WITHOUT VACATUR to the agencies for further consideration consistent with this Opinion.

DATED this 24th day of June, 2021.

Donald W. Molloy, District Judge
United States District Court

FOB Objections Related to the EA for the Forest Plan Amendment for Elk, Old Growth, Coarse Woody Debris, and Snag Forest Plan Components

Matt Anderson, Forest Supervisor
Bitterroot National Forest
1801 N First Street
Hamilton, MT 59840

Submitted electronically on June 3, 2023, to:
https://cara.fs2c.usda.gov/Public//CommentInput?Project=57302

Mr. Anderson,

These objections are part of a combined effort that includes lead objector Friends of the Bitterroot (FOB), Friends of the Clearwater (FOC), WildEarth Guardians (WEG), Alliance for the Wild Rockies (AWR), and Native Ecosystems Council (NEC). Therefore, these objections incorporate the Draft EA and scoping comments submitted by each organization and all previous submissions (and attachments) to the Forest Service on the Amendment proposal from these organizations.

In addition, all scoping comments, comments, attachments and/or objections provided by FOB, WEG, AWR, FOC, and NEC for the Darby Lumber Lands II Project (2019), the Eastside Forest and Habitat Improvement Project (2023), the Gold Butterfly Project (202?), the Bitterroot Front Project (2022), and the Mud Creek Project (2023) are fully incorporated.

As required by 36 C.F.R. § 218.8(d), the Lead Objector is: Jim Miller, President of Friends of the Bitterroot, PO Box 442, Hamilton, MT 59840, 406-381-0644.

1. For decades, we claimed the Bitterroot National Forest (BNF) ignored the best, most recent, available science during project planning and implementation.
2. We applaud the Agency for declaring a desire to amend the Forest Plan (FP) to align with the best, most recent, available science.
3. However, we stipulate that the Forest Service's (FS) proposed amendment must follow the best, most recent, available scientific research fully analyzed in an EIS.
4. It is improper to continue relying on the outdated and/or outlier studies which support management goals while pretending BNF decisions are based on the best science.
5. The scope and number of amendments and changes to the plan are a plan revision without the proper review process of a revision is in violation of NEPA and NFMA.
6. The amendment removes protections for wildlife so that aspect must be fully analyzed in the revision process.

7. Therefore, we could support FP amendments if, and only if, the amendments are based entirely on the best, most recent, available scientific research fully analyzed in an EIS.

Proposed Amendments

8. Because our previous comments have enumerated our specific arguments with these proposed amendments (most of which have not been addressed by the Agency), we will concentrate these objections on a single section of the EA.
9. The following are our objections related to the “Comments and Response Summary” contained in Appendix A of the BNF Amendment EA.

Environmental Impact Statement and Significance of the Plan Amendment

10. In response to multiple comments insisting that this amendment process should have been conducted using an EIS, the EA (p. 120) proclaims:

    The Forest Service has considered the degree of effects of the components in the amendment. The amendment does not include any ground-disturbing activities, nor does it direct any to be done in the future.

    A plan amendment is only considered a significant change in the forest plan if it “may create a significant environmental effect and thus requires preparation of an environmental impact statement ...” 36 C.F.R. 219.13(b)(3). Effects of the proposed action are disclosed in chapter 3 of the environmental assessment, and the responsible official was able to reach a finding of no significant impact based on this analysis. As a result, the proposed amendment is not considered a significant change to the forest plan.

11. The first point, “The amendment does not include any ground-disturbing activities, nor does it direct any to be done ...” is misleading.
12. While ground-disturbing activities are neither included nor directed, ground-disturbing activities not included in the 1987 Forest Plan are enabled by these proposed amendments and will occur in multiple locations spread across the entire BNF.
13. In other words, Land Management and Resource Plan are programmatic by nature and rarely authorize ground disturbing activities.
14. Further, the cited reference explains significance depends on the scope and scale of the amendment.
15. As we explain below, the scope and scale is such that an EIS is necessary to comply with NEPA.
16. The second point, “A plan amendment is only considered a significant change in the forest plan if it “may create a significant environmental effect…” ignores the fact that new management activities will take place, each of which “may create a significant environmental effect.”

17. Removing specific standards related to road densities, among others, across the entire forest constitutes a broad scale scope and scale that itself rises to the level of a significant action.
18. In addition, the "enabling" of new ground-disturbing management activities across the entire forest is also a significant change in the Forest Plan.
19. The Agency claim that these proposed amendments will have no significant impact is not factual and certainly duplicitous.

Forest Plan Guidelines

20. Each of the proposed amendments remove 1987 Forest Plan "standards" and replace them with "guidelines."
21. The EA (p. 120) declares:

    Guidelines, as defined under the 2012 Planning Rule, are more restrictive than they were in the 1982 Rule.

    Guidelines included in the proposed action are being created under the 2012 Planning Rule and will be subject to the rule's requirements. Although guidelines were considered more discretionary under earlier rules, the 2012 Planning Rule re-defined guidelines in a way that is more constraining. Specifically:

    > A guideline is a constraint on project and activity decision making that allows for departure from its terms, so long as the purpose of the guideline is met. 36 C.F.R. 219.7(e)(1)(iv)

    They are similar to standards in the level of resource protection afforded and only allow deviation if their purpose can be met in another equally effective way. As a result, guidelines proposed in the amendment are not discretionary and cannot be easily deviated from.

22. The 36 CFR § 219.7(e) [2012 Planning Rule as amended] states:

    (iii) ***Standards.*** A standard is a mandatory constraint on project and activity decisionmaking, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

    (iv) ***Guidelines.*** A guideline is a constraint on project and activity decisionmaking that allows for departure from its terms, so long as the purpose of the guideline is met. (§ 219.15(d)(3)). Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

23. Thus, according to the 2012 Planning Rule, the EA's assertion that guidelines "… cannot be easily deviated from" is disingenuous.
24. "Standards" are mandatory while "guidelines" "… allows for departure from its terms, …."

25. Despite Agency claims to the contrary, these proposed amendments remove mandatory requirements from the 1987 Forest Plan and replace them with “guidelines” which are nothing more than “emphatic, operational suggestions.”
26. Commenters’ contentions that “the proposed guidelines contain loopholes which allow the Forest Service to do whatever it wants” were evaded or directly addressed by the Agency.
27. We do not approve of the replacement of “standards” with “guidelines.”
28. The Forest Service should follow rules (standards), not suggestions (guidelines) which allow for differing interpretations by ever-changing Agency management-level officials.

Old Growth

29. Numerous commenters to the Draft EA point out that the adoption of Green et al. 1992 (rev. 2011) would allow the Forest Service to remove large trees from the landscape while retaining old growth status for stands of trees.
30. The Agency’s response (EA p. 121) was:

    Green et al. 1992 (rev. 2011) would be adopted and applied in its entirety; therefore, it can’t be a perversion. Green et al. has been applied in stand mapping and project planning for two decades. The lawsuit brought against the Gold Butterfly project by Friends of the Bitterroot in 2020 has triggered the need to formally amend the plan to keep using this best available science. The definition of old growth goes well beyond a simple number of trees per acre of a given diameter. The definition allows the identification of many more stands that would be classified as “mature” under the existing forest plan and changes them to a category with much stricter sideboards and considerations if, and when, they may be proposed for vegetation management. The minimum characteristics described in Green et al. are not prescriptive for future vegetation treatment proposals. A functioning old growth stand must remain a functioning old growth stand. The prescription for any stand is based on stand condition, location, and project and resource objectives.

31. Rather than supporting the Forest Services’ claims, that response confirms the point made by the commenters, “A functioning old growth stand must remain a functioning old growth stand.”
32. By changing the definition of “a functioning old growth stand” to one that is more inclusive (Green et al 1992), the Agency enables the removal of large, old trees from an old growth stand while supposedly retaining “function” with fewer large trees than required by the 1987 Forest Plan.
33. As the Agency readily admits, some form of the proposed old-growth amendment has been used for decades as site-specific amendments.
34. During those projects, the on-the-ground implementation of those old-growth amendments allowed a substantial number of large, old trees to be removed despite Forest Service assertions that Green et al. 1992 would protect those trees. (See attachment A)
35. Based on the decades-long history of misuse of site-specific old growth amendments, current public confidence in the Agency’s intentions is virtually nonexistent.
36. We, along with many others, no longer believe Forest Service assertions of retaining large, old trees under Green et al 1992.

37. If the intent of the proposed amendment is to retain as many large, old trees as possible, the wording of the proposed amendment should be revised to not only make that absolutely clear, but to ensure that future management officials would be mandatorily bound by "standards."
38. There must be specific "standards" that prevent logging old growth plus specific "objectives" to retain no less than precise volumes of mature stands so they can develop into old growth.
39. As written, the proposed old growth amendment contains too many loopholes to convince the public that the Forest Service is being truthful.

Carbon and Greenhouse Gas

40. Many commenters suggested the Agency fails to recognize the importance of old growth stands in sequestering carbon.
41. The response offered by the Forest Service is that "Additional scientific references regarding carbon and sequestration were added to the EA." (EA p. 123)
42. Because "adding a reference" does not equate to "following the recommendations of the reference," that response reinforces the public's perception that the Agency is unwilling to follow the latest and best science.

Elk Habitat

43. Among comments on the Draft EA were those "expressing concern regarding the integrated resource management requirements as they pertain to elk habitat conditions under 36 C.F.R. 219.10(a)(5)." (EA p. 123)
44. The Agency's response (EA pp. 123-4) states, in part:
    1. The elk population in the analysis area has increased over the past half century despite past and current land management practices;
        - The proposed Amendment language contains guidelines that will enhance elk forage availability and nutritional quality in future site-specific project through vegetation management, prescribed fire, or potential wildfire;
        - The proposed Amendment language may decrease certain cover types in future site-specific projects, which could be detrimental to elk, although research suggests that thermal cover may not influence elk to the extent originally thought when the Forest Plan was implemented; and
        - Road densities, while high in certain places within the analysis area, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area. The proposed Amendment language included guidelines to minimize these effects in future site-specific project planning.
45. The first point that "the elk population in the analysis area has increased over the past half century…" does not provide the public with information required to reach a reasoned decision.

46. It has been suggested that elk populations have increased not because of Forest Service action or inaction but because elk herds each year spend a substantial amount of time on private land.
47. Without knowledge of the exact "analysis area," it is impossible to understand the meaning of that Agency response.
48. Did the analysis area include only places on the BNF where past site-specific amendments to the Forest Plan were instituted?
49. Was analysis conducted on areas that had not been affected by on-the-ground management actions to act as a control or, did the analysis area include the entirety of the BNF with no control areas?
50. Without making periodic monitoring and analysis results publicly available (regarding elk occurrence on areas which were included in past projects that included site-specific elk amendments to the Forest Plan), it is impossible for the public to have the information needed to reach an informed understanding of the proposed elk amendment.
51. The point that "research suggests that thermal cover may not influence elk to the extent originally thought…" is not supported by the references cited by the EA.
52. Furthermore, most past research into thermal cover has been related to winter seasons.
53. The Forest Service (EA p. 8) suggests:

    By 2100, temperature is projected to increase 6 to 12 °F for the annual mean monthly minimum, and 5 to 11 °F for the annual mean monthly maximum.

54. Such a temperature rise will make thermal cover during summer months extremely important for the health and survival of elk.
55. Since it is universally accepted by climate scientists that substantially warmer temperatures will occur, cherry-picking and/or misinterpreting data to support the pretense that thermal cover is not important is irrational.
56. The point that "road densities …, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area" is not adequately supported.
57. Research cited by the EA reveals that elk are affected by road density, especially in areas with low quality food sources.
58. Again, without providing sufficient monitoring and information about the analysis area, the public is not able to reach reasonable conclusions.

Species of Conservation Concern

59. "Several commenters expressed concerns regarding effects to individual species, and either stated or implied that certain species should be identified as species of conservation concern." (EA p. 124)
60. The Forest Service responded:

    …, species of conservation concern requirements only apply if the proposed amendment would result in substantially adverse impacts or substantially lessen protections for a specific species.

Each species identified by commenters is discussed in the environmental assessment. See section 3.4.3.5 for wolverine and table 4 for fisher, flammulated owl, and black-headed woodpecker. Since the proposed amendment would neither result in substantial adverse impacts, nor lessen protections, the 2012 Planning Rule does not require the responsible official to evaluate them as potential species of conservation concern or develop species-specific plan components under 36 C.F.R. 219.9(b).

61. We wholly reject the assertion that removing specific, protective road density standards will not "lessen protections" for species of conservation concern.
62. As the Agency freely admits, many projects have been completed over the last two decades that include site-specific amendments similar to those being proposed here as Forest Plan amendments.
63. Given that history, there have been many opportunities to conduct after-project monitoring and analysis regarding the impact those projects had on species that commenters suggest should be identified as species of conservation concern.
64. The EA includes no record of such monitoring or analysis of data collected to substantiate the assertion that the Forest Plan amendments as proposed, would not enable "substantially adverse impacts or substantially lessen protections for a specific species."
65. Therefore, the Forest Service claim is an unsupported assumption akin to magical thinking.

Grizzly Bear

66. A response to commenters' concerns (EA, p. 124) states:

> … Since the forest plan was revised under the 1982 Planning Rule, these 2012 Planning Rule requirements only apply to those changes to the plan made by the amendment. 81 Fed. Reg. 90723 at 90725. As a result, new species-specific plan components would only be needed if the proposed elk habitat changes adversely affect the recovery of grizzly bear.

67. That response does not address our concern that the consultation with the United States Fish and Wildlife Service (USFWS) was only done on the Travel Plan and the Elk Habitat Effectiveness (EHE) amendment and did not include the other programmatic amendments to Coarse Woody Debris (CWD), snags, and old growth, each of which affect grizzly habitat and their food sources.
68. For example, Keisker shows grizzly bears are associated with CWD-6 for prey including 5 classes of log decomposition (Attachment B, Keisker, D.G., 2000, p. 52, table 8).
69. This proposed programmatic amendment package does not mandate the retention of larger diameter CWD, nor does it mandate the retention of snags which eventually become large diameter CWD. (i.e., guidelines are suggestions, not mandates.)
70. The cumulative effects of all amendments must be analyzed including the different EHE site-specific amendments for the Mud Creek Project.
71. These proposed guidelines would have restricted new road construction in the Mud Creek Project because the area does not meet elk objectives.
72. For example, the EA response to comments on Elk concerns (EA, p. 124) maintains:

Road densities, while high in certain places within the analysis area, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area. **The proposed Amendment language included guidelines to minimize these effects in future site-specific project planning,**" (emphasis added)

73. The Mud Creek Project would be restricted according to these proposed guidelines.
74. Thus, the BA fails to disclose the cumulative effects of this amendment package and the Mud Creek Project deviation from these proposed amendment guidelines.
75. The current BNF Travel Plan has a laundry list of specifications for road and trail reductions.
76. The 2021 Consultation with USFWS was for both the Travel Plan and EHE.
77. Documentation included with this proposed Amendment Package does not disclose how the BNF complied with these closures and modifications to conform with the Travel Plan and the USFWS Biological Opinion (BO).
78. The USFW 2021 BO for Travel Plan and Elk Amendment to Forest Plan (Attachment C, p. 7) states:

    1) Decrease by 51 miles (3.5 percent) the miles of roads designated open to highway-legal vehicles, both yearlong and seasonally.
    2) Decrease by 74 miles (67 percent) the miles of double-track trails designated open to vehicles 50 inches or less in width, yearlong, from 110 miles to 36 miles. Increase by 9 miles (1.5 percent) the miles of double-track trails designated open to vehicles 50 inches or less in width, seasonally.
    3) Decrease by 291 miles (88 percent) the miles of single-track trails designated open to motorcycles, yearlong, from 330 miles to 39 miles. Increase by 42 miles (55 percent) the miles open seasonally to motorcycles, from 78 miles to 121 miles.
    4) Authorize 30 miles of existing unauthorized routes, including19 miles of double-track trails and 11 miles for use as single-track trails (10 miles seasonally, and 1 mile open yearlong).
    5) Decrease the areas designated open to snowmobile use by 205,141 acres (27 percent).
    6) Motorized/mechanical transport, including bicycles, is prohibited in the Selway-Bitterroot recommended wilderness area and in the Sapphire and Blue Joint wilderness study areas, for both summer and over-snow use.
    7) Game retrieval using motorized means off designated routes is not allowed.

    While some of these actions only required administrative changes, and thus we able to be accomplished right away, **other actions require on-the-ground changes as projects are implemented on the Forest.** The Travel Management Plan Record of Decision stated, "The physical treatment of closed routes, through decommissioning or placing in long-term storage, will take future administrative access needs, including fire suppression and timber management, into consideration, and will be analyzed in separate, site-specific NEPA projects and decisions when applicable" (U.S. Forest Service 2016b). The Environmental Baseline for this biological opinion incorporates all on-the-ground changes that have been made to date." (Emphasis added)

79. Some commenters expressed concern that replacing management direction for elk could adversely affect the recovery of grizzly bears. (EA, p.124)

80. The Agency's response (EA, p. 125) was:

> Forest Plan direction may occasionally result in adverse effects to individual grizzly bears over the life of the plan, particularly as a result of access management direction and inadequate food and attractant storage.

81. However, this proposed Programmatic Amendment Package, the Biological Opinion, and the USFS Biological Assessment is fundamentally flawed, in part, because it fails to comply with NEPA.
82. For example, the Forest Service failed to analyze illegal motorized use of closed and stored roads.
83. The USFWS letter to Anderson accompanying the BO stated, "The Forest made a determination of *may affect, likely to adversely affect* for grizzly bears."
84. If the USFS has determined their management actions are likely to adversely affect grizzly bears, is there also a likelihood that those management actions will affect the recovery of the species?
85. Given the Agency's failure to update the entire Forest Plan in a timely manner, we question how much more time will pass before the plan is modernized and whether the plan is to continually amend the Forest Plan and never abide by the regulations that require revision every 15 years.
86. An additional response to commenters' articulated concern that replacing management direction for elk could adversely affect the recovery of grizzly bears (EA, p.124) was:

> As a result, new species-specific plan components would only be needed if the proposed elk habitat changes adversely affect the recovery of grizzly bear.

87. An analysis of the recovery of grizzly bear seems to be missing from the EA documentation.
88. In response to consistent and recent sightings of grizzly bears on the BNF, FOB wrote a letter in the fall of 2021 asking for a species-specific amendment for grizzly bears. (See Attachment D, FOB Letter to BNF on Grizzly Programmatic Amendment – 2021)
89. More than one year later, the Agency has yet to respond.
90. Subsequently, two sub adult grizzlies spent the greater portion of the 2022 summer on the BNF.
91. There is no communication agreement between the BNF and the USFWS for grizzly, a document which should include possible release sites.
92. Therefore, the two grizzly bears were moved to the Sapphire Mountains, a substantial distance from the designated Bitterroot Ecosystem (BE).
93. During the April 12, 2023, Spring Bitterroot Subcommittee meeting, Hilary Cooley continued to express the need for a communication agreement with the BNF.
94. Yet, no progress has been made on a communication and release plan.
95. That does not bode well should more grizzlies be pre-emptively caught on the BNF.
96. It is past time for a grizzly amendment to the Forest Plan.
97. Connectivity to the Bitterroot Ecosystem (BE), is essential to sustained grizzly recovery.
98. The most recent five-year review published by USFWS emphasizes the importance of connectivity to grizzly bear recovery. (See Attachment E, 2021 US Fish and Wildlife Service 5-year review of grizzly bears in the lower-48 states, p. 21)

The uncertainty associated with the stressors of human-bear conflicts, human population growth, and potential **reductions in connectivity** further represent a possible reduction in overall viability of the grizzly bear in the lower-48 States in the foreseeable future. (Emphasis added)

99. In a recent ruling on the Flathead Forest Plan, the Court found that forests must consider the direct, indirect, and cumulative effects of proposed actions on the entire population of grizzly bears in the lower 48. (See Attachment F, WEG et al. v. USFS, Steele et al (district court opinion and order) - 24jun21)
100. The decision found, "…, there is no question or argument that the Service has unreasonably delayed in carrying out the non-discretionary commitments in the ROD in violation of the APA." (See Attachment G, AWR v. Cooley (district court opinion and order) - 15mar23, p. 26; See also Attachment H, USFWS Court Submission With Bitterroot Grizzlies Schedule - 14apr23)
101. Currently in draft form, Montana Fish Wildlife and Parks (MFWP) has proposed a grizzly bear management plan. (See Attachment I, MFWP Grizzly Bear Management Plan [draft] – 2022)
102. To protect grizzly bears, MFWP plan (p. 11) recommends:

FWP would support land management agencies' policies previously agreed to as part of the CSs. Elsewhere, FWP would continue existing policy of avoiding open road densities exceeding 1 mi/mi2 on lands it owns or manages. FWP would take the view that, outside of areas with specific road density standards, grizzly bears can coexist with humans in areas with moderate amounts of motorized access if attractants are well managed, conflicts are minimized, and mortality of grizzly bears is sufficiently low.

103. The plan discusses the importance of the BNF to grizzly bear recovery (p. 81).

Due largely to its many miles of remote and protected habitat, the Bitterroot area (primarily in Idaho, but also extending east to the foothills of the Bitterroot Mountains in Montana) has long been identified as a priority area for grizzly bear recovery (Mattson and Merrill 2002, Roy et al., 2001, USFWS 2000). Merrill et al. (1999) identified the Idaho portion of the Bitterroot area as potentially suitable for grizzly bears. Extrapolating from Resource Selection Function models developed in Yellowstone and the Swan Mountain Range, Boyce and Waller (2003) projected that the Bitterroot area could potentially support over 300 grizzly bears. Using a more general predictive model, Mowat et al. (2013) predicted that the Bitterroot area could support over 400. Boyce et al. (2002) used theory and estimates of the potential population size in the Bitterroot to bolster the case that even a small population in the greater Bitterroot area would substantially buffer grizzly bears against complete extirpation in the U.S. Rocky Mountains, assuming low levels of dispersal among the NCDE, Cabinet-Yaak, and Bitterroot populations.

104. The USFW 2021 BO conservation recommendations (Attachment C, p. 51) are:

Continue to manage access on the Forest to achieve lower road densities and high secure habitat, particularly in areas important for connectivity for grizzly bears. By managing motorized access, several grizzly bear management objectives could be met including: (1)

minimizing human interaction and potential grizzly bear mortality; (2) minimizing displacement from important habitats; (3) minimizing habituation to humans; and (4) providing relatively secure habitat where energetic requirements can be met (Interagency Grizzly Bear Committee 1998). Additionally, lower road densities and higher secure habitat would also benefit other wildlife and public resources.

The presence of attractants is a major factor leading to the food conditioning and habituation, and the eventual direct mortality or management removal of grizzly bears. The Service recommends that the Forest add food storage requirements to permits and contracts when planning projects and pursue a Forest-wide food storage order. As grazing permits are evaluated, the Service recommends the Forest discuss with permittees their plans for timely removal of livestock carcasses and consider adding prohibitions on feeding supplemental grains or other livestock feed on grazing allotments. Management of garbage, food and livestock feed storage benefits grizzly bears as well as black bears and other carnivores. Human/carnivore and livestock/carnivore interactions would also be reduced, leading to a public safety benefit.

105. The BO points out the fact that lack of food storage orders on the BNF is a continued threat to the recovery of grizzlies.
106. The recommendations included in the BO suggest road density is important for the recovery of grizzly bears, yet this amendment package allows for increased road densities.
107. As the USFWS BO (p. 28) suggests:

Overall, existing motorized routes and any new routes constructed in the future within action area, temporary or permanent, may affect grizzly bears. These effects may be insignificant in some situations or adverse in others. Adverse effects may significantly impact an adult female grizzly bears' ability to find food resources, breed and raise young, and find adequate shelter at some time over the life of the [BNF's already outdated] Forest Plan.

108. The BNF must stop delaying and promptly complete a programmatic amendment to the Forest Plan for grizzly bears which includes standards for motorized access and road densities.

Biodiversity

109. Commenters voiced concerns related to the removal of the current Forest Plan elk habitat effectiveness thresholds that provide protection for numerous native species. (EA p. 125)
110. The Agency response (EA p.126), in part maintains:

This amendment will therefore not result in substantial losses in or degradation of habitat because:

1) The majority of drainages on the Forest have been out of compliance with this standard since the adoption of the Forest Plan, removing the standard will not make a substantial change in on-the-ground conditions.

2) The revised plan components in the proposed action include guidelines that will limit the construction of new, permanent roads.
3) No actual road construction or changes in road density are authorized by this amendment. Any such proposed actions will be subject to project-level effects analysis.

111. Point 1 is an unconditional admission that the BNF has been ignoring the 1987 Forest Plan since its creation.
112. That unqualified admission reveals the Agency has disregarded directives contained in the National Forest Management Act of 1976 for more than three decades.
113. Point 2 states that new "guidelines will limit the construction of new, permanent roads."
114. As we have previously expressed, "guidelines" are not "standards" and are therefore not binding.
115. And, as has been revealed by numerous studies, unless completely obliterated, any and all roads (administrative, open, closed, blocked, etc.) will be used by the public.
116. Point 3 claims that "[n]o actual road construction or changes in road density are authorized by this amendment."
117. However, as worded, the proposed amendments authorize and enable new road construction during future projects.

Snags and Coarse Woody Debris

118. "Some commenters felt the agency had not considered important aspects of snags and coarse woody debris such as how they contribute to soil function and the existence of mycorrhizae and carbon in the soil." (EA p.126)
119. The Forest Service response to the publics' concerns was both terse and disrespectful.

Additional discussion and literature citations were added to the EA.

120. Such responses do nothing to increase the publics' confidence in the Agency and only substantiate the wide-spread belief that Forest Service assertions that public input is incorporated into policy are little more than pretense.

Summary

121. The proposed old-growth amendment provides no required percentages of old growth in areas suitable for timber production.
122. Instead, it suggests the retention of old growth on the entire forest "when possible."
123. When wouldn't it be possible?
124. The current Forest Plan (1987) provides the flexibility needed to allow for the protection of all old-growth and mature trees that exist on the BNF should the Agency choose to use the available latitude, which it has not.
125. Therefore, the Forest Service could operate within the Forest Plan's (1987) leeway to fulfill Biden's Executive Order 14072 to preserve old-growth and mature forests.
126. The BNF does not need the proposed old-growth Forest Plan amendment to meet E.O. 14072 objectives.

127. Therefore, the Agency's desire to amend the old-growth portion of the current 1987 Forest Plan implies there is another reason for the proposed amendment, an unspecified, hidden agenda.
128. Given the past implementation of similar versions of the proposed old-growth amendment in concert with amendments to elk habitat, snag retention, and coarse woody debris, a logical conclusion is that the Forest Service's intends to make it easier to satisfy NEPA and NFMA requirement while increasing the amount of logging that occurs on the BNF.
129. The newly proposed definition of old growth (not a standard) suggests (not requires) minimum, old-growth characteristics.
130. For example, in Ponderosa Pine-Doug Fir forests, eight 21" dbh trees, greater than 170 years old per acre) need to be preserved. (There is a basal area condition, but that can be obtained with any size tree.)
131. It must be noted that Green et al 1992 calls this a "screening process," not a "definition."

> The minimum criteria are used to determine if a stand is potentially old growth. Where these values are clearly exceeded, a stand will usually be old growth. (Green et al 1992, p. 11)

132. The BNF's proposed definition used Green's identification of "potential" old growth and claims that defines old growth, supposedly "increasing" the old growth on the forest.
133. Paradoxically, the same amount of old growth will exist on the BNF after the proposed redefinition as before.
134. The proposed definition is more encompassing than the 1987 Forest Plan definition, but no new trees will be magically created.
135. The proposed definition undeniably allows the Agency to log old-growth stands down to the status of "potential" old growth, not necessarily well-functioning old growth.
136. Numerous studies have concluded that more old-growth trees and more old-growth characteristics mean better functioning old-growth ecosystems.
137. Many independent scientists (i.e., not attached to the timber industry, Forest Service, or BLM) now recommend that no old trees should ever be logged because that degrades old-growth related ecosystems and reduces carbon sequestration.
138. The proposed old-growth amendment allows large, old trees to be cut for any number of the usual reasons (resilience to insects, wildfire, and disease) as long as the minimum criteria are retained.
139. In other words, this proposed amendment allows the forest to degrade existing old-growth stands and still refer to them as old growth.
140. Along with the proposed old growth amendment are amendments that decrease protections for the amounts of elk habitat, coarse woody debris, and snags.
141. Each of these original protections were put in place to preserve wildlife habitat.
142. Those protections are made weaker because "standards," which could be enforced, are being replaced by "guidelines," which cannot.
143. In short, these sweeping Forest Plan Amendments are being proposed to make commercial logging projects easier to get through the NEPA process.

144. There are no proven benefits to forest ecosystems, wildlife, clean air, water, or the public owners of the BNF.

145. The Forest Service declares (EA p. 18):

> "Litigation on the Gold Butterfly Project has led the Forest to propose this amendment [package] to the Forest Plan …"

146. Thus, it appears the Agency is proposing changes to the Forest Plan not to assist it in managing the BNF for the benefit of the forest or the public that owns it, but to facilitate management agendas while limiting public participation both administratively (during project planning) and in the courts (when administrative processes fail).

147. Undeniably, these proposed Forest Plan amendments are intentionally vague, cosmetic, and not worth the paper on which they are written.

148. Members of FOB and the other aforementioned organizations regularly visit widely dispersed areas of the BNF for research, recreation, enjoyment, and other activities.

149. Because those members' use is so widely dispersed across the BNF, this set of proposed Forest Plan amendments will enable detrimental impacts to those members' future activities in the places they will continue to visit.

150. Since the proposed amendments authorize the implementation of additional ground-disturbing management actions on the entirety of the BNF, there is no real possibility the Agency will not pursue site-specific projects that affect those members.

151. As written, we are strongly opposed to this Forest Plan Amendment Package the Forest Service is proposing.

152. The changes included in the proposal will have a substantial impact on the BNF, a vast array of ecosystems, and the human environment.

Suggested Resolution

153. Therefore, the amendment package must be analyzed with an EIS using the most recent scientific research that remedy the problems this Objection identifies (i.e., eliminating standards, shrinking the retention of functioning old growth, diminishing carbon storage, increasing greenhouse gas emissions, reducing secure elk habitat, disregarding the needs of species of conservation concern, damaging bull trout critical habitat, lowering protections for grizzly bears, degrading biodiversity, and downgrading safeguards for snags and coarse woody debris) and/or halting all land-disturbing management activities on the BNF until a Forest Plan Revision is completed.

154. Emerging research appears to support a long-held belief that managed forests are less able to adapt to changing conditions than unmanaged forests. (See Attachment J, Faison, E. K. et al, 2023, The importance of natural forest stewardship in adaptation)

155. Consequently, we question any need for this proposed amendment package which appears designed to enable a significant increase in land-disturbing management activities on the BNF.

Submitted respectfully,
/S/

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On the following pages are 10 attachments referenced in the above text by letter (e.g., A, B, C, etc.) and 3 declarations from members or Friends of the Bitterroot.

Attachment G

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MONTANA
MISSOULA DIVISION

ALLIANCE FOR THE WILD ROCKIES and NATIVE ECOSYSTEMS COUNCIL, Plaintiffs, vs. HILARY COOLEY, in her official capacity as U.S. Fish and Wildlife Service Grizzly Bear Recovery Coordinator, et al., Defendants, and STATE OF IDAHO, Defendant-Intervenor.	CV 21–136–M–DWM OPINION and ORDER

This case arises out of a dispute over the United States Fish and Wildlife Service's (the "Service") management of grizzly bear (*ursus arctos horribilis*) recovery in the Bitterroot Ecosystem of Montana and Idaho. Nearly forty years ago the Fish and Wildlife Service and interested members of the public began scientific inquiry concerning the dearth of grizzly bears in what is now designated as the Bitterroot Ecosystem. Based on the best available science and after considerable study as well as public input from citizens in Montana and Idaho, an investigation spanning nearly fifteen years, a record of decision and rule elected to establish a nonessential experimental grizzly population through introduction of twenty-five grizzly bears into the area. Introduction of the experimental population would happen if funds were available to locate, move, and introduce the bears. Additionally, the record of decision incorporated other mandatory requirements as part of the reintroduction of the experimental grizzly. Now, almost forty years have passed, and nothing has been done: no bears, no community advisory committee, no community or other educational instruction in towns or schools for bear safety, safe practices in garbage storage techniques, and other ways to reduce attracting bears.

Plaintiffs are environmental organizations that claim the Service violated the National Environmental Policy Act ("NEPA") and the Administrative Procedure Act ("APA") by choosing not to implement its grizzly bear recovery plans that had been adopted and by failing to finalize a proposed rule change regarding bear management. Plaintiffs further allege that the Service must prepare a supplemental environmental impact statement ("EIS") to consider the changed circumstances regarding grizzly bears in the area. Cross-motions for summary judgment are pending regarding the merits of Plaintiffs' claims. Federal Defendants and

Defendant-Intervenor Idaho (collectively "Defendants") also challenge Plaintiffs' standing. Because the Service has unreasonably delayed in implementing its 2000 Record of Decision and Final Rule regarding grizzly bears and failed to conduct a supplemental EIS based on the changed circumstances, Plaintiffs succeed on two of their claims. Plaintiffs' claim regarding finalization of a 2001 proposed rule fails because Plaintiffs lack standing to pursue that claim.

BACKGROUND[1]

A. Grizzly Bears and the Bitterroot Ecosystem

Prior to European settlement, the American West was home to an estimated 50,000 grizzly bears but, by 2000, the grizzly bear population dwindled to roughly 1000 in the coterminous United States.[2] FWS 889. European settlers killed grizzly bears for fur, sport, and to eliminate possible threats to humans and livestock. FWS 890. This human activity caused a precipitous drop in grizzly bear populations, leading to the species being listed as threatened in the lower-48 States under the Endangered Species Act ("ESA") in 1975. FWS 890. The species remains listed as threatened to this day. *See* FWS 10602.[3] By November 2000, the

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[1] The administrative record is cited as "FWS [page number]."

[2] The Service uses the designation "lower-48 States" to refer to this region, for consistency's sake, the same designation is used here. *See* FWS 10602.

[3] On February 6, 2023, the Service announced that it plans to explore delisting of grizzly bears in the Northern Continental Divide and Greater Yellowstone Ecosystems based on two petitions, including one from the state of Montana. *See* 88 Fed. Reg. 7658, 7658–60 (Feb. 6, 2023).

remaining grizzly bears in the lower-48 States were in six Ecosystems in Montana (Northern Continental Divide, Yellowstone, Cabinet-Yaak), Idaho (Yellowstone, Cabinet-Yaak, and Selkirk), Wyoming (Yellowstone), and Washington (Selkirk and North Cascades), FWS 869, occupying merely 2 percent of their historic range, FWS 890.

The Bitterroot Ecosystem includes much of east-central Idaho and a small part of western Montana. FWS 890, 10600. It is one of the largest contiguous blocks of Federal land in the lower-48 States and contains two wilderness areas which themselves make up "the largest block of wilderness habitat in the Rocky Mountains south of Canada." FWS 869. The area was home to widespread grizzly bear populations until the middle of the 20th century when evidence of the bear's last sign was found. FWS 890. By November 2000, the best available science indicated that there were no grizzly bears within the Bitterroot Ecosystem. FWS 879. Even so, as recently as October 2022, grizzly bears have been seen in the Bitterroot Ecosystem. (*See* Doc. 39-1.) The bears were captured and moved to the Sapphire Mountains. (*Id.*)

B. November 2000 EIS, Record of Decision, and Final Rule

Ever since the Service published the Grizzly Bear Recovery Plan in 1982 it has been planning the recovery of the bears in the Bitterroot Ecosystem. FWS 890. In November 2000, the Service published a Final EIS, FWS 26–793, and Record of

Decision ("ROD"), FWS 867–84, delineating "Grizzly Bear Recovery in the Bitterroot Ecosystem." It also promulgated and published a Final Rule on "Establishment of a Nonessential Experimental Population of Grizzly Bears in the Bitterroot Area of Idaho and Montana." FWS 886–932. The EIS analyzed and evaluated six alternatives: (1) restoration of grizzly bears as a nonessential experimental population with citizen management (the "proposed action and preferred alternative"); (2) restoration of grizzly bears as a nonessential experimental population with management by the Service; (3) natural recovery (the "no action" alternative); (4) no grizzly bear alternative (preventing recovery in the Bitterroot Ecosystem); (5) restoration of grizzly bears as a threatened population with full protection of the ESA and habitat restoration; and (6) restoration of grizzly bears as a threatened population with full protection of the ESA and Service management. FWS 40.

Following public comment, including comments by Plaintiff Alliance for the Wild Rockies ("Alliance"), (*see* Doc. 24-1 at ¶ 4), the Service selected alterative 1, the restoration of grizzly bears as a nonessential experimental population with citizen management, FWS 869. The Service's stated purpose for this selection was threefold: "to reestablish a viable grizzly bear population in the Bitterroot [E]cosystem"; to designate these reestablished bears as a nonessential experimental population; and manage the process according to both § 4 and § 10(j) of the ESA to "address local concerns." FWS 869.

In the 2000 ROD, the Service further explained its selection. It articulated a detailed account of the intent to establish the Bitterroot Grizzly Bear Experimental Population Area ("Experimental Population Area") under § 10(j) of the ESA. The Experimental Population Area includes 25,140 square miles making up "most of central Idaho and part of western Montana." FWS 870. Management of experimental species is not cabined by the requirements of the ESA. Under § 10(j) of the ESA, the Secretary may designate reintroduced populations of a species outside of its current range but within its historical range as "experimental." 16 U.S.C. § 1539(j). An experimental population must be separate geographically from nonexperimental populations of the same species. *Id.* § 1539(j)(1). Additionally, the Secretary may authorize the release of any population of an endangered species outside of its current range "if the Secretary determines that such release will further the conservation of the species." *Id.* § 1539(j)(2)(A).

Nonetheless, prior to any such release, the Secretary must determine "whether or not such population is essential to the continued existence of an endangered species or a threatened species." *Id.* § 1539(j)(2)(B). As noted, regulatory restrictions on nonessential experimental populations are looser than under the standard framework for protection of endangered species under § 7 of the

ESA. *See* FWS 889. In this case, the ROD outlines the Service's plan to use the § 10(j) designation by flexibly reintroducing twenty-five grizzly bears into a region after consulting citizens' comments about the potential impacts of the stricter ESA consultation obligations.

Additionally, the ROD describes the Service's commitment to: (1) establish a Bitterroot Grizzly Recovery Area ("Recovery Area"), a smaller subset of the Experimental Population Area, in the Selway-Bitterroot and Frank Church Wildernesses to act as the grizzly bears' "core habitat for survival, reproduction, and dispersal of the recovering population"; (2) establish a Citizen Management Committee to lead the recovery efforts; (3) implement sanitation and public information campaigns before introducing any bears; and (4) release a minimum of twenty-five grizzly bears into the Recovery Area over a period of five years, "subject to the availability of funding" and "no sooner than 1 year after initiation of formation of the [Citizen Management Committee] and initiation of sanitation and information efforts." FWS 870–73. The experimental reintroduction plan was set to progress in the stages listed above. The Final Rule, published on November 14, 2000 and codified as 50 C.F.R. § 17.84(l), implemented the Service's selected alternative. As discussed below, it is undisputed that other than the designation of the nonessential experimental population, the Service has not implemented the

ROD and Final Rule. There has been no action for twenty-two years even considering the changing circumstances.

C. June 2001 Proposed Rule

In June 2001, the Service changed course. It apparently abandoned the preferred alternative in the ROD and proposed selecting the "No Action" Alternative (alternative 3 above) as the new preferred alternative ("2001 Proposed Rule"). In 2001, the Service published a proposed rule, titled "Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of Grizzly Bears in the Bitterroot Area of Idaho and Montana; Removal of Regulation." Had this "No Action" alternative been implemented, it would have changed the Service's grizzly bear recovery plans and removed 50 C.F.R. § 17.84(l), from the Code of Federal Regulations. Although the 2001 Proposed Rule would officially end the reintroduction program, the proposal also notes that it "does not mean that we are permanently precluding a reintroduced population of grizzly bears into the Bitterroot Ecosystem." FWS 1221. The comment period on the 2001 Proposed Rule ran from June 22 to August 21, 2001, FWS 1217, and overwhelmingly yielded responses in opposition to the dramatic agency change of course, FWS 1232–33.

The 2001 Proposed Rule cited agency funding and local concerns as the impetuses for the change of course. Specifically, it noted that the Service was reevaluating the Final Rule "[i]n light of [its] current recovery needs for grizzly bears in other areas and [its] available resources, as well as the objections of the States that would be affected by the reintroduction of grizzly bears" and "the possibility that humans may be killed or injured as grizzly bears are introduced." FWS 1217. Unmentioned in the 2001 Proposed Rule, however, is a lawsuit filed by the state of Idaho over the Service's decision to engage in these active recovery efforts. *See* FWS 1017–34. Although the ultimate resolution of that litigation is unclear, internal Service emails indicate that the suit was the incentive for the agency's proposed course correction. FWS 1511. Even though the "No Action" alternative was never officially adopted, the record suggests it has been the agency's actual plan ever since.

The proposed "No Action" alternative confusingly incorporates some action. While it "allow[s] grizzly bears to naturally expand their current range into central Idaho and the Bitterroot Ecosystem," FWS 28, it also includes the designation of a Bitterroot Grizzly Bear Recovery Zone and a population saturation goal of 280 grizzly bears, FWS 55. Ironically, because grizzly bears are listed as a threatened species under the ESA, under the "No Action" Alternative, § 7(a)(2) protections apply to naturally repopulated grizzly bears present in the Bitterroot Ecosystem. FWS 53; *see also* 16 U.S.C. § 1536(a)(2). This in effect precludes management of peregrinated bears under § 10(j) rules.

D. Procedural History

Alliance for the Wild Rockies is a non-profit organization "dedicated to the protection and preservation of the native biodiversity of the Northern Rockies Bioregion, its native plant, fish, and animal life, and its naturally functioning ecosystems." (Doc. 1 at ¶ 9.) Native Ecosystems Council is a non-profit organization "dedicated to the conservation of wildlife and natural resources on public lands in the Northern Rockies." (*Id.* at ¶ 10.) Federal Defendants are Hilary Cooley, the Service's Grizzly Bear Recovery Coordinator, (*id.* at ¶ 11), Martha Williams, the Service's Director, (*id.* at ¶ 12), and Deb Haaland, the Secretary of the Department of the Interior, (*id.* at ¶ 13) (collectively "Federal Defendants"). Finally, the state of Idaho intervened under Federal Rule of Civil Procedure 24(a) due to its interest in the conservation and management of grizzly bears in the Bitterroot Ecosystem, the majority of which is within its territorial borders. (*See* Doc. 11 at 2.)

Plaintiffs bring three claims: (1) the Service violated the APA § 706(1) by failing to finalize the 2001 Proposed Rule (Claim I); (2) the Service violated the APA § 706(1) by failing to comply with the 2000 ROD and Final Rule (Claim II); and (3) the Service violated NEPA and the APA by failing to prepare a supplemental EIS (Claim III). (*See* Doc. 1 at ¶¶ 80–97.) The remedy Plaintiffs seek is a declaration that Federal Defendants have violated the APA and/or NEPA and an order requiring the Service to prepare a supplemental EIS and to issue a new final rule and record of decision based on the outcome of a supplemental EIS. (*Id.*) The parties filed cross-motions for summary judgment, (*see* Docs. 23, 27, 31), which were argued on March 7, 2023, in Missoula, Montana, (*see* Doc. 41 (Min. Entry)).

Where an agency's administrative record is complete and constitutes the whole and undisputed facts underlying agency decision making, summary judgment is the appropriate vehicle to address claims under the APA. *City & Cty. of S.F. v. United States*, 130 F.3d 873, 877 (9th Cir. 1997) ("[T]he function of the district court is to determine whether or not as a matter of law the evidence in the administrative record permitted the agency to make the decision it did.").

ANALYSIS

Plaintiffs have Article III standing to pursue their claims related to the 2000 ROD and Final Rule because there is a reasonable probability that the Service's failure to carry out those commitments have caused Plaintiffs' injury that can be traceable to, and redressed by, the Service. Considering the merits of the parties' arguments, the Service has unreasonably delayed implementing the 2000 ROD in violation of § 706(1) of the APA. Further, because those obligations are outstanding, and because there has likely been a significant change in circumstances regarding grizzly bears in the Bitterroot Ecosystem in the past two decades, a supplemental EIS is required.

I. Standing

Standing exists under Article III, when "a plaintiff [has] (1) a concrete and particularized injury that (2) is caused by the challenged conduct and (3) is likely redressable by a favorable judicial decision." *Juliana v. United States*, 947 F.3d 1159, 1168 (9th Cir. 2020) (citing *Friends of the Earth, Inc. v. Laidlaw Env't Servs. (TOC), Inc.*, 528 U.S. 167, 180–81 (2000)). "Environmental plaintiffs adequately allege injury in fact when they aver that they use the affected area and are persons for whom the aesthetic and recreational values of the area will be lessened by the challenged activity." *WildEarth Guardians v. U.S. Dep't of Agric.*, 795 F.3d 1148, 1154 (9th Cir. 2015) (internal quotation marks and alteration omitted). "[The redressability] requirement is satisfied when 'the relief requested—that the agency follow the correct procedures—may influence the agency's ultimate decision.'" *Id.* at 1156 (9th Cir. 2015) (quoting *Salmon Spawning & Recovery All. v. Gutierrez*, 545 F.3d 1220, 1226 (9th Cir. 2008)). "In analyzing redressability . . . [courts] assume its existence." *Juliana*, 947 F.3d at 1170. Thus, the proper inquiry here is whether Plaintiffs have shown that forcing the Service to act could protect Plaintiffs' aesthetic, recreational, vocational, and scientific interests in grizzly bears in the Bitterroot Ecosystem.

A plaintiff "must establish standing for every claim" it brings. *Ctr. for Biological Diversity v. Bernhardt*, 946 F.3d 553, 560 (9th Cir. 2019). At the summary judgment stage, a plaintiff "must set forth by affidavit or other evidence specific facts, which for the purposes of the summary judgment motion will be taken to be true" to satisfy the requirements of standing. *Lujan v. Defs. of Wildlife*, 504 U.S. 555, 561 (1992) (internal quotation marks and citation omitted). Plaintiffs have standing to pursue Claims II and III, but because their alleged harm is not redressable by a favorable decision here as to Claim I, they do not have standing to pursue that claim, which seeks to compel finalization of the 2001 Proposed Rule.

A. 2001 Proposed Rule (Claim I)

Plaintiffs first ask that the Service be ordered to finalize the 2001 Proposed Rule. However, even if the claim was viable, a determination here would not redress the injuries Plaintiffs have alleged. For example, Plaintiffs state they do not want to see the 2001 Proposed Rule implemented nor do they want to see the Service abandon recovery efforts in the area. (*See* Doc. 24 at 24.) Finalizing the Proposed Rule would have the opposite effect because the 2000 ROD and Final Rule—which establish a nonessential experimental grizzly bear population in the Bitterroot Ecosystem—are still in effect and have codified Plaintiffs' desired course of action. Because there is no connection to be made between Plaintiffs' alleged injury, discussed below, and the Service's delay in finalizing the 2001 Proposed Rule, Plaintiffs cannot show their injury is redressable. Accordingly, because Plaintiffs lack standing to pursue Claim I, it is unnecessary to address the remaining elements of standing as it relates to Claim I.

B. 2000 ROD, Final Rule, and Supplemental EIS (Claims II and III)

In Claims II and III, Plaintiffs seek an order requiring the Service to implement the 2000 ROD and Final Rule and to undertake a supplemental EIS. Plaintiffs have established all three elements of standing as to these claims.

Plaintiffs submitted only one declaration describing how the Service's alleged failure to act threatens their aesthetic, recreational, vocational, and scientific interests in grizzly bears in the region. (Doc. 24-1.) Federal Defendants insist that a single declaration of harm is insufficient and argue Plaintiffs have not alleged any injury-in-fact, reductively characterizing Plaintiffs' alleged injury as merely harming their "chances of observing grizzly bears in the area." (Doc. 28 at 19.) While Plaintiffs agree they are harmed by limitations on their ability to observe grizzly bears in the Bitterroot Ecosystem, they also allege other aesthetic, vocational, and scientific harms. For example, Alliance's Executive Director Michael Garrity declares that "Alliance was an active participant in the original NEPA proceedings for Bitterroot grizzly recovery," (Doc. 24-1 at ¶ 4), and that "Alliance has invested decades of work into recovery of grizzly bears . . . in the

Bitterroot Ecosystem," (*id.* at ¶ 5). Further, Garrity declares that he and Alliance's members engage in "nature study and wildlife observation" in grizzly bear habitat and intend to continue to do so. (*Id.* at ¶ 3.)

In *WildEarth Guardians*, a single member's declaration that he had "reduced recreational and aesthetic enjoyment of areas in Nevada impacted by [Nevada Wildlife Services Program's] predator damage management programs," adequately demonstrated an injury-in-fact. 795 F.3d at 1155. He named specific wilderness areas affected and stated that he planned to visit those areas again. Because the declaration stated that the agency's activity negatively impacted the plaintiff's enjoyment of those areas by causing him to curtail his recreational activities and reducing his likelihood of seeing animals, the injury-in-fact requirement was satisfied. *Id.* Just as in *WildEarth Guardians*, Plaintiffs present only one declaration that speaks to injury-in-fact. Nevertheless, the interests identified in the declaration fall within NEPA's and the APA's scope of protections and because one declaration is sufficient, Plaintiffs have established injury-in-fact.

Federal Defendants next argue that even if Plaintiffs have experienced some injury, the injury is not traceable to the Service because it has not reintroduced nor removed grizzly bears from the Bitterroot Ecosystem. (Doc. 28 at 20.) Whether or not the Service has introduced or removed grizzly bears from the Bitterroot Ecosystem is not the issue; rather, Plaintiffs allege, *inter alia*, that the ROD legally binds the Service at some point to reintroduce grizzly bears, and that by failing to do so, it has violated the APA, harming the interests outlined above. The ROD included non-discretionary commitments other than just the reintroduction of grizzly bears. Plaintiffs has also established causation.

Finally, Federal Defendants argue that "recovery planning measures are non-binding and do not impose legal obligations on any party." (Doc. 28 at 20.) Based on oral argument, this is apparently not the case. Federal Defendants fail to explain why a positive ruling for Plaintiffs in this case would not redress their complaints. Just arguing that Plaintiffs' position is incorrect does not fatally undermine their standing to bring a claim. Plaintiffs have established redressability to satisfy that element of standing.

Because Plaintiffs have established the three elements of Article III standing, the merits of Claims II and III are considered below.

II. Delayed Implementation of the 2000 ROD and Final Rule (Claim II)

NEPA claims are reviewed under the APA, which authorizes a court to "compel agency action . . . unreasonably delayed." 5 U.S.C. § 706(1). Section 706(1) "empowers a court . . . to compel an agency to perform a ministerial or non-discretionary act, or to take action upon a matter, without directing how it shall act." *Norton v. S. Utah Wilderness All.*, 542 U.S. 55, 64 (2004) (internal quotations and emphasis omitted). Such a claim may proceed "where a plaintiff asserts that an agency failed to take a *discrete* agency action that it is *required to take*." *Id.* "Thus, a court may compel agency action under the APA when the agency (1) has a clear, certain, and mandatory duty and (2) has unreasonably delayed in performing such duty." *Vaz v. Neal*, 33 F.4th 1131, 1136 (9th Cir. 2022) (internal quotation marks and citations omitted). To determine whether an agency has unreasonably delayed, courts consider the following factors:

> (1) the time agencies take to make decisions must be governed by a rule of reason;
>
> (2) where Congress has provided a timetable or other indication of the speed with which it expects the agency to proceed in the enabling statute, that statutory scheme may supply content for this rule of reason;
>
> (3) delays that might be reasonable in the sphere of economic regulation are less tolerable when human health and welfare are at stake;
>
> (4) the court should consider the effect of expediting delayed action on agency activities of a higher or competing priority;
>
> (5) the court should also take into account the nature and extent of the interests prejudiced by delay; and
>
> (6) the court need not find any impropriety lurking behind agency lassitude in order to hold that agency action is unreasonably delayed.

Id. at 1137 (citing *Telecomm. Rsch. and Action Ctr. v. FCC*, 750 F.2d 70, 79–80 (D.C. Cir. 1984)) (known as the "*TRAC* factors").

Defendants maintain that because the Service has no duty to act, the *TRAC* factors are inapposite and the Court need not assess delay. Conversely, however, Defendants have conceded that the Service unreasonably delayed if it is under a duty to act. The inaction and delay here is more than twenty-two years. Thus, the crux of this case, and this claim, comes down to whether there is a "*discrete* agency action that [the Service] is *required to take*." *S. Utah Wilderness All.*, 542 U.S. at 64. There is. The Service is obligated to carry out the non-discretionary commitments it made in the 2000 ROD and Final Rule. Furthermore because Defendants have conceded there has been an unreasonable delay, Plaintiffs are entitled to summary judgment on Claim II.

A. Duty

Plaintiffs argue that the Service is legally bound to fulfill each non-discretionary step included in the ROD. Defendants counter that the Service continues to have complete discretion to implement any and all aspects of that decision document. Their premise is that nothing in the ROD or 2000 Final Rule is mandatory. Neither argument is completely accurate: where the 2000 ROD and Final Rule outline non-discretionary activity the Service must take, the Service has a statutory duty to act.

NEPA "requires federal agencies to assess and publicly disclose the environmental impacts of proposed federal actions." *WildEarth Guardians*, 795 F.3d at 1151 (citing 42 U.S.C. §§ 4321–4347). When a Federal agency is considering a major action that "significantly affect[s] the quality of the human environment," an EIS is required. *Id.* (cleaned up). The purpose of this process is to inform both the agency and the public of the potential environmental impact of any given major federal action. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). A record of decision is required at the conclusion of the EIS process to identify and explain the agency's preferred considered alternative. 40 C.F.R. § 1505.2(a) ("At the time of its decision . . . each agency shall prepare and timely publish a concise public record of decision," which: (1) "states the decision"; (2) identifies alternative decisions the agency considered; and (3) "[s]tates whether the agency has adopted all practicable means to avoid or minimize environmental harm from the alternative selected."). The regulations further instruct that "[a]gencies may provide for monitoring to assure that their decisions are carried out and should do so in important cases." *Id.* § 1505.3. And, "[m]itigation [] and *other conditions* established in the environmental impact statement or during its review and committed as part of the decision shall be implemented by the lead agency or other appropriate consenting agency." *Id.* (emphasis added).

A Council on Environmental Quality directive explains that "agencies will be held accountable for preparing Records of Decision that conform to the decisions actually made and for carrying out the actions set forth in the Records of Decision." 46 Fed. Reg. 18,026, 18,037 (Mar. 23, 1981) ("Forty Most Asked

Questions Concerning CEQ's National Environmental Policy Act Regulations," ("Forty Questions")). Importantly, it also instructs: "the terms of a Record of Decision are enforceable by agencies and private parties." *Id.* Courts have held that "an agency is bound to commitments it makes in the ROD." *Friends of Animals v. Sparks*, 200 F. Supp. 3d 1114, 1123 (D. Mont. 2016) (collecting cases).

The analysis in *Sparks* is instructive. In *Sparks*, the Bureau of Land Management stated in a record of decision that it would recalculate the appropriate management levels of wild horses in a particular region "within five years or after the revision to the Billings [Resource Management Plan], whichever comes first." *Id.* at 1120. In that record of decision, the agency committed itself to a "specific, affirmative action" to which it did not abide. *Id.* The Court determined that § 1505.3, along with the Forty Questions memorandum and case law, "require[d] [Bureau of Land Management] to follow through with the commitments it [made] in a record of decision." *Id.* at 1123 (noting that if the Bureau of Land Management's record of decision language did "not constitute a commitment, then no language will suffice").

Here, the Service committed to introducing twenty-five experimental grizzly bears in the Bitterroot Ecosystem if it was able to appropriate sufficient funds to do so. FWS 872. However, as Plaintiffs make clear, this is the only discretionary aspect of the ROD to which the Service committed itself. While the ROD and

Final Rule's main purpose is the recovery of grizzly bears in the Bitterroot Ecosystem through the reintroduction of the species and designation as a nonessential experimental population, the ROD clearly explains a non-discretionary "overlapping staged process" for the implementation of this plan. FWS 871. The stages are outlined in the ROD as follows: (1) formation of a Citizen Management Committee "during the first few months of implementation" of the ROD;[4] (2) implementation of sanitation and education efforts to prepare the land and community for the presence of grizzly bears; and (3) placement of the bears themselves, "which will begin after the [Citizen Management Committee] has been established and the sanitation and information programs have begun." FWS 870–72. These preliminary stages are neither contingent nor discretionary. The ROD even includes a short, specific timeline for when the Service must set up the Citizen Management Committee, much like the plan revisions in *Sparks*. Further, to the extent that the Service conditioned the reintroduction of grizzly bears into the Bitterroot Ecosystem on the availability of funding, *see* FWS 872, the record does not reflect the nature or specifics of those purported financial

[4] The Citizen Management Committee will be comprised of 15 members including local citizens and agency representatives from Federal and State agencies and the Nez Perce Tribe. FWS 870. Additionally, the Citizen Management Committee will include two scientists as non-voting members to provide updated scientific information on grizzly bears. *Id.*

limitations. Ultimately, just like in *Sparks*, the ROD here includes non-discretionary and discrete commitments that the agency did not carry out.

In *Tyler v. Cisneros*, the Ninth Circuit held that under 40 C.F.R. § 1505.3 an agency must comply with mitigation measures it agrees to engage in during the NEPA review process. 136 F.3d 603, 608 (9th Cir. 1998). In that case, the United States Department of Housing and Urban Development entered into an agreement with various local organizations under which it committed to request consultation with those organizations if it believed the agreement could not be carried out as originally planned. *Id.* The agreement was incorporated as a condition in the agency's Finding of No Significant Impact with a notice that the agency was bound by the "measures in the [a]greement." *Id.* at 606. The court held that § 1505.3 binds an agency to commitments made during the NEPA process. *Id.* Just like in the agency commitments in *Tyler*, the ROD here outlines non-discretionary grizzly bear recovery planning measures.

Defendants further argue that regardless of what the ROD says, the reintroduction of a species under § 10(j) is an exercise of agency discretion. In fact, they argue, the very purpose of § 10(j) is to provide the agency with flexibility and discretion to make decisions about the protection of experimental species populations. Plaintiffs concede that while that may be the case, the Service already exercised its discretion under § 10(j) when it decided to designate grizzly bears in the Bitterroot Ecosystem as a nonessential experimental population.

Section 10(j) instructs that the Secretary "may authorize the release . . . of any population . . . of an endangered species or a threatened species outside the current range of such species if the Secretary determines that such release will further the conservation of such species." 16 U.S.C. § 1539(j)(2)(A); *see also Defs. of Wildlife v. Hall*, 807 F. Supp. 2d 972, 977 (D. Mont. 2011) ("Section 10(j) of the ESA is a way to provide greater management flexibility to those charged with the reintroduction of a species on an experimental basis."). Further, § 10(j)'s implementing regulations state, "[t]he Secretary may designate . . . an experimental population." 50 C.F.R. § 17.81(a). The Service has the discretion to designate an experimental population in the first instance, and it did so here. *See id.* So, while § 10(j) designation is entirely discretionary, a point which Plaintiffs conceded at the March 7 hearing, that discretion is no longer relevant as it ended when the nonessential experimental population was designated.

Ultimately, the non-discretionary commitments the Service lays out for itself in the ROD are binding and establish a duty to act that may be compelled under § 706(1) of the APA. These include phases 1 and 2 of the Service's recovery planning goals, namely the establishment of a Citizen Management Committee, the exercise of education efforts, and the bear-preparation tasks, all of which may be compelled if unreasonably delayed.

B. Unreasonable Delay

Because the Service was under a duty to act upon non-discretionary commitments it made in the ROD, it can be compelled to take such actions if they have been unreasonably delayed. *See* 5 U.S.C. § 706(1). Defendants very purposely did not address the issue of unreasonable delay in their briefing. (*See* Doc. 39 at 12.) Through making other substantive arguments, they also conceded at the March 7 hearing that because it has been over twenty years since the ROD was issued, such delay is unreasonable. That finding is appropriate with no further discussion. Nevertheless, the *TRAC* factors, as discussed briefly below, highlight the perils of agency delay in this context.

As introduced above, there are six factors governing a court's consideration of unreasonable delay. *Vaz*, 33 F.4th at 1137. Regarding the "rule of reason" factor, the Ninth Circuit has held that a ten-year delay is "nothing short of egregious." *In re Nat Res. Def. Council*, 956 F.3d at 1142. Here, over twenty years have passed since the ROD was issued, which clearly violates the "rule of reason." Regarding the "statutory timetable" factor, Plaintiffs do not cite a statutory scheme that mandates any timeline for agency action, so none is considered here. Regarding the "human health and welfare" factor, Plaintiffs argue that not implementing the public health and safety measures outlined in the ROD, such as proper food storage and bear-proofing, impact the public's health. These measures were planned based on the understanding that there were no grizzly bears in the area and that would remain the case until and unless the Service reintroduced them. Now, while it is not clear whether the bears have entered the Experimental Population Area, they have entered the Bitterroot Ecosystem. Because the lack of preparation is likely to impact the health and safety of the people living in the area, this factor weighs in Plaintiffs' favor.

Under the fourth factor, "the court should consider the effect of expediting delayed action on agency activities of a higher or competing priority." *Telecomm. Rsch. & Action Ctr.*, 750 F.2d at 80. Plaintiffs argue that there are no other competing priorities cited in the record. As noted above, Federal Defendants do not refute that point, or any other; however, it is not hard to find mention of various other competing priorities in this record. For example, grizzly bear management in the other Ecosystems are all managed by the Grizzly Bear Recovery Program, currently led by Defendant Hilary Cooley, making competing priorities even within that department apparent. *See, e.g.*, FWS 1217. Thus, although Plaintiffs' argument is unrefuted for the fourth factor, it does not weigh in Plaintiffs' favor.

Regarding the "interests prejudiced" factor, the Final Rule here was implemented under Section 10(j) of the ESA. The ESA places a high priority on preserving listed species, which is an interest of paramount importance. *See Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 184 (1978). Therefore, recovery of the nonessential experimental population of grizzly bears in the Bitterroot Ecosystem is a high priority that has been prejudiced by the twenty-year delay, weighing this factor in favor of Plaintiffs.

Finally, "the court need not find any impropriety lurking behind agency lassitude in order to hold that agency action is unreasonably delayed." *Telecomm. Rsch. & Action Ctr.*, 750 F.2d at 80 (internal quotation marks omitted). Plaintiffs argue that the Service is clear that it has no intention to implement the ROD, *see* FWS 10494 ("Reintroduction has not occurred and there are currently no plans to do so."), even though years of scientific research and thousands of public participants decided it was the best option for grizzly bear recovery. So, while no impropriety is present, the Service has acted contrary to the public's and to its own stated interests. Therefore, this factor also weighs in Plaintiffs' favor.

Because Plaintiffs' analysis is unrefuted and the *TRAC* factors favor Plaintiffs, there is no question or argument that the Service has unreasonably delayed in carrying out the non-discretionary commitments in the ROD in violation of the APA.

III. Failure to Prepare a Supplemental EIS (Claim III)

NEPA does not squarely address when an agency is required to supplement an EIS, but its implementing regulations do. *See Marsh v. Or. Nat. Res. Council*, 490 U.S. 360, 370 (1989). Those regulations "impose a duty on all federal agencies to prepare" a supplemental EIS, *id.* at 372, if "a major Federal action remains to occur" and either substantial changes or significant new circumstances are present, 40 C.F.R § 1502.9(d). While an initial EIS is generally sufficient, in certain circumstances an agency must "take a 'hard look' at the new information to assess whether supplementation might be necessary." *S. Utah Wilderness All.*, 542 U.S. at 73. Supplementation is necessary "when the remaining governmental action would be environmentally 'significant.'" *Friends of Animals v. U.S. Fish & Wildlife Serv.*, 28 F.4th 19, 33 (9th Cir. 2022) (citing *Marsh*, 490 U.S. at 372). However, "an agency need not supplement an EIS every time new information comes to light after the EIS is finalized." *Marsh*, 490 U.S. at 373.

Plaintiffs insist that both significant new circumstances and substantial changes require a supplemental EIS. Defendants claim that no major federal action "remains to occur" and thus no supplemental EIS is required. The parties' briefing on this issue is like two ships passing in the night. Plaintiffs focus heavily on the significant new circumstances and substantial changes they argue exist. Defendants, on the other hand, focus on the threshold issue of "no major Federal action," conceding the second element of the test set forth in 40 C.F.R § 1502.9(d). Because the non-discretionary requirements in the ROD constitute a major federal action that remains to occur, and because there has potentially been a significant change in circumstances over the past two decades, a supplemental EIS is warranted.

A. Major Federal Action

Defendants argue that since the ROD and Final Rule were approved and published in November 2000, and because the Service has clearly committed itself to not introducing grizzly bears into the Bitterroot Ecosystem, there is no outstanding major federal action. Even so, they also conceded in both their briefing and at the March 7 hearing that a supplemental NEPA process is required if the Service either chooses to reintroduce grizzly bears in the future, (Doc. 28 at 37 n.5), or if there is some compellable action required of them under the 2000 ROD and Final Rule. Plaintiffs correctly insist that the Service's outstanding commitments in the ROD constitute a pending major federal action.

A major federal action is "an activity or decision subject to Federal control and responsibility subject to" a set of enumerated exceptions. 40 C.F.R. § 1508.1(q). The exceptions include, in relevant part, that a major federal action does not include "[a]ctivities or decisions that are non-discretionary and made in accordance with the agency's statutory authority." *Id.* § 1508.1(q)(1)(ii). A proposed action that requires finalization is a major federal action that remains to occur while any discretionary actions that an agency may choose to take is not. *See S. Utah Wilderness All.*, 542 U.S. at 73.

In *Southern Utah Wilderness Alliance*, the plaintiffs argued that a Bureau of Land Management land use plan managing a Wilderness Study Area was a major federal action and that evidence of increased off road vehicle use was "significant new circumstances or information" that required supplemental NEPA analysis under § 1502.9. 542 U.S. at 73. The Supreme Court held that the land use plan that was approved and was currently in effect was the major federal action: "that action [wa]s completed when the plan [wa]s approved." *Id.* The Court never reached the issue of whether "significant new circumstances or information" were present. *Id.* Even if there was any change of circumstances regarding off road vehicle use, that information was irrelevant because there was nothing the agency was required to do. *Id.* at 74.

Here, under the applicable regulations, and by the Service's own admissions, the outstanding agency actions required of the Service constitute a major federal action. As further described above, the Service is required to complete the non-discretionary commitments it made in the ROD. *See* 40 C.F.R. § 1508.1(q)(1)(ii).

In *Marsh*, the Supreme Court held that a major federal action remained to occur when a large dam was one third completed but was still under construction.

See 490 U.S. at 366–67. Similarly here, Defendants argue that the major Federal action was completed upon finalization of the Final Rule in November 2000. And, they argue that because the Service has not and does not plan to reintroduce grizzly bears, there is no pending major federal action. While it is true that a major federal action was completed upon finalization of the Final Rule, the Service is not so easily off the hook because non-discretionary duties remain to occur. Because the various sections of the ROD are severable, the extant non-discretionary commitments in the ROD that have been unreasonably delayed constitute a major federal action that "remains to occur." The agency can not have it both ways. It must either "fish or cut bait."

B. Changes

In the past two decades, significant new circumstances regarding grizzly bears in the Bitterroot Ecosystem are seemingly present. Plaintiffs argue that the current, if intermittent, natural presence of peripatetic grizzly bears in the Bitterroot Ecosystem, when no such presence existed when the 2000 ROD and Final Rule were published, presents "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R. § 1502.9(d)(1)(ii). Defendants contend instead that although there have been recent sightings of grizzly bears, no established populations have been found, and thus grizzly bears have not been reestablished in the Bitterroot Ecosystem. As of their January 2022 Answer, Federal Defendants

> aver that in the last five years, there have been verified sightings of grizzly bears in the headwaters of the east fork of the Bitterroot River; in the Miller Creek area to the south of Missoula; in the Trail Creek area east of Lost Trail ski area; at the Stevensville Golf Course; along Lolo Cr/Hwy 12 just west of Lolo, Montana; and near the Lochsa River in Idaho southeast of Lolo Hot Springs.

(Doc. 6 at ¶ 62.) The Service has even updated its "may be present" map for grizzly bears, *see* FWS 10600, while also reporting that "no known *population*" exists in the Bitterroot Ecosystem, FWS 10605 (emphasis added).

Importantly, "a population qualifies as a section 10(j) experimental population "only when, and at such times as, the population is *wholly separate geographically* from nonexperimental populations of the same species." *United States v. McKittrick*, 142 F.3d 1170, 1175 (9th Cir. 1998) (quoting 16 U.S.C. § 1539(j)(1)) (emphasis added). Thus, the § 10(j) designation and every commitment associated with the ROD is based on the now changed historical premise that there are no grizzly bears present. The premise that grizzly bears were not present in the Bitterroot Ecosystem when the ROD and Final Rule were published was scientifically accurate at that time. But the current presence of naturally occurring grizzly bears is a significant change in circumstances that undermines the basic premise on which the ROD and Final Rule were based. It may impact the advisability or feasibility of introducing an experimental population of bears.

Plaintiffs also argue that there have been substantial changes to the proposed action because though the Service never finalized its 2001 proposal to choose the "No Action" alternative from the 2000 EIS, it essentially chose that alternative anyway by never introducing grizzly bears into the Bitterroot Ecosystem. Essentially, they argue, that *through its actions* the agency has adopted the "No Action" alternative in practice if not officially in name.

In *Klamath Siskiyou Wildlands Center v. Boody*, the Ninth Circuit held that supplemental NEPA process was required when an agency adopted a policy decision mere months after completing an EIS that "closely resemble[d] the rejected alternative." 468 F.3d 549, 562 (9th Cir. 2006). Similarly here, the Service has practically adopted the "No Action" alternative, rejected in the EIS, ROD, and Final Rule that were published mere months before its direction reversal. At the very least, the agency adopted a policy that implemented a rejected alternative legally established less than a year after it had rejected the "No Action" policy choice. That is a substantial change in the proposed action. The Service identified grizzly bear reintroduction into Bitterroot Ecosystem as a priority twenty years ago. If that is no longer a priority, the Service cannot simply continue to ignore it. For the past two decades, the Service has acted as though the

2000 ROD and Final Rule never existed in the first instance. While an agency may procedurally alter course, if it does so it must abide by NEPA and the APA. It cannot ignore its own decisions as reflected in a ROD and final rule.

IV. Remedies

Having determined the Service has violated the APA and NEPA, the last question here is what is the appropriate remedy. Plaintiffs present a moving target but now request the following, specific remedies order the Service to: (1) not implement the 2001 Proposed Rule, remove the § 10(j) rule, and prepare a supplemental EIS for Bitterroot grizzly bear recovery; (2) issue a new ROD after the EIS is complete; and (3) "commence implementation of the new Record of Decision within one calendar year of signing the Record of Decision." (Doc. 35 at 24–25.) "Defendants deny that Plaintiffs are entitled to the relief requested or any relief whatsoever." (Doc. 6 at 20.) As is often the case, the proper remedy lies somewhere in the middle.

For the reasons discussed above, the Service must comply with the non-discretionary legally binding commitments made in the 2000 ROD and Final Rule. The usual remedy for a violation of § 706(1) is to compel the action unreasonably delayed. *See In re A Cmty. Voice*, 878 F.3d 779, 788 (9th Cir. 2017). But, as Defendants made clear at the March 7 hearing, a supplemental EIS is also required given the amount of time that has elapsed and the fact that an updated EIS may or may not change the agency's chosen course for grizzly bear recovery in the Bitterroot Ecosystem. Thus, despite the agency's decades of inaction, further delay may be the most appropriate remedy to ensure that grizzly bear recovery efforts are based on contemporaneous and accurate scientific data. Plaintiffs also recognize this challenge. The remedy conundrum creates the unenviable prospect of forgiving one wrong to prevent another. Even so, the appropriate remedy here is to remand to the Service for the preparation of a supplemental EIS to be undertaken within a reasonable timeframe with the recognition that if it is not completed, immediate enforcement of the nondiscretionary portions of the 2000 ROD and Final Rule will be ordered.

CONCLUSION

Based on the forgoing, IT IS ORDERED that Plaintiffs' motion for summary judgment (Doc. 23) is GRANTED in PART and DENIED in PART. It is GRANTED on Claims II and III as outlined above and DENIED as to Claim I. This matter is REMANDED to the Service for the preparation of a supplemental EIS and if warranted, a new ROD and final rule. On or before April 15, 2023, the Service shall file a notice proposing a detailed timeline for the completion of that process. If not provided by this date, the Court will impose a timeline. Plaintiffs shall have fourteen (14) days from the date of that filing to object to the reasonableness of the agency's proposal.

IT IS FURTHER ORDERED that Federal Defendants' (Doc. 27) and Defendant-Intervenor's (Doc. 31) cross-motions for summary judgment are GRANTED as to Plaintiffs' Claim I and DENIED in all other respects.

DATED this 15th day of March, 2023.

11:06 A.M.

Donald W. Molloy, District Judge
United States District Court

Attachment H

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MONTANA
MISSOULA DIVISION

ALLIANCE FOR THE WILD ROCKIES, et al., *Plaintiffs*, v. **HILARY COOLEY, in her official capacity as U.S. Fish and Wildlife Service Grizzly Bear Recovery Coordinator, et al.**, *Federal Defendants* and **STATE OF IDAHO**, *Defendant-Intervenor.*	CV 21-136-M-DWM **FEDERAL DEFENDANTS' RESPONSE TO THE COURT'S MARCH 15, 2023 ORDER**

Federal Defendants submit the following timeline in compliance with the Court's March 15, 2023 Opinion and Order (ECF No. 42) on the parties' cross-motions for summary judgment, which is set forth in the Declaration of Gary Frazer, Assistant Director for the Ecological Services Program of the U.S. Fish and Wildlife Service ("Service"), attached hereto as Exhibit 1. Ex. 1 ¶ 7.

The Court ordered the Service to prepare "a supplemental EIS and if warranted, a new ROD and final rule" and to "file a notice proposing a detailed timeline for the completion of that process." ECF No. 42 at 34. The Service proposes to initiate a new NEPA process, including a draft and final EIS and a new ROD, rather than supplementing the outdated November 2000 EIS. Ex. 1 ¶ 5. Because of the change in circumstances arising from individual bears dispersing within the Bitterroot Ecosystem with greater regularity, the Service plans to take a fresh look at its strategy for supporting restoration of grizzly bears to the Bitterroot Ecosystem. *Id.* ¶¶ 3–4. With the preparation of an EIS, the Service anticipates considering a range of alternatives, including options to facilitate natural recolonization through affirmative actions, such as identifying connectivity areas, addressing sanitation issues, future augmentation, and/or revising the recovery plan chapter for the Bitter Ecosystem. *Id.* ¶ 4. Because of the substantial public interest in the restoration of grizzly bears to the Bitterroot Ecosystem, the Service will conduct a public scoping process to invite input on the possible range of alternatives for consideration in the draft EIS. *Id.* ¶ 5.

The Service's proposed timeline for completing the actions accounts for the agency's significant workload and limited resources. *Id.* ¶ 6; 40 C.F.R. § 1501.10(a); 43 C.F.R. § 46.240(b) ("Time limits should reflect the availability of Department and bureau personnel and funds. Efficiency of the NEPA process is dependent on the management capabilities of the lead bureau, which must assemble an interdisciplinary team and/or qualified staff appropriate to the type of project to be analyzed to ensure timely completion of NEPA documents."). The Service staff who will be responsible for this action will be working concurrently on three processes: a species status assessment and 12-month findings on petitions to delist the Northern Continental Divide Ecosystem and Greater Yellowstone Ecosystem grizzly populations; the Service's joint proposal with the National Park Service to restore grizzly bears to the North Cascades Ecosystem in Washington; and this EIS for restoring grizzly bears to the Bitterroot Ecosystem. Ex. 1 ¶ 6. These actions share the limited resources that are applied to the continual management of human/bear conflicts within the occupied range of the grizzly bear. *Id.*

The Service anticipates completing a pre-scoping process, which includes early planning meetings, within three months of a court order. Ex. 1 ¶ 7; 40 C.F.R. § 1501.9(a)–(c); 43 C.F.R. § 46.235(a). The Service plans to consult with interested partners, such as the Nez Perce Tribe, the Idaho Department of Fish and Game, the Montana Department of Fish, Wildlife, and Parks, and the U.S. Forest Service. 40 C.F.R. §§ 1501.7(h), 1501.8(a)–(b), 1501.9(b)–(c); 43 C.F.R. § 46.200(a)–(b).

The Service anticipates drafting a Notice of Intent for the Federal Register, which will include a notice for a public scoping process, in one month. Ex. 1 ¶ 7; 40 C.F.R. §§ 1501.9(d)(6), 1502.4(a). The Service anticipates it will take four months for processing the Notice of Intent. Ex. 1 ¶ 7. This includes the time needed for internal review and approval and for developing outreach materials for the public scoping process.

The Service anticipates publishing the Notice of Intent by the eighth month of the timeline, at which time the formal public scoping process will begin. 40 C.F.R. §§ 1501.9(d)(6), (e), (f), 1502.4(a); 43 C.F.R. § 46.235. The Service plans on providing the public two months to comment on scoping. 40 C.F.R. § 1501.9(c), (d)(6).

The Service anticipates completing the review of the public scoping comments and preparation of a draft EIS in twelve months. Ex. 1 ¶ 7; 40 C.F.R. §§ 1501.9(e), 1502.4(a), 1502.9(b), 1502.17(a), 1502.19(d). *See generally* 40 C.F.R. §§ 1502.10–1502.24; 43 C.F.R. §§ 46.400–46.450. This includes the time needed for coordination with cooperating agencies, which can include a Federal, State, Tribal, or local agency. 40 C.F.R. §§ 1501.7(g)–(h), 1501.8(a)–(b), 1502.9(b). The Service anticipates it will take four months to process the draft EIS for Federal Register publication, including internal review and approval, and for developing outreach materials for seeking public comment on the draft EIS. Ex. 1 ¶ 7. The Service plans on providing the public two months to comment on the draft EIS once it is published. Ex. 1 ¶ 7; 40 C.F.R. § 1503.1(a); 43 C.F.R. § 46.435(a)–(c).

The Service anticipates completing the review of the public comments on the draft EIS, preparation of responses to the comments, and preparation of a final EIS in nine months, which includes internal review and approval to select the alternative and prepare the Record of Decision. Ex. 1 ¶ 7; 40 C.F.R. §§ 1502.9(c), 1503.4. *See generally* 40 C.F.R. §§ 1502.10–1502.24; 43 C.F.R. §§ 46.400–46.450. The Service anticipates it will take four months to process the final EIS for publication in the Federal Register, which includes internal review and approval, and for developing outreach materials. Ex. 1 ¶ 7.

The Service anticipates issuing the Record of Decision two months after the publication of the notice of publication of the final EIS. Ex. 1 ¶ 7; 40 C.F.R. § 1506.11(a)–(b).

The Service anticipates completing the process in approximately forty-three months, in October 2026.

Approximate timeline for completion (following Court order)	**Milestone**
3 months	Pre-Scoping: Tribal Consultation, meetings with partners, internal FWS briefings
1 month	Draft Notice of Intent for Federal Register to initiate Public Scoping for the EIS
4 months	Process Notice of Intent to Initiate Public Scoping for Federal Register publication (internal review and briefings); develop outreach materials
2 months	Public Scoping and Comment Period
12 months	Review public scoping comments, prepare draft EIS including coordination with any cooperating agencies
4 months	Process draft EIS for Federal Register publication (internal review and briefings); develop outreach materials
2 months	Public comment period on the draft EIS
9 months	Review public comments and prepare responses; prepare the Final EIS; internal review and briefings to select alternative and prepare ROD
4 months	Process Final EIS for Federal Register publication (internal review and briefings); develop outreach materials
2 months	30-day waiting period per 40 CFR 1506.11, finalize and issue ROD.
43 months	**Total time to completion**

Dated: April 14, 2023

Respectfully submitted,

TODD KIM, Assistant Attorney General
United States Department of Justice
Environment and Natural Resources Division

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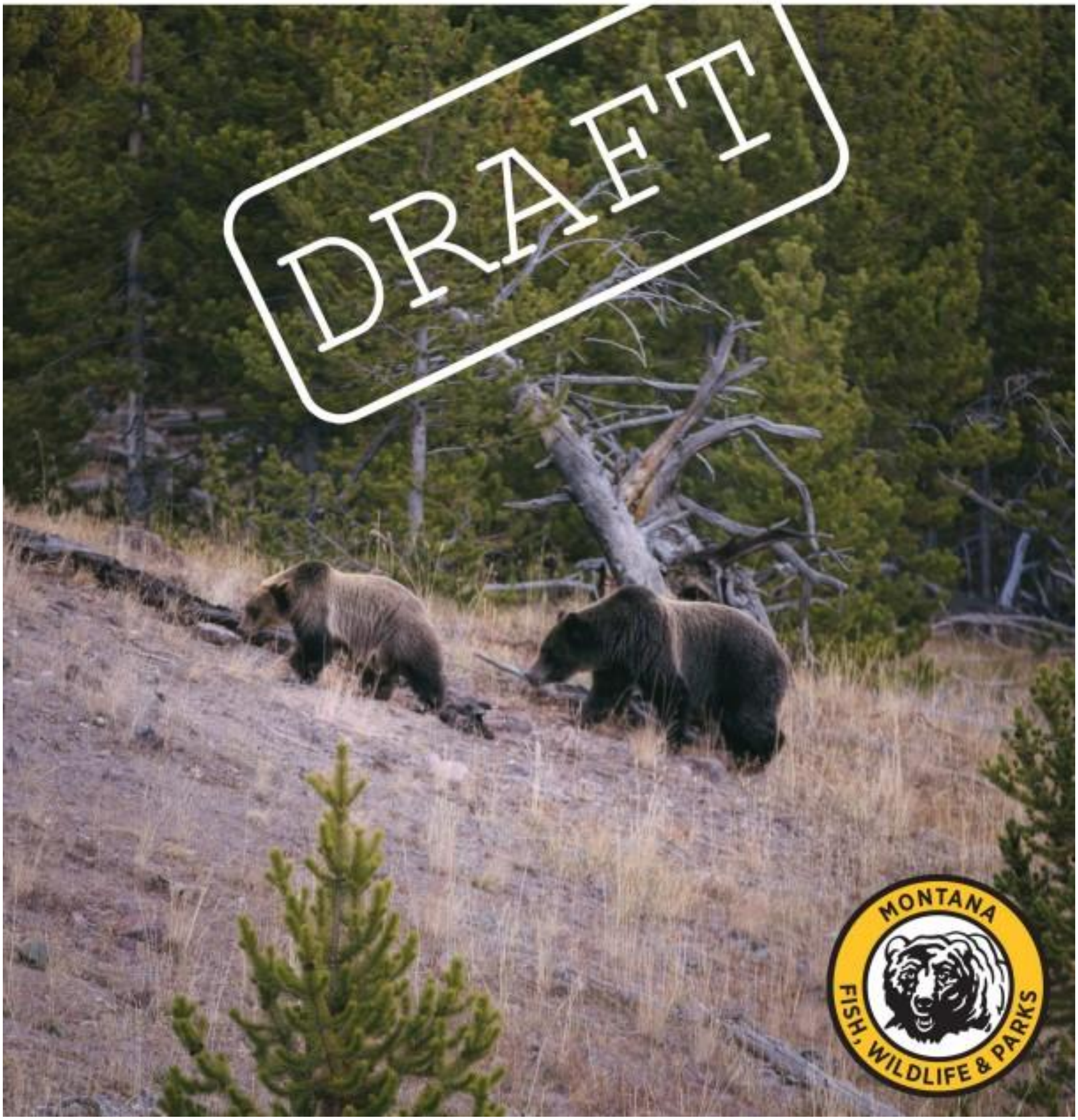
CERTIFICATE OF SERVICE

I hereby certify that on April 14, 2023, I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system, which will send notification of such to the attorneys of record.

/s/ LeeAnn Kim
LEEANN KIM
Attorney for Federal Defendants

MONTANA GRIZZLY BEAR MANAGEMENT PLAN 2022



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Figures and Tables

Executive Summary

Montana Fish, Wildlife and Parks (FWP) proposes to manage grizzly bears (*Ursus arctos*) within the state of Montana under the direction of a new, programmatic plan. This plan, analyzed through the Montana Environmental Policy Act (MEPA) process and accompanied by an Environmental Impact Statement (EIS), will be fully compliant with the Endangered Species Act (ESA) and will maintain commitments in existing agreements with federal, state, and tribal agencies. The plan will supplant two previous plans under which FWP has operated: one for Northwest Montana, and one for Southwest Montana.

Recognizing that grizzly bears have expanded their area of occupancy to include many areas beyond the federally designated Recovery Zones (RZs)—as well as the buffer areas surrounding two of these zones, called Demographic Monitoring Areas (DMAs)—this plan will guide management statewide, focusing on the 30 counties where grizzly bear presence has been documented in recent years or may be documented in the near future. Since grizzly bears currently are listed as threatened under the ESA, the plan is designed to guide state management while this species remains so listed—and also to articulate FWP's future vision for management should any grizzly bear populations in Montana be delisted and full management authority for them be returned to the state.

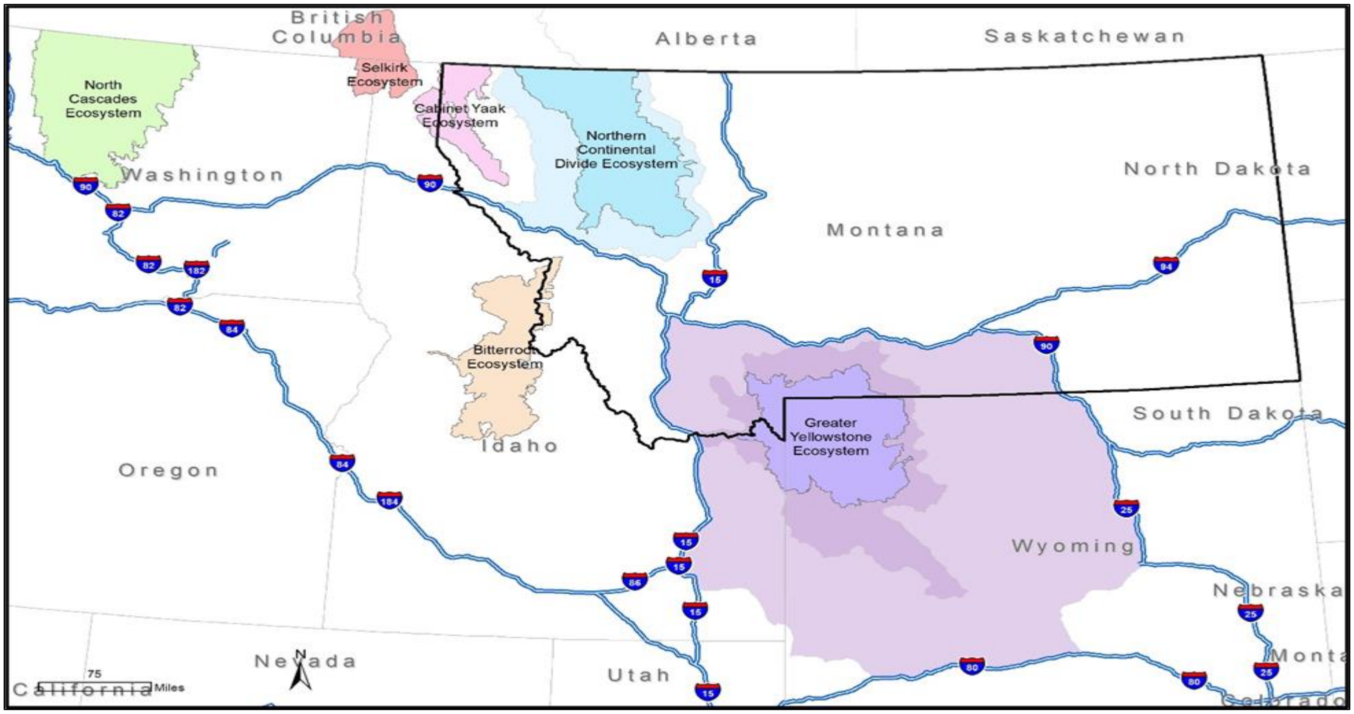
FWP envisions a future in which grizzly bears will continue to be an important symbol of the State of Montana and part of its cultural heritage. The overwhelming success of grizzly bear recovery, to date, speaks to its importance and central role in the culture of Montana. FWP would continue to ensure their long-term presence in Montana, recognizing that they are among the most difficult species to have in our midst. FWP views grizzly bears as both "conservation-reliant" (meaning it will always require intensive management) and "conflict-prone" and embraces the challenges of ensuring the species' healthy future, while ensuring the safety of people and their property. As it supports a thriving grizzly bear population, FWP expects to continue its internationally recognized conflict prevention and response program, and fully expects that removal of some animals will be necessary in the implementation of this plan.

As shown in the Figure 1, FWP's Preferred Alternative considers the cornerstone populations occupying the Northern Continental Divide Ecosystem (NCDE) and the Greater Yellowstone Ecosystem (GYE) as having met recovery targets and supports their delisting. As this plan documents, populations in these two secure areas are abundant and appropriately distributed across the landscape. FWP supports federal policies for meeting recovery goals in the Cabinet-Yaak Ecosystem (CYE) and for attaining natural recovery of a population in the Bitterroot Ecosystem (BE); the latter is comprised largely of wilderness. FWP also takes the position—and this plan documents the case—that populations occupying the NCDE and GYE are abundant enough to provide dispersal opportunities for establishing connectivity among recovery ecosystems. Therefore, FWP's Preferred Alternative does not identify specific statewide population targets beyond those already referenced in the Recovery Plan or Conservation Strategies. Related details are covered in the remainder of this document.

In recent years, grizzly bear populations in the various recovery zones have expanded until they are close to connecting (e.g., NCDE and CYE, NCDE and GYE, NCDE and BE, GYE and BE). A remaining challenge is ensuring long-term connectivity between those zones, across human-populated areas—a challenge that will require effort and patience from FWP and from Montanans. Fortunately, connectivity can be attained by a lower number of dispersed animals navigating through those areas, instead of by full populations occupying the whole state. FWP believes this connectivity can be achieved by securing attractants (to help grizzly bears rely on natural, not anthropogenic, foods and avoid human contact) and by occasional, thoughtful translocations. It is believed these strategies together can bring connectivity between core populations to fruition.

Figure 1. All six grizzly bear Ecosystems, as mapped by USFWS

USFWS-identified grizzly bear Recovery Zones: North Cascades Ecosystem (NCE); Selkirk Ecosystem (SE); Cabinet-Yaak Ecosystem (CYE); Northern Continental Divide Ecosystem (NCDE); Bitterroot Ecosystem (BE); Greater Yellowstone Ecosystem (GYE). The lighter blue surrounding the NCDE, and the darker purple immediately surrounding the GYE, show those zones' Demographic Monitoring Areas (DMAs). The medium purple surrounding the GYE and its darker-purple DMA is a Distinct Population Segment (DPS). For the other four Ecosystems, the USFWS has not formally mapped any DPS or DPS areas. Note the western two Ecosystems do not overlap Montana.



FWP's Preferred Alternative does not manage for grizzly bear presence outside of core areas, where the likelihood of conflict is elevated and legitimate concerns about human safety become the single highest priority. The likelihood that a bear in a certain location contributes to the long-term persistence and connectivity of the species is a fundamental principle that will guide management in conflict-prone areas. Where that likelihood is low, grizzly bear presence will not be an objective and FWP will be quick to recommend (or implement, if appropriate) control when conflicts arise. Because there are no cornerstone populations of grizzly bears in Central or Eastern Montana (nor does FWP envision a future in which there will be any), there is nothing with which to connect. Thus, grizzly bear presence would not be an objective in areas far from their largely mountain habitats and in prairie habitats where agricultural development predominates. Individual animals in these areas could be accepted to the degree they remain conflict-free.

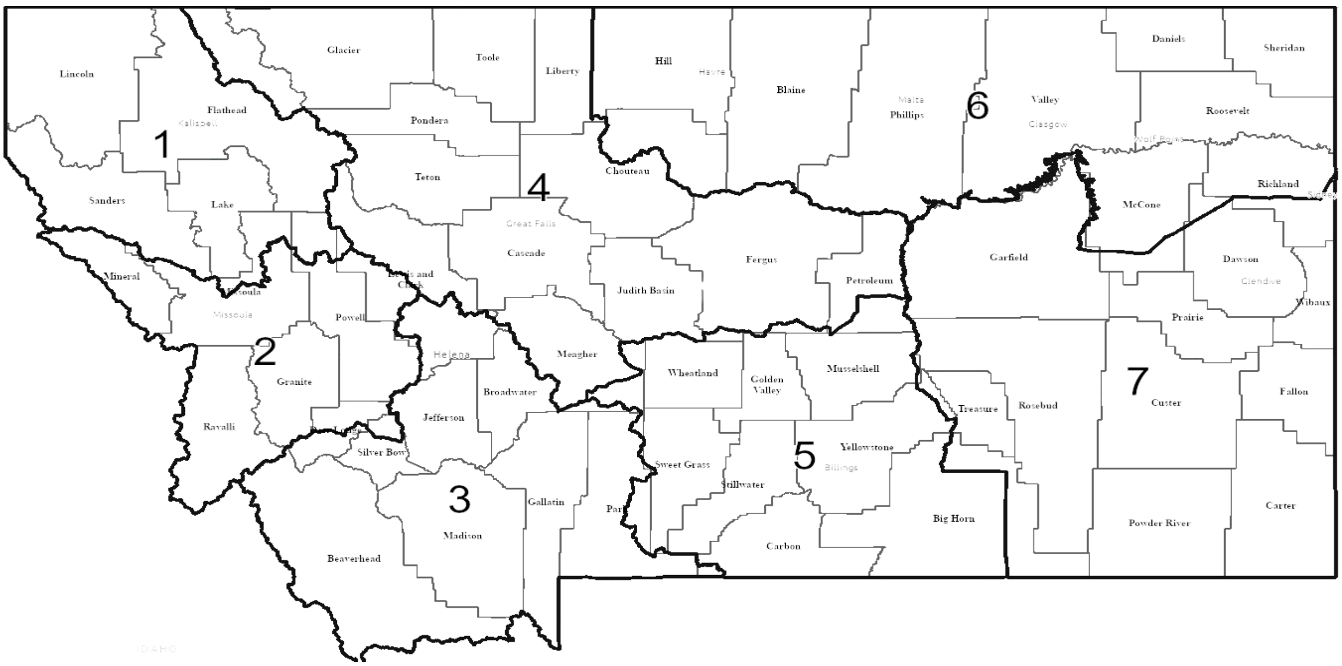
In contrast, where the likelihood is high that grizzly bear presence can contribute to long-term persistence and connectivity with low potential for conflict, FWP would make all reasonable efforts to recommend (or implement, if appropriate) actions that minimize bear removal.

FWP emphasizes that i) human safety would not be compromised under any scenario, and ii) decisions in any given case may deviate from these fundamental principles, as no programmatic plan can anticipate all variables in a situation.

In addition to the years of working with state, federal, and tribal partners, and commitments made under various agreements, FWP's Preferred Alternative has benefitted from the work of the Grizzly Bear Advisory Council (2019-2020), a group of 18 citizens empaneled to draft recommendations related to grizzly bear management. FWP also notes the rigorously implemented public opinion survey of Montanans, finalized in 2020 (survey questions and results are available online at: https://www.cfc.umt.edu/research/humandimensions/news/human-dimensions-grizzly-bear.php). This plan builds upon the experience and interactions of many, both within and outside of FWP, in identifying and successfully "threading the needle" between the difficulties of managing this particular species.

Figure 2. FWP regions in Montana

Below are Montana's seven FWP regions, each with its headquarters city (in parentheses) and approximate counties served. However, note that regional boundary lines do not always correspond to county lines.



Region 1 (Kalispell)	***Region 2 (Missoula)***	***Region 3 (Bozeman)***	***Region 4 (Great Falls)***	***Region 5 (Billings)***	***Region 6 (Glasgow)***	***Region 7 (Miles City)***
Lake	*Granite*	*Beaverhead*	*Cascade*	*Golden Valley*	*Blaine*	*Carter*
Lincoln	*Mineral*	*Broadwater*	*Glacier*	*Musselshell*	*Daniels*	*Custer*
Sanders	*Ravalli*	*Gallatin*	*Judith Basin*	*Stillwater*	*Hill*	*Fallon*
…and parts of…	*…and parts of…*	*Jefferson*	*Liberty*	*Sweet Grass*	*Phillips*	*Garfield*
Flathead	*Deer Lodge*	*Madison*	*Pondera*	*Wheatland*	*Richland*	*Prairie*
Lewis & Clark	*Lewis & Clark*	*…and parts of…*	*Teton*	*Yellowstone*	*Roosevelt*	*Rosebud*
Missoula	*Missoula*	*Carbon*	*Toole*	*…and parts of…*	*Sheridan*	*Treasure*
Powell	*Powell*	*Deer Lodge*	*…and parts of…*	*Big Horn*	*Valley*	*Wibaux*
Lewis & Clark	*Silver Bow*	*Lewis & Clark*	*Chouteau*	*Carbon*	*…and parts of…*	*…and parts of…*
		Meagher	*Fergus*	*Fergus*	*Chouteau*	*Big Horn*
		Park	*Flathead*	*Meagher*	*Dawson*	*Dawson*
		Silver Bow	*Lewis & Clark*	*Park*	*McCone*	*McCone*
			Meagher	*Petroleum*	*Richland*	*Richland*
			Petroleum			

Table 1 compares, side by side, the no-action alternative vs. FWP's Preferred Alternative, with each row corresponding to an identified issue. Background and details are provided in the main body of the document.

(Note: For definitions of the abbreviations, acronyms, and other terms used throughout this document, see the Definitions section following this table.)

Table 1. Alternative A vs. Alternative B: Comparison of two plans and their outcomes

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Role of grizzly bears in Montana	Grizzly bears would continue to be the "official state animal of Montana," recognizing the importance that Montana plays nationally in conservation of the species. However, contention and uncertainty would continue to surround appropriate policy for bears outside of RZs or DMAs, especially in light of growing population dispersal and increasing conflict.	Grizzly bears would be seen as a valued part of Montana's fauna, a species that is both "conservation-reliant" and "conflict-prone." Under this Alternative, clarity would be provided about where grizzly bear presence is a management objective. Core populations associated with existing RZs and DMAs would be maintained at recovery levels. Between core populations, FWP would manage for a significantly lower density of grizzly bears to provide opportunities for connectivity. The Preferred Alternative recognizes that human–bear conflicts and bear mortalities would be greater in areas between population cores.
Numerical objectives	There would be no numerical statewide objectives. FWP has committed to population and habitat objectives in the GYE CS, and in the NCDE CS.	FWP would renew its commitment to recovery and long-term demographic and genetic health of grizzly bears, statewide. FWP is committed to specific numeric goals in the GYE and NCDE as articulated in the two Conservation Strategies (CSs) and supports the recovery goal in the CYE. However, this Alternative finds that establishing a statewide numeric minimum, optimum, or maximum population objective would not be useful.
Distributional objective	No explicit distributional objective would be identified. FWP would manage for core populations in the NCDE, GYE, and CYE. Current FWP plans envision future biological connections among these cores as well as to the BE. A goal of the NCDE CS is to provide opportunity for connectivity with other Ecosystems in Montana, but no explicit objective is articulated. FWP would continue to struggle with the meaning of "biologically suitable and socially acceptable."	Sustaining grizzly bear recovery would continue to be an objective where recovery objectives have been met. Achieving recovery would continue to be an objective where objectives have not yet been met. Statewide objectives would include a low density of grizzly bears between RZs or DMAs that could provide connectivity opportunities. Bears could be moved if natural connectivity is lacking. Grizzly bear presence would not be an objective where connectivity between populations is not likely (i.e., east of the NCDE DMA and northeast of the GYE DMA).
Human safety	FWP would maintain a focus on human safety and conflict prevention.	FWP would maintain a focus on human safety and conflict prevention.
Role of private lands in grizzly bear conservation and management	No explicit direction would be articulated for private lands, but FWP would recognize the pivotal role of private-landowner support in recovery and the significant contribution of private lands in the recovery effort.	FWP would acknowledge the contribution of private lands in providing habitat for grizzly bears beyond secure[1] and would prioritize aid to landowners to minimize conflicts wherever they might occur. Where grizzly bear expansion does not contribute to connectivity, FWP would have lower tolerance for grizzly bears involved in conflicts.

[1] See ARM 12.9.1401. "Secure" is a general term meaning wild places where humans visit but do not live, where extractive activities are limited spatially and temporally, where roads are primitive and do not dominate the landscape, and where wildlife generally lives with minimal interaction with people. No specific standards are implied.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Conflict prevention	Focus would be on the NCDE, GYE, CYE and surrounding areas, including Sapphire, Flint, Highwoods and nearby ranges and, beginning in 2022, the Bitterroot area.	FWP would continue its active conflict prevention program, focusing on the same core areas as at present and areas important to connectivity. FWP would continue to research emerging technologies to minimize human–bear conflict, and provide funding and in-kind support to independent research programs
Conflict response	Conflict bears would be controlled as recommended by IGBC (1986), attempting to minimize number of bears removed. FWP would consider conservation as well as human safety and tolerance in addressing conflicts outside fundamental recovery areas. Responses to conflicts would be generally more aggressive when they occur on or near private lands. FWP would not participate in moving federally listed bears involved in conflicts if captured outside of RZs.	FWP would continue its emphasis on reducing attractants that often precipitate conflicts. When necessary, bears involved in conflicts would be controlled consistent with state and federal guidelines throughout Western Montana. Where discretion is possible, FWP would attempt to minimize removal (moving bears or euthanizing them) where connectivity between core populations is likely but would be quicker to recommend and/or implement removal where connectivity is unlikely. Under MCA 87-5-301, FWP would not participate in moving federally listed bears involved in conflicts if captured outside of RZs.
Public certainty vs. agency flexibility in conflict response	FWP would anticipate less predictability for the public about agency management actions since there will be no management direction in the different management areas (e.g., RZs, DMAs, outside of the DMAs, connectivity areas).	FWP would anticipate more predictability than the status quo due to adoption of different management direction in different management areas because of the additional guidance provided in the preferred alternative regarding the biological importance of bears in certain locations. However, FWP would retain some discretion to respond to conflict bears on a case-by-case basis.
Destinations of a bear captured in a conflict setting when moving it away from the site is recommended and FWP is allowed to move it under state law (i.e., captured inside RZ).	Bears involved in conflicts would be moved to areas where the probability of causing additional conflict is low (and only to sites previously approved by the Commission). Since 2009, 84% of destinations have been in FWP Region 1 (72% in Flathead County). Under MCA 87-5-301, only bears captured within RZs could be moved by FWP under listed status.	Bears involved in conflicts with people would be moved to areas with a lower probability of conflict. However, if a non-conflict (non-target or preemptively trapped) animal is captured, FWP would consider moving it to an area outside of the Ecosystem of origin, in which connectivity is an objective, if a Commission-approved release site exists. As the known range of grizzly bears changes, FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range (Appendix G) to which grizzly bears could be moved. If delisted, bears involved in conflict outside RZs also could be handled in this way.
Moving non-conflict bears (captured outside RZs) whose origin is uncertain	FWP would have no overall policy; decisions would be made on a case-by-case basis.	If the situation allows, these bears would be left in place. If moving the bear is required, it would be moved to a Commission-approved release site which provides the best chance for the bear to find life requisites while minimizing conflict. The site selected for release need not be located within the Ecosystem of origin, particularly if releasing the bear at the selected site would advance the interests of connectivity. As the known range of grizzly bears changes, FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range to which grizzly bears could be moved but would not seek approval of new release sites beyond the most recently updated Occupied range.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Moving non-conflict bears to areas outside of Occupied range	Movement of grizzly bears outside Occupied range would require a separate environmental analysis and decision notice, as well as approval from the Commission.	If FWP proposes to move a bear into unoccupied habitat for purposes of recovery or connectivity, it will first complete an environmental analysis and seek approval from the Commission.
Orphaned cubs	Cubs orphaned after September 1 generally would be left in the wild. Bringing younger orphans to MWRC is discouraged and must follow the MWRC intake policy because i) acceptable permanent captive situations are very difficult to find, and ii) re-release into the wild is only permitted with pre-approved plan and release area.	Cubs orphaned after September 1 would be generally left in the wild. Bringing younger orphans to MWRC is discouraged and must follow the MWRC intake policy because i) acceptable permanent captive situations are very difficult to find, and ii) re-release into the wild is only permitted with pre-approved plan and release area.
Conflict management operational structure	FWP would continue supporting bear managers in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell, Libby, Missoula, and Red Lodge.	Building on current structure, FWP would prioritize bear manager FTE where expanding population presents the need for conflict management and also opportunities for connectivity while maintaining efforts in the three Occupied cores.
Prioritizing information, outreach, and communication efforts	FWP would maintain efforts aimed at people living, working, and recreating in grizzly bear habitat, targeting both new and long-term residents.	FWP would prioritize efforts where expanding population presents the need for conflict management and also opportunities for connectivity while maintaining efforts in the three Occupied cores.
Population research and monitoring	Population monitoring and research would continue as described in the NCDE and CYE CSs and in the CYE.	FWP would continue monitoring, as committed to in CSs, but also would prioritize finding ways to increase its understanding of bear status in areas of potential connectivity.
Resources required	No change from present.	Slightly more than current baseline.
Hunting of grizzly bears: Values and beliefs	Goal would be to allow for limited regulated harvest upon delisting of bears, but no specific plans are in place. MCA and ARM identify the potential of grizzly bear hunting if not federally listed.	FWP would prepare for a conservative grizzly bear hunting season if not federally listed, but the decision on whether to establish a hunting season would rest with the Commission. FWP recognizes the strongly held views held by many members of the public.
A potential grizzly bear hunt: Functions, expectations, regulations.	If delisted, hunting would be implemented within a scientifically sound framework that maintains a viable and self-sustaining population, and to garner additional public support.	If delisted and a hunting season is adopted by the Commission, it could be used to limit expansion where core connectivity is unlikely (particularly in Central and Eastern Montana), but it would be consistent with maintaining an appropriate density of grizzly bears where connectivity is prioritized. Hunter-killed bears within the DMA would be counted against DMA mortality limits as outlined in the GYE CS and NCDE CS. In no case would hunting compromise recovered populations.
Law enforcement	FWP would continue to work cooperatively with federal (where listed) and tribal authorities to deter unlawful take, and to apprehend violators.	FWP would continue to work cooperatively with federal (where listed) and tribal authorities to deter unlawful take, and to apprehend violators.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Recreational use	FWP would consider grizzly bear presence in all recreation planning and decisions on FWP lands. FWP also would consider grizzly bear presence when providing input on other public land management decisions. FWP would continue or expand its program of educating recreationalists, including hunters, about recreating safely in grizzly bear country.	FWP would consider grizzly bear presence in all recreation planning and decisions on FWP lands. FWP would also consider grizzly bear presence when providing input on other public land management decisions. FWP would continue or expand its program of educating recreationalists, including hunters, about recreating safely in grizzly bear country.
Motorized access management	FWP would support land management agencies' policies previously agreed to as part of the CSs. Elsewhere, FWP would continue existing policy of avoiding open road densities exceeding 1 mi/mi^2 on lands it owns or manages. FWP would take the view that, outside of areas with specific road density standards, grizzly bears can coexist with humans in areas with moderate amounts of motorized access if attractants are well managed, conflicts are minimized, and mortality of grizzly bears is sufficiently low.	FWP would support land management agencies' policies previously agreed to as part of the CSs. Elsewhere, FWP would continue existing policy of avoiding open road densities exceeding 1 mi/mi^2 on lands it owns or manages. FWP would take the view that, outside of areas with specific road density standards, grizzly bears can coexist with humans in areas with moderate amounts of motorized access if attractants are well managed, conflicts are minimized, and mortality of grizzly bears is sufficiently low.
Engagement with community groups	FWP would continue informal communication and cooperation with community groups.	FWP would stand ready to adopt the leading role in grizzly bear management but would also acknowledge that success will depend on actions taken by citizens working collaboratively. While exercising its authority and leadership role, FWP would actively encourage bottom-up, community-based efforts to resolve management challenges. FWP expects this approach to yield solutions which are tailored to local communities, bolstered by local buy-in, but which also respect the values and mandates expressed in national and/or state laws and regulations.
Climate change	FWP would not explicitly consider climate change as part of its grizzly bear management.	In allocating resources or suggesting regulations, FWP would consider habitat variations, including those manifest in climate—e.g., lengthening of non-denning seasons may increase chances of human–bear conflict, particularly in autumn. FWP would continue to monitor populations as they respond to these variations and would adjust management responses accordingly.

Definitions

Below are some acronyms, abbreviations, and other terms used in this document.

Acronyms and abbreviations

Term	Meaning
ARM	Administrative Rules of Montana.
BE	Bitterroot Ecosystem, as commonly used and understood by the IGBC.
BIR	Blackfeet Indian Reservation.
BLM	[United States Department of the Interior] Bureau of Land Management.
Commission	Montana Fish and Wildlife Commission—the body appointed to make policy and regulations for FWP.
CS	Conservation Strategy. In this document, “CS” and “Conservation Strategy” refer to two specific documents: the GYE CS (GYE Subcommittee 2016) and the NCDE CS (NCDE Subcommittee 2019).
CSKT	Confederated Salish and Kootenai Tribes.
CYE	Cabinet-Yaak Ecosystem, a geographic area defined by the 1993 USFWS Grizzly Bear Recovery Plan.
DCA	Demographic Connectivity Area. Defined in the NCDE CS as “an area in zone 1 intended to allow grizzly bear occupancy and potential dispersal beyond the NCDE to other recovery areas.”
DMA	Demographic Monitoring Area—a geographic area specifically mapped as part of the GYE CS or the NCDE CS. A DMA is an area surrounding an RZ, within which recovered grizzly bear populations will be maintained, population monitoring will be conducted, and demographic objectives will be applied.
DNRC	Montana Department of Natural Resources and Conservation.
DPS	Distinct Population Segment—a designation used by the USFWS to identify a vertebrate population that is distinct and significant relative to the entire species, for the purposes of listing, delisting, or reclassifying under the Endangered Species Act (ESA). For the purpose of delisting, the USFWS designated the grizzly bear population in the GYE as a DPS in 2007 and delineated a geographic boundary within which this designation applies.
ESA	Endangered Species Act.
FIR	Flathead Indian Reservation.
FTE	Full-time equivalent (staff position).
FWP	Montana Fish, Wildlife, and Parks.
GBAC	Grizzly Bear [Conservation and Management] Advisory Council—a group of 18 citizens selected and empaneled, by then-governor Steve Bullock of Montana, via Executive Order 9-2019. Their final report was issued in 2020.
GBRP	1993 USFWS Grizzly Bear Recovery Plan.
GNP	Glacier National Park.
GYE	Greater Yellowstone Ecosystem, a geographic area defined by the 1993 USFWS GBRP.
IGBC	Inter-agency Grizzly Bear Committee.
IGBST	Inter-agency Grizzly Bear Study Team, an inter-agency team tasked with monitoring and researching the GYE population (led by the Northern Rocky Mountain Science Center, under the USGS).
MCA	Montana Code Annotated.
MEPA	Montana Environmental Policy Act.
MOA	Memorandum of Agreement.
MOU	Memorandum of Understanding.
MWRC	Montana Wildlife Rehabilitation Center
NCDE	Northern Continental Divide Ecosystem, a geographic area defined by the USFWS GBRP.
PCA	Primary Conservation Area. As used in the GYE and NCDE CSs, these are the geographic RZs, renamed as PCAs in the event that delisting occurs, intended “to be managed as a source area for the grizzly bear population.”
RZ	Federally defined grizzly bear Recovery Zone (as articulated in the Federal Recovery Plan). RZs are predominantly public lands, where habitat protections are in place to support stable-to-increasing grizzly bear populations.
SDM	Structured Decision Making. A formal process to help identify issues and make decisions, especially in uncertainty.
USDA	United States Department of Agriculture.
USDA WS	USDA Wildlife Services.
USFS	United States Forest Service.
USFWS	United States Fish and Wildlife Service.
USGS	United States Geological Survey (under which the Northern Rocky Mountain Science Center operates).

Other terms—specific to bears and bear management

Generally, this document adopts the definitions of terms suggested by Hopkins et al. (2010), as listed below. A single asterisk (*) denotes an exception, while a double asterisk (**) denotes terminology not addressed by Hopkins.

Aggressive behavior: Bear behavior (defensive or offensive) that is threatening to people. Defensive behaviors can be associated with a bear's defense of itself, its young, or its food—often during surprise encounters. Offensive behaviors can be related to a bear's overt attempts to obtain anthropogenic foods in the presence of people or active predation on people.

Aggressive bear: A bear that has displayed aggressive behavior and is a public safety concern.

Anthropogenic attractant: Any food or other attractant having a human origin.

** Augmentation: Deliberate movement of a grizzly bear into a population, with the intent of increasing that population's abundance, genetic diversity, or both.

** Attractant: Anything that attracts a bear to a site [from NCDE Subcommittee 2019].

Aversive conditioning: A learning process in which deterrents are continually and consistently administered to a bear to reduce the frequency of an undesirable behavior.

Bear attack: Intentional contact by a bear resulting in human injury.

** Bear deterrent: An agent administered to bears to cause pain, avoidance, or irritation [from Lackey et al. 2018].

** Boneyard: A site used for disposing of multiple animal carcasses [from NCDE Subcommittee 2019].

Conditioning: Learning triggered by receiving a reward or punishment for a given response to a given stimulus. Rewards of unsecured anthropogenic foods can lead to food conditioning in bears, whereby they learn to associate humans or their infrastructure with food. Although usually used in a binary sense (i.e., either conditioned or not) because we typically lack sufficient knowledge of a bear's behavior and intentions, and also because we lack a nuanced vocabulary for describing both, this trait almost surely exists along a continuum (from mild to severe).

Conflict bear: A bear involved in human–bear conflict (see below).

** Conflict prevention: Strategies and actions that aim to deter or prevent bears from obtaining anthropogenic foods, killing or injuring livestock, damaging property, or injuring people.

** Connectivity: The ability for animals from one population to interact physically with those from a different population. May also be referred to as "linkage." In this document, the term "connectivity" is synonymous with the term "linkage" and a "connectivity zone" is synonymous with a "linkage zone." "Genetic connectivity" refers to situations in which neighboring populations exchange individuals and gene flow is achieved through reproduction of immigrants (and their descendants). "Demographic connectivity" refers to situations in which neighboring populations exchange individuals and immigrants (and their descendants) contribute significantly to population dynamics. By definition, demographic connectivity also achieves genetic connectivity.

Control: In this context, hazing, moving, or euthanizing a grizzly bear.

** Core: In this document, FWP uses the term "core" (or "population core" or "cornerstone population") to refer to the four focal areas entirely or partially in Montana that have been termed "grizzly bear ecosystems" since the early 1980s. These are populations that are either biologically recovered (in the case of NCDE and GYE) or identified by the USFWS as requiring recovery (in the case of CYE and BE). Note that this usage of "core" is different from its meaning in some USFS Forest Plans that use it to mean large, contiguous blocks of landscape devoid of motorized human use. FWP notes, however, that large, remote landscapes have allowed these populations to persist, and we expect that importance to continue in the future.

** Corridor: The term "corridor" is sometimes used when referring to connectivity among core portions of a population's geographic range. In this document we do not use the term "corridor," preferring to use the term "connectivity" (which we also synonymize with "linkage"). The term "corridor" can be misleading because i) it suggests the animals using such areas do so out of specific intention to move from one core area to another (which may not be the reason they are present within the "corridor"); and ii) it suggests that animals within the corridor are present only temporarily while moving through, and that these areas provide only what is needed for such movement rather than for normal requirements of obtaining food, shelter, or mates. We prefer the more general and expansive term "connectivity" because, while individual grizzly bears may use connectivity areas briefly while dispersing or finding a new home range, they may also use them during their entire lives. Connectivity areas may, by definition, contain breeding aggregations of grizzly bears, although they are likely to be at lower densities than within areas we call "population cores" or "population cornerstones."

** Denning season: The typical time period during winter months in which most grizzly bears are hibernating in dens [from NCDE Subcommittee 2019S].

** Depredation: An action generally associated with the killing of domestic livestock animals.

Ecosystem: A term used to define the six recovery areas designated in the Recovery Plan [USFWS 1993]. Use of this technical term recognizes the complex and sometimes unique interactions of many living and non-living components within each of these large landscapes. In this document, reference to an Ecosystem refers to the general area occupied by the resident grizzly bear population and not specifically to the RZ or DMA.

Extirpate: In population biology, this term typically means to eliminate locally. An entire species could be said to be "extinct" (e.g., the passenger pigeon, Ectopistes migratorius); in contrast, we'd characterize grizzly bears in California has having been "extirpated."

Food-conditioned bear: A bear that has learned to associate people, human activities, human-use areas, or food storage receptacles with food. Although usually used in a binary sense (i.e., either food-conditioned or not), the learning process usually means that an individual falls within a continuum from mildly to severely food-conditioned. (See definitions for Conditioning and Habituation.)

Habituation: The waning of an innate response to a stimulus after repeated or prolonged presentations of that stimulus. Bears that are continually exposed to humans, with no negative consequences, can lose their innate avoidance behavior and become habituated—or, more precisely, human-habituated. Although usually used in a binary sense (i.e., either habituated or not) because we typically lack sufficient knowledge of a bear's behavior and intentions and we also lack a nuanced vocabulary for describing both, this trait almost surely exists along a continuum (from mild to severe).

Hazing: A technique in which deterrents are administered to a bear to immediately modify the bear's undesirable behavior.

* Human–bear conflict: An interaction between a grizzly bear and human in which a bear either does, or attempts to, damage property, kill or injure livestock, damage beehives, injure people, or obtain anthropogenic foods, attractants, or agricultural crops [adapted from NCDE Subcommittee 2019]. In the field, the specifics of each situation are reviewed by an inter-agency team, bears are not necessarily "branded" as being "conflict" or "non-conflict" animals based solely on this definition and chosen responses can vary in their aggressiveness based on a comprehensive review.

** Hyperphagia: An increase in bears' appetite and food consumption during the fall, associated with the need to gain adequate fat reserves for hibernation [from NCDE CS].

Management removal: Lethal or non-lethal removal of a bear from the population by or at the direction of management personnel.

Nuisance bear: FWP follows Hopkins et al. (2010) in considering this term poorly defined and susceptible to multiple interpretations, so its usage is avoided in this document. We note, however, that it was still in common usage in the mid-1980s when IGBC (1986) was finalized, so it appears in that guidance as well as some older technical literature.

Occupied range. When capitalized, an Occupied range is the area within a boundary produced using standardized, objective algorithms to differentiate the area where grizzly bear populations are verified to have colonized, from the area where only scattered observations (perhaps of dispersing individuals) are known. The outermost boundaries of Occupied range are revised biennially, using newly obtained data and the standardized algorithms.

Onsite release: A management method that consists of releasing a captured bear back to its original site of capture.

Preemptive capture: Capturing a bear deemed to be at significant risk of future conflict (often due to nearness to human infrastructure), even though no conflict has yet occurred.

Relocation: The terms “relocation” and “translocation” are often used interchangeably. In this document, FWP uses relocation to describe the capture and subsequent transport of a bear from the site of capture to another location in association with attempts to mitigate human–bear conflicts.

** Removal: Capture and removal of a bear, either lethally or by placement in an authorized zoological or research facility.

Translocation: The terms “relocation” and “translocation” are often used interchangeably. In this document, FWP uses translocation to describe the capture and subsequent transport of a bear for purposes unrelated to human–bear conflict, such as demographic or genetic augmentation of another population.

** Transplant/Transplantation: Transplantation is defined in MCA 87-5-702(11) as “the release of or attempt to release, intentional or otherwise, wildlife from one place within the state into another part of the state.” For purposes of this plan, to “transplant” means to move a bear outside of its home range into an area generally understood as different from the area of its origin. The word “transplant” generally is used in reference to a new population becoming resident in the new area as a result of human-assisted movements (e.g., in the case of a transplanted population).

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Part I: Introduction to This Plan

Scope of this document and of decisions to be made

This document provides the foundation for Montana Fish, Wildlife, and Parks' (FWP) decisions regarding conservation and management of grizzly bears at the state level. It is not intended as a compendium of all aspects of grizzly bear conservation or management in Montana, because some decisions and commitments are incorporated in existing plans or agreements. These other documents are referenced and briefly reviewed herein, but for the sake of brevity, are not repeated in their entirety. That said, adoption of this plan will serve to recommit FWP to the existing plans and strategies to which it is a party.

Purpose and need

Grizzly bears are listed under the Endangered Species Act (ESA) of 1973 as a threatened species within their entire range in the lower 48 states. Management authority rests with the U.S. Fish and Wildlife Service (USFWS) for recovering the species. That said, federal, state, and tribal authorities typically work cooperatively and very few day-to-day management activities are conducted by field staff of the USFWS. Rather, states, tribes, and other agencies conduct most work "on the ground" under authority permitted by the USFWS.

States, tribes, and other federal agencies are expected to produce, and have in the past produced, management plans that explain and guide their priorities and resource allocations. Potential changes in status of grizzly bear populations within Montana also must be considered in this statewide plan.

In 1993, the USFWS recognized six areas, four of which are partly or wholly within Montana, with recovering grizzly bear populations. The 1993 USFWS Grizzly Bear Recovery Plan (GBRP) identifies a recovery objective of delisting each of the populations sequentially as they achieve the recovery targets, along with continued ESA protection of each population until its specific recovery targets are met.

At present, in two of the recovery areas that are partly or entirely located within Montana (NCDE and GYE), USFWS has found that grizzly bears have met existing recovery criteria. In 2007, the USFWS designated the GYE population as a Distinct Population Segment (DPS) for the purpose of delisting, and also delineated a geographic boundary within which this designation applies and within which delisting would occur. To delist the NCDE population, the USFWS may similarly designate it as a DPS and delineate a DPS boundary.

Delisting of the GYE and NCDE populations could occur within the time frame typically considered for FWP management plans (generally not less than 10 years), in which case federal oversight of state activities would cease within each of those designated DPS boundaries. Federal oversight would continue outside the DPS boundaries for these populations until targets outlined in the Recovery Plan (1993) are met and those recovered populations are delisted. This potential multi-jurisdictional future provides an additional rationale for a comprehensive, statewide plan for Montana.

Grizzly bears have expanded in abundance and distribution in Montana in recent years (see Figures 3 and 4), enhancing long-term prospects for population sustainability by increasing the likelihood of biological connectivity. However, because grizzly bears can damage property and injure or kill people, their closer proximity to human habitation poses new challenges for Montanans beyond those anticipated by existing plans and agreements.

Figure 3. Main areas of Montana with estimated distribution of grizzly bears (2018)

This map shows, as of 2018, the distribution of grizzly bears in main areas of Montana (blue stippled area surrounded by blue line), plus estimated locations of verified sightings beyond those areas (shown by pins). Distribution of bears is not necessarily uniform across the whole of the stippled areas or of the pinned areas. Since 2018, the Occupied area is likely to have expanded somewhat.

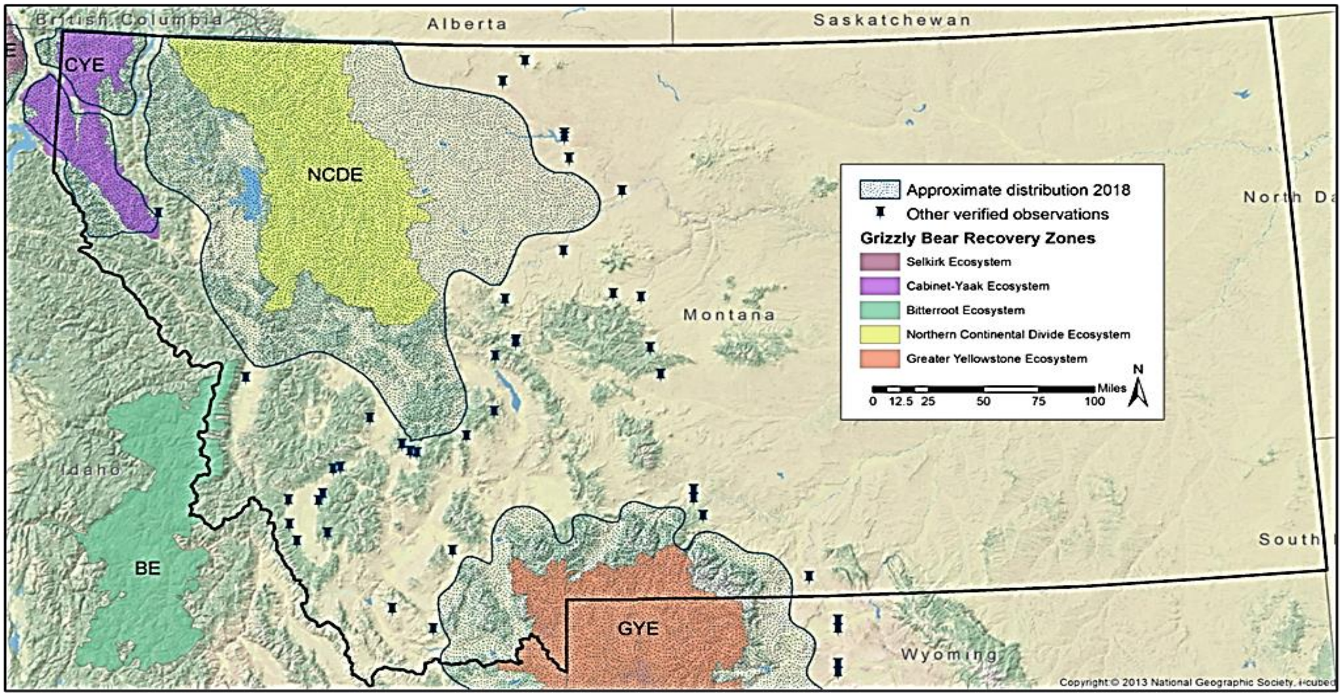


Figure 4. Other areas where grizzly bears "may be present" (2021)

According to USFWS (January 2021), blue shading is where grizzly bears "may be present." This term includes individuals that may be scattered or dispersing, and does not necessarily indicate a meaningful assemblage of bears in all outlying areas.

This draft plan reflects these updated biological and social conditions, and updates two existing plans. It takes advantage of recommendations and perspectives previously provided by the Governor's Grizzly Bear Advisory Council (GBAC), as well as a recently completed survey of Montanans' knowledge, beliefs, and attitudes toward grizzly bears. The plan also reflects existing laws, regulations, and policies, as well as intergovernmental commitments made by FWP and by the Commission. It will guide FWP activities consistent with ESA listed status, but also will guide management should delisting of recovered populations occur in the future.

Sidebar 1. FWP process and ESA delisting

FWP recognizes that many citizens have great interest in the listing status of the grizzly bear under the Endangered Species Act (ESA). ESA listing and delisting are federal processes. Petitions from the states of Montana and Wyoming to remove grizzly bears from the list of threatened and endangered species in the NCDE and GYE areas (and from Idaho to delist all populations south of Alaska) are now under consideration by the USFWS.

This FWP process recognizes the current federal status of the grizzly bear and anticipates policy under a possible future change in that status. However, this document is not a delisting plan. Removing a species from the list of threatened and endangered species requires not only documentation that recovery criteria have been met, but also documentation that the state has in place adequate regulatory mechanisms to ensure that listing will not be necessary in the future.

Montana's grizzly bear management plan illustrates Montana's aptitude and commitment to successfully manage the species, both now and in the future. In doing so, FWP demonstrates the adequacy of its regulatory and management mechanisms, in accordance with the listing and delisting criteria set forth in Section 4 of the ESA.

Context and background of this document

This draft plan, presented here as the Preferred Alternative, is written in the context of two existing FWP plans (cited above) and public processes that are considered to have fulfilled the scoping requirements of MEPA. Each is briefly summarized here.

Recognizing that grizzly bears are expanding in geographic range, that conflicts with humans appear to be increasing, and that populations of both grizzly bears and humans are likely to keep increasing in the immediate future, FWP realized new planning guidance may be necessary for grizzlies. A structured decision-making (SDM) process resulted in decisions to work with the Governor to empanel an independent citizens' council to examine these issues and, following that, to replace existing management plans with one statewide plan. The SDM process also developed a problem statement, strategic objectives, fundamental objectives, and constraints/sideboards; these are reiterated in the Sidebar 2.

Sidebar 2. FWP problem statement, resulting from 2019 structured decision-making process

Grizzly bears in Montana are native, iconic omnivores that have high value to people and cultures across the state and the world and play important roles in Montana ecosystems. At the same time, they can and do injure or kill people and livestock, and cause property damage and economic loss, which may disproportionately affect certain individuals. Their potential presence is both valued and feared. While the benefits of grizzly bear population recovery are experienced broadly across society, the costs associated with increasing grizzly bear populations are localized among communities in close proximity to grizzly bears.

After 40 years of hard work by all Montanans, grizzly bear populations have reached and surpassed federal recovery goals in the GYE and NCDE. Grizzly bear density is increasing, and bears are now expanding into areas where they have not been for decades, including in connectivity areas between recovery zones. These connectivity areas include a greater percentage of working private lands and places where human population also is expanding, creating greater conflict potential. Existing agency communications and management plans had established public expectations concerning where bears would occur and do not reflect recent changes to bear distribution.

Consistent with its long history of wildlife conservation, Montana remains committed to maintaining the long-term viability of grizzly bears. The challenge is balancing conflicting values and addressing diverse needs, especially in areas newly recolonized by bears. Federal protected status currently governs Montana's ability to address distribution and abundance. However, even if delisting occurs, many challenges will remain. These challenges, including the likely establishment of more bears in more areas, are likely to intensify over time—adding to the complexity and to the demands upon staff and operational resources.

The time is right for Montana to address its statewide strategy regarding grizzly bear conservation. Timely and continued engagement with Montanans is essential for success.

Strategic objectives

1. Ensure grizzly bear population viability over the long term.
2. Maximize human safety.
3. Maximize effective response to conflicts involving grizzly bears.
4. Maximize effective grizzly-related outreach and conflict prevention.
5. Maximize intergovernmental, inter-agency, and tribal coordination.

Fundamental objectives

1. Maximize engagement among people with diverse and competing values.
2. Maximize public confidence and ownership in grizzly bear management.
3. Maximize transparency of grizzly bear planning processes.
4. Maximize clarity of grizzly bear management objectives in all parts of the state.
5. Maximize clarity of guidance for making time-sensitive management decisions.
6. Minimize financial costs of grizzly bear management.
7. Maximize public agreement on the role of hunting at appropriate locations, levels, and times.
8. Maximize management flexibility within the confines of the ESA.

Constraints / sideboards

Maximize considerations of existing grizzly bear management objectives and existing commitments. Honor intra- and inter-agency commitments already in place.

On July 24, 2019, then-governor Steve Bullock signed Executive Order 9-2019, creating a Grizzly Bear Conservation and Management Advisory Council (GBAC) consisting of 18 Montana citizens[2]. In setting up the need and rationale for this council, the Executive Order included a preface which is worth repeating here (note: the "Whereas" preceding each line has been deleted).

> Grizzly bears are valued by people and cultures across Montana and around the world, yet are also feared and can affect people's livelihoods and safety. Their numbers in Montana continue to increase and have expanded into areas where they have not been for decades, including places key to connecting their populations. Despite this success, long-term coexistence of people and grizzly bears across the landscape will remain a challenge.
>
> Existing management plans did not fully anticipate grizzly bear distribution across the landscape and as Montana's human population continues to grow, we can expect conflicts between bears and people to increase in frequency and complexity.
>
> As "threatened" under the federal Endangered Species Act (ESA), grizzly bears are currently managed by the U.S. Fish and Wildlife Service—in cooperation with the Montana Department of Fish, Wildlife and Parks (FWP), the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the Blackfeet Tribe, and the Confederated Salish and Kootenai Tribes. In the Grizzly Bear Recovery Plan, the U.S. Fish and Wildlife Service identifies six recovery areas, and four of those exist wholly or partly within Montana. Recent litigation has created uncertainty about the delisting of grizzly bears from the ESA's "threatened" list.
>
> It is timely that Montanans work together to determine how the state and its partners will collectively manage and conserve grizzly bears. It is important to recognize existing grizzly bear management objectives and existing intra-agency and inter-agency commitments already in place, including conservation strategies, monitoring protocols, recovery plan criteria, and forest plans. The future of grizzly bear management in Montana must maintain scientific integrity, and balance diverse interests and values.
>
> Montana remains committed to maintaining the long-term viability of grizzly bears and balancing their needs with those of people. It is important for the public to have ownership and confidence in grizzly bear management in Montana. To ensure its citizens have a voice in the future of grizzly bears, Montana must provide meaningful opportunities for people to engage in a public discussion around grizzly bear management, recovery, and conservation. It is in the best interests of all Montanans to bring stakeholders and experts together to recommend statewide strategies for conserving and managing grizzly bears for today and for the future.

Citizens' recommendations from Governor's Grizzly Bear Advisory Council (GBAC)

In August 2020, the GBAC[2] submitted to Governor Bullock its final report —which contained a vision statement, guiding principles, and specific recommendations—along with advice about resources required to implement them. The GBAC report provides an indispensable foundation for considerations made in this draft document and plan, as well as for final decisions on policy and strategy. Additional public input, received as part of the GBAC process, also has been incorporated. The complete GBAC report, posted online at https://fwp.mt.gov/gbac, is included in this document as Appendix E.

[2] Alphabetically, members of the GBAC (and their locations) were: Brett Barney (Wyola), Chad Bauer (Missoula), Darrin Boss (Havre), Jonathan Bowler (Condon), Trina Jo Bradley (Valier), Caroline Byrd (Bozeman), Michele Dieterich (Hamilton), Erin Edge (Missoula), Nick Gevock (Helena), Lorents Grosfield (Big Timber), Kameron Kelsey (Gallatin Gateway), Robyn King (Troy), Kristin Kipp (Browning), Cole Mannix (Helena), Heath Martinell (Dell), Chuck Roady (Columbia Falls), Greg Shock (St. Ignatius), and Anne Schuschke (East Glacier). Facilitators were Shawn Johnson and Heather Stokes Center for Natural Resources and Environmental Policy, University of Montana.

Summary of GBAC report (2020) – including its Guiding Principles and Council Recommendations

The vision statement of the GBAC is as follows: "We envision fully recovered grizzly bear populations in the four identified recovery areas in Montana and landscapes in-between that accommodate grizzly bear presence and connectivity while maintaining the safety and quality of life of those that live, work, and play in Montana."

In Guiding Principle 1, the GBAC advised that "all those living in or visiting Montana should expect the potential presence of grizzly bears on the landscape…." In Guiding Principle 2, the GBAC advised that "the identification of areas between established recovery zones that best contribute to genetic and demographic connectivity is necessary to prioritize resource allocation, focus outreach and education efforts, build social tolerance, and proactively engage local communities and landowners." In Guiding Principle 3, the GBAC advised that "as expansion occurs outside the four recovery Ecosystems and the landscapes in-between them in Montana, FWP and relevant agencies will have to balance this expansion with the need to prioritize resources that support both public and private lands." In Guiding Principle 13, the GBAC advised that "both genetic and demographic connectivity are important to the long-term sustainability, persistence, and resiliency of grizzly bears. Connectivity areas will exist in diverse social and environmental settings. Not all these settings are conducive to permanent habitation but should be managed to promote genetic and demographic connectivity in biologically suitable habitat, being mindful that biologically suitable does not always mean acceptable."

After "Guiding Principles" came "Council Recommendations," with subheadings.

Under the subheading of "Grizzly bear distribution, relocation, and connectivity," the GBAC stated that "genetic and demographic connectivity among Montana's four recovery zones is important to the long-term viability of grizzly bear populations in the continental United States" and added that the intent of their recommendations was to "balance the continued importance of public lands with the need for the involvement of private lands to support our vision for an interconnected metapopulation of grizzly bears in Montana."

Under that same subheading, a few of the Recommendations were as follows. In Recommendation 19 the GBAC advised that "FWP should continue to allow natural movement to new areas between all four identified recovery zones in Montana." In Recommendation 20, the GBAC advised that "FWP and all relevant agencies should clearly define the 'landscapes in-between' the four recovery zones in Montana that are important for genetic and demographic connectivity and the long-term sustainability of the grizzly bear." Finally, in Recommendation 21, the GBAC advised that "FWP, in coordination with relevant agencies and through a public process, should evaluate and identify those landscapes that can reasonably be considered important for grizzly bear recovery and connectivity from those that cannot, and clearly distinguish these in its management plan. Such a distinction is necessary for determining appropriate relocation sites between the four recovery zones, as well as for prioritizing resources for outreach and education, transportation upgrades, and conflict prevention, reduction, and response efforts. These decisions should be in accordance with current Conservation Strategies."

In Guiding Principle 5, the GBAC offered that "strategies and tools aimed at proactively preventing or reducing conflicts are often effective and can be less expensive than compensating for conflict after the fact." In Guiding Principle 10, the GBAC advised FWP to "strive to cultivate social tolerance through sound management decisions and conflict prevention measures."

Also in Council Recommendations, under the subheading of "Conflict prevention and reduction," the GBAC stated the following: "Preventing conflicts with grizzly bears is essential to the development of social acceptance and the continued conservation of grizzly bears. Proactive, inclusive efforts to mitigate conflict can engage communities, protect private property, maintain human safety, and be an efficient use of limited resources, while minimizing associated bear mortality."

Under that same subheading, the Recommendations included the following points.

In Recommendation 11, about human–bear conflicts in and around developed areas, the GBAC advised FWP to:

- provide guidance for "land use planning to prevent human/grizzly conflicts;"
- recommend actions to "governing bodies on how to minimize grizzly bear conflicts;"
- help local communities "identify and use available local grants for conflict prevention;" and
- prioritize the "research, development, and funding of new and innovative tools and techniques for conflict prevention and aversive conditioning…."

In Recommendation 12, about conflicts related to agriculture, the GBAC advised FWP to:

- "research and make recommendations on best management practices that help reduce depredations on livestock and non-livestock commercial losses;"
- "integrate technology to allow for timely reporting of agricultural conflicts to neighboring farms and ranches;" and
- "increase and diversify partnerships, funding, and support for community-based groups and other organizations" working on preventing or reducing human–bear conflicts.

Additionally, under the subheading of "Education and outreach," in Recommendation 3 the GBAC advised FWP to "provide residents and landowners with accurate information on the effective use of non-lethal methods to haze grizzly bears."

Under the subheading of "Conflict response and protocols," the GBAC stated that "timely and consistent conflict response is necessary to build and maintain relationships between FWP and the communities where grizzly bears exist. Building these relationships prior to conflict will help to promote open communication and sharing of information if the need for response should occur."

Under that same subheading, in Recommendation 15, the GBAC advised FWP to:

- "make bear management specialists Full Time Equivalent (FTE) positions included in permanent base funding, provide each specialist with a year-round technician, and create more of these fully funded positions as needed;"
- "clarify management protocols for conflict bears and continue to share them with landowners, livestock producers, and communities to maximize transparency;" and
- "periodically review inter-agency Memorandums of Understanding (MOUs) for opportunities to improve efficiency and capacity for conflict response."

And under the subheading of "Grizzly bear distribution, relocation, and connectivity," in Recommendation 23 the GBAC advised FWP to "expedite work with landowners, agricultural producers, and communities to prioritize the creation of new suitable relocation areas inside and between recovery Ecosystems which further the conservation, connection, and recovery of grizzly bears in Montana while ensuring existing land uses are supported."

In Guiding Principle 1, the GBAC advised that "All those living in or visiting Montana… should have access to education, assistance, and resources involved with coexisting with grizzly bears."

Returning to Council Recommendations, under the subheading of "Education and Outreach," the GBAC stated that "Education and outreach should engage all Montanans and visitors in the shared responsibility of grizzly bear conservation."

More specifically, under that same subheading, the GBAC advised FWP as follows:

- in Recommendation 2, to "provide easy access to education about hunting safely in grizzly bear country for resident and non-resident hunters in Montana;"
- in Recommendation 3, to "provide residents and landowners with accurate information on the effective use of non-lethal methods to haze grizzly bears;"
- in Recommendation 5, to "create open and accessible communication channels between bear managers and the public to encourage communal efforts around bear awareness and conflict prevention;"
- in Recommendation 6, to work with other agencies to "create consistency and timeliness around public access to grizzly bear mortality data across recovery Ecosystems;"
- in Recommendation 7, to "explore ways to inform, promote, and incentivize Bear Aware programs in communities;"
- in Recommendation 8, to "support educational efforts to build a common understanding of perspectives between agricultural producers and urban communities;" and
- in Recommendation 9, to "create and use consistent messaging around the use and effectiveness of bear spray."

Finally, in Recommendation 10, the GBAC supported the creation of "a full time and permanent Grizzly Bear Information, Education, and Outreach Coordinator to support and contribute to the broader efforts of FWP's Wildlife Stewardship Outreach Specialist."

The GBAC reported to the Governor that "substantial deliberation was given to the role of hunting; however, because of the diversity of interpretations of available science, backgrounds, values, and opinions individually held by Council members, we cannot reach consensus that hunting has a role in grizzly bear management." Further considerations were contained in a non-consensus section of the GBAC document.

Statewide survey of Montanans' attitudes toward grizzly bears

FWP and human dimension researchers Holly Nesbitt, Alex Metcalf, and Elizabeth Metcalf (of the University of Montana) designed and administered a survey of Montanans' general views about grizzly bears and attitudes toward their management. Questionnaires were sent to 5,350 randomly selected adults (aged 18+) within Montana in early November 2019, with follow-up mailings in late November 2019 and early January 2020. A total of 1,758 responses were received. To account for possible non-response bias, responses were weighted to account for differences between the sample and the adult population of Montana in terms of age, gender, educational level, and geographic location (rural vs. urban, within or outside grizzly bear range). See https://www.cfc.umt.edu/research/humandimensions/news/human-dimensions-grizzly-bear.php for the full questionnaire and results (Nesbitt et al. 2020).

Below is a summary of key survey results relevant to FWP developing a statewide grizzly bear management plan.

- Most Montanans (92%) agree that grizzly bears have a right to exist in Montana, and 86% find it acceptable for bears to live in primarily forested areas that are publicly owned. When asked if grizzly bears do not belong where people live, the responses were more evenly divided: 35% agreed or strongly agreed, and 43% disagreed or strongly disagreed with this statement.

- Most Montanans (57%) disagree that their recreational opportunities are limited by grizzly bears; however, 23% agree or strongly agree.
- When asked about their emotional response to seeing a grizzly bear from a distance while walking, more Montanans reported they would be nervous, scared, or upset than those that reported they would be relaxed, not scared, or pleased.
- A minority of Montanans agree that their personal safety is threatened by grizzly bears (19%) or that grizzly bears pose a safety risk to people they care about (28%).
- About 60% of Montanans agree that people should learn to live with grizzly bears near their homes, while 20% disagree. When asked about taking actions to reduce human–bear conflict on their own property, respondents' willingness was high for securing attractants, but lower for actions related to livestock.
- Almost all Montanans (94%) report they have or would be willing to carry bear spray while recreating or hunting.
- About 49% of Montanans support enough hunting to manage grizzly bear population size; 30% support a very limited season that would not affect the population size; and 4% support as much grizzly bear hunting as possible. About 17% believe grizzly bears should never be hunted in Montana.

Existing statues, regulations, plans, and agreements

The grizzly bear is currently listed under the ESA as threatened throughout its range in the contiguous United States. As such, the ESA and its implementing regulations provide direction and, in some cases, restrict actions that can be taken. The Recovery Plan (USFWS 1993) and its supplements (USFWS 1997, 2007, 2017, and 2018) outline recovery goals and methods pursuant to populations in Montana. Where not superseded by federal law or regulation, the Montana Code Annotated (MCA, Table 2) provides direction to FWP and the FWP Commission regarding the management of grizzly bears. Under the authority of the MCA, the Commission develops more detailed regulations governing grizzly bear management in the Administrative Rules of Montana (ARM).

Two existing FWP management plans currently guide discretionary activities regarding grizzly bears: 1) the Grizzly Bear Management Plan for Western Montana: Final Programmatic Environmental Impact Statement 2006-2016 (cited hereafter as Dood et al. 2006); and 2) the Grizzly Bear Management Plan for Southwestern Montana 2013: Final Programmatic Environmental Impact Statement (cited hereafter as FWP 2013). Upon its adoption, this current document will supersede those two prior plans.

Additionally, the State of Montana, represented by FWP, is a signatory to two separate documents called Conservation Strategies (CS): the 2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem [Yellowstone Ecosystem Subcommittee 2016]—hereafter called the GYE CS; and the 2019 Conservation Strategy for the Grizzly Bear in the Northern Continental Divide Ecosystem [NCDE Subcommittee 2019]—hereafter called the NCDE CS. These two CS documents do several things for their respective Ecosystems (GYE and NCDE, Sidebar 3):

- Both CSs provide comprehensive, inter-jurisdictional guidance on how grizzly bears would continue to be conserved and managed if they were to be delisted in the two respective Ecosystems (GYE and NCDE).

- Both CSs summarize and describe strategies, standards, and guidelines to be coordinated among state, federal, and tribal entities for managing grizzly bear populations, conflicts, and habitats in the event that federal protection (under the ESA) is removed in each Ecosystem.
- Both CSs simultaneously prefigure management after delisting, and support delisting by documenting regulatory mechanisms that assure species conservation and avoid future relisting.

However, neither CS provides explicit guidance for managing and conserving grizzly bears in the buffer zone—or Demographic Monitoring Area (DMA)—outside of its own Ecosystem.

The majority of the NCDE grizzly population is expected to occupy the Recovery Zone (RZ)—which, should delisting occur, would be renamed the Primary Conservation Area (PCA)—as well as a buffer surrounding it called Management Zone 1; the two of these together form the Demographic Monitoring Area (DMA). Two Demographic Connectivity Areas (DCAs) are intended to provide sufficient security for female grizzly bear occupancy, potentially providing a demographic "stepping stone" from the NCDE to the CYE (via the Salish DCA) and to the Bitterroot Ecosystem (via the Ninemile DCA). The NCDE CS also identifies a Management Zone 2, which is intended to provide sufficient habitat protection to allow for occasional occupancy and movement of male bears toward the GYE.

The NCDE CS provides documentation and cross-referencing of FWP's Grizzly Bear Management Plan for Western Montana (Dood et al. 2006), while the GYE CS provides documentation and cross-referencing of FWP's Grizzly Bear Management Plan for Southwest Montana (FWP 2013). Both documents include Memoranda of Understanding (MOUs), in which each agency agrees to use its authority to implement the measures for conservation, monitoring, and cooperation, while respecting statutory responsibilities that differ among signatories.

The demographic objectives of the NCDE CS were formally adopted by the Commission in ARM 12.9.1403. At the time of this writing, FWP anticipates that similar ARM commitments for the GYE may be necessary.

For a map and a summary of these two Ecosystems and their related conservation strategies, see Figures 3, 4 and 5 and Sidebar 3.

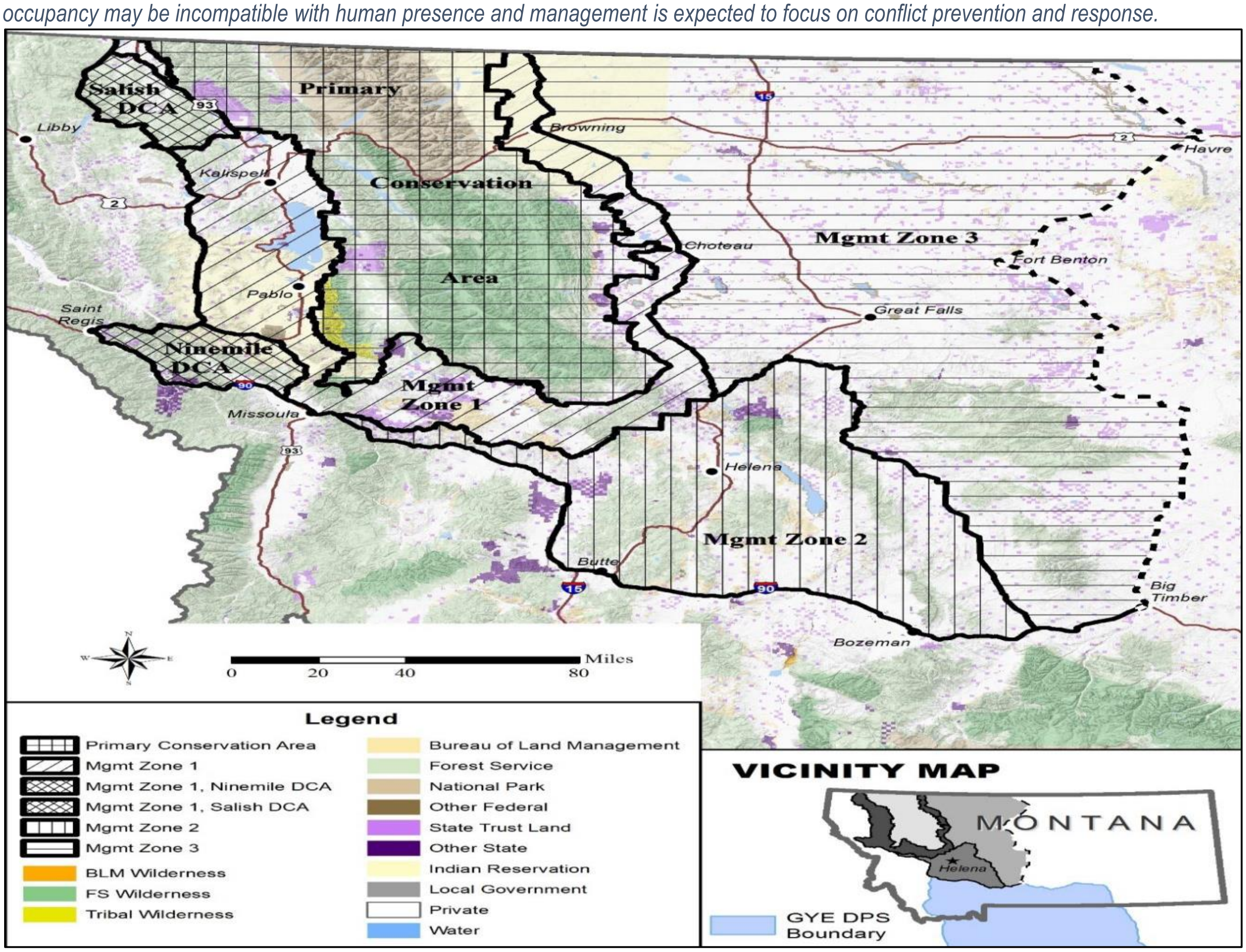
Sidebar 3. Summaries of both (NCDE and GYE) existing Conservation Strategies

The NCDE Conservation Strategy (NCDE 2020)—and by reference its signatory agencies—stated that its goal was to "maintain a recovered, genetically diverse grizzly bear population throughout the Demographic Monitoring Area (DMA: the Primary Conservation Area (PCA) and Zone 1) while maintaining demographic and genetic connections with Canadian populations and providing the opportunity for demographic and/or genetic connectivity with other ecosystems (Cabinet-Yaak, Bitterroot, Greater Yellowstone)."

The GYE Conservation Strategy—and by reference its signatory agencies—stated that it was "developed to be the document guiding management and monitoring of the GYE grizzly bear population and its habitat upon recovery and delisting." Its vision was that the Primary Conservation Areas (PCAs, called Recovery Zones under listed status) would be a "secure area for grizzly bears, with population and habitat conditions maintained to ensure a recovered population is maintained for the foreseeable future and to allow bears to continue to expand outside the PCA. Outside of the PCA, grizzly bears will be allowed to expand into biologically suitable and socially acceptable areas… [but the objective outside the PCA] is to maintain existing resource management and recreational uses and to allow agencies to respond to demonstrated problems with appropriate management actions."

Figure 5. Map of NCDE existing Conservation Strategy zones

Management zones and Demographic Connectivity Areas (DCAs) identified by the NCDE Conservation Strategy. Management Zone 1 surrounds the Recovery Zone (RZ), which after delisting would be called the Primary Conservation Area (PCA). The two DCAs have less restrictive habitat standards but are meant to allow for occupancy of adult female grizzly bears. Management Zone 2 is meant to allow for movement of male grizzly bears toward the southeast. No specific habitat protections are developed for Management Zone 3, where occupancy may be incompatible with human presence and management is expected to focus on conflict prevention and response.



Part II: Issues and Alternatives

Issues identified and considered

Regarding grizzly bear management, FWP has identified a list of broad themes in which FWP decisions and input will have substantial effects on the species' status and on the lives of Montanans. These themes, which provide structure for FWP's decision-making, have emerged from years of inter-agency collaboration on grizzly bear conservation, previous state and inter-agency plans, routine interactions with the public during FWP's day-to-day management and research, the GBAC process and associated public input, and the University of Montana Attitudes Survey. The themes are listed below.

- **Status and role of grizzly bears in Montana.**

What do FWP and Montanans see as the status and role of grizzly bears in Montana? How does FWP view the future of the state when thinking about the advantages and disadvantages of sharing it with these animals?

- **How many grizzly bears should live in Montana?**

Should FWP identify statewide numeric objectives for the species, and if so, what should those be?

- **Distributional objective and population connectivity.**

Over the long term, where in Montana will grizzly bears live, and what is their biological role in species conservation and management within their U.S. Northern Rocky Mountain distribution? Although inherent topographic and biological characteristics dictate much of the answer to this question (and commitments under the ESA and associated Conservation Strategies constrain its decision space), FWP—through its own management activities as well as those of federal, state, tribal, and non-governmental partners—influences where grizzly bears will live in Montana and, very roughly, at what densities.

- **Human safety.**

Grizzly bears are large, powerful animals that can sometimes act aggressively in defending cubs, food resources, or their sense of personal space. Although many potential interactions are resolved by bears moving away (often well before any human is even aware of their proximity), they can and do injure people. Although FWP cannot control the behaviors of individual bears, actions taken by FWP (in conjunction with partners) can often reduce the risk to human safety.

- **The role of private lands in the future of grizzly bear conservation and management.**

Most of the planning for grizzly bear recovery in the U.S. has assumed that public lands would form the backbone of needed habitat and that grizzly bears would rarely occupy private lands. The first part of that assumption remains true, but the second part has proven false, as grizzly bears are increasingly found on private lands. While this discovery creates increased opportunities for biological connectivity between population cores, it also increases conflict with humans as grizzly bears compete for resources, damage property, and threaten human safety.

- **Conflict prevention.**

Humans have limited ability to alter grizzly bear behaviors, which result from natural selection and encoded genetic instructions. However, FWP can greatly reduce the chances that bears' biological drives to obtain food and shelter will lead to conflicts with humans. In recent decades an entire sub-field of conflict prevention has emerged and a variety of technical approaches can be attempted to reduce or prevent conflicts—especially concerning the securing of attractants. If human-related food supplies (garbage, pet foot, bird feeders, beehives, fruit trees, spilled grain, livestock, etc.) are more easily obtainable than natural ones, bears tend to overcome their wariness of people to access those supplies. Such attractants set the stage for property damage and for habituation or conditioning of bears. However, when attractants are secured so that there is no nutritive reward for the bears' natural curiosity, the probability of conflict is reduced substantially.

- **Conflict response.**

Human–bear conflicts can be reduced but cannot be eliminated entirely. There will always be a need to respond to circumstances in which an individual bear has damaged property or threatened human safety or is very likely to do so. For any threatened species under the ESA, federal guidance and approval is required if any action more intrusive than hazing is considered. That said, even under listed status there remains considerable flexibility for how any given situation is handled.

FWP's initial response to most conflict situations is to reduce or eliminate the conflict source (e.g., attractants). In some cases, however, FWP recommends to USFWS the capture of a bear. Captured bears, in turn, can be i) released onsite for further monitoring, ii) relocated a short distance from the site, iii) relocated a long distance from the site, or iv) euthanized.

As of March 2022, FWP can no longer move federally listed grizzly bears that are involved in conflict and captured outside Recovery Zones; however, FWP can move federally listed bears not involved in conflict outside RZs to sites previously approved for that purpose by the Commission. This restriction does not preclude FWP from providing conflict response and working toward conflict resolution, but it does significantly limit FWP's ability to address especially persistent conflicts.

- **Public certainty vs. agency flexibility in responding to human–bear conflict.**

In conflict responses, two goals are in tension: i) flexibility for state (and federal) managers to balance conservation objectives while ensuring safety for humans and property; and ii) the public benefit of consistent, predictable conflict response. FWP sees no option for simultaneously optimizing both goals. Increasing agency flexibility to tailor conflict responses does unavoidably reduce the ability to predict (in a programmatic plan, or on a finer spatiotemporal scale) what that response will be. Similarly, providing increased certainty to the public does unavoidably constrain managers in ways that could force them to make sub-optimal decisions. This plan attempts to partially address this tension by outlining different management strategies in different management areas—such as in RZs, areas that connect RZs, and areas that do not connect populations or RZs.

- **Destinations of bears captured in conflict situations.**

An option often considered by managers when dealing with a human–bear conflict is to capture the bear in question and move it to another location with the intention of providing it an alternative, conflict-free habitat while working to reduce the attractiveness of its original conflict location. Sometimes a grizzly bear is captured in anticipation of conflict (i.e., a preemptive capture), while at other times a bear that is not the presumed offender is captured incidentally (i.e., a non-target capture). In all cases, the decision of where to release the captured bear is complex and reflects both short-term contingencies and also longer-term strategic objectives. As of March 2022, FWP can only move federally listed bears involved in conflicts if captured within RZs (although federal authorities can move them if captured outside RZs). At its February 4, 2022, meeting the Commission approved a list of sites to which grizzly bears (including non-conflict bears) could be moved by FWP.

- **Moving bears to initiate new or to support existing populations.**

The action of moving grizzly bears from one population to another to increase the latter's abundance, genetic diversity, or both is known as augmentation. The USFWS has formally proposed augmentation to move bears from other areas into the two established Recovery Zones lacking populations (the Bitterroot, and the North Cascades in Washington State), but implementation of both proposals has been placed on hold.

Since 2005, FWP and USFWS have cooperatively augmented the CYE by moving in an average of 1.2 bears per year from the NCDE, a program many credit with saving the CYE population. The idea of similarly augmenting the GYE has been discussed for almost 40 years. Some citizens view animals that are brought into new areas by people very differently than they would view the same animals who arrived on their own. Also, agencies typically have been reluctant to move an animal that has the potential to cause conflicts in its new home.

At their meeting of December 14, 2021, the Commission approved an augmentation program to move several grizzly bears from the NCDE to the GYE. A more detailed protocol document has been drafted (Appendix I) to articulate the purpose and need of the augmentation program and to provide guidance to field staff regarding the type of bear, circumstances of its capture, time of year, and likely release areas. This protocol document is now under consideration by both the GYE and NCDE subcommittees of the Inter-agency Grizzly Bear Committee (IGBC).

- **Orphaned cubs.**

Occasionally an adult female grizzly bear is killed and her offspring come into FWP possession. Offspring older than one year of age can be treated similarly to other bears, but orphaned cubs under that age pose a particular challenge because they face much lower odds of survival if left to fend for themselves. The question of how to address such situations deserves considerable thought and planning before they occur.

- **Conflict management operational structure.**

Minimizing and responding to human–bear conflicts requires considerable resource commitments, including specialized staff, equipment, materials, and the funding necessary to acquire and maintain these operational components.

- **Prioritizing information, outreach, and communication efforts.**

For Montanans to live their lives with minimal human–bear conflicts, certain steps are required. However, living safely around grizzly bears is not something Montanans know intuitively. Targeted and well-planned educational programs are required to enhance the public's level of knowledge before people can effectively avoid conflict. As with decisions on how, when, and where to deploy staff, FWP must decide how to prioritize information, outreach, and communication efforts.

- **Population research and monitoring.**

In cooperation with federal and tribal partners, FWP conducts ongoing monitoring of grizzly bear populations to understand trends in abundance, distribution, and habitat use, as well as ancillary information that helps direct management. Most such efforts are guided by inter-agency agreements currently in place. In brief, inter-agency biologists focus their ongoing monitoring efforts on four areas: Greater Yellowstone, Northern Continental Divide, Cabinet-Yaak, and Selkirk (the last of which does not overlap Montana). FWP is committed to continuing its participation in these monitoring efforts. To date, very few resources have been expended to better understand the status of bears outside of these four core areas.

- **Resources required.**

Because this plan is programmatic and FWP budgets are ultimately controlled by the Montana legislature, only a rough estimate of resources required is provided here. FWP would anticipate expending resources similarly to those currently expended to further conservation, management, and educational efforts related to grizzly bears. In fiscal year 2020, there were 13.93 full-time equivalent (FTE) FWP personnel working on grizzly bears. The total funds estimated to support the grizzly bear program was approximately $1.44 million. Of that amount, about 70% went toward personal services (e.g., salaries and benefits), 28% toward operating costs, and 2% toward equipment.

- **Values and beliefs associated with hunting grizzly bears.**

State laws and regulations in Montana consider the grizzly bear a species for which hunting seasons may be authorized by the Fish and Wildlife Commission, should the species be delisted under the ESA. However, the issue of hunting grizzly bears elicits strong reactions from many members of the public.

Many proponents of hunting feel that if a population is considered to be "recovered," that means it should have animals available for hunting. Some proponents feel that hunting may increase social tolerance for bears by people or that hunting may help bears become warier of humans; others feel that hunting is a preferred population management tool for regulating the population and potentially addressing bears involved in conflicts. Many opponents, on the other hand, consider grizzly bear hunting to be trophy hunting. Other opponents are concerned that the populations will be overharvested; they would rather see "excess" animals used for expanding distribution into other areas. Many opponents simply do not support harvesting an iconic and, for some, spiritually significant animal. The potential for hunting is a key reason some grizzly bear advocates oppose delisting. Additional background is provided in Part III.

- **A potential grizzly bear hunt: functions, expectations, and regulations.**

If delisting occurs during this plan's implementation and a decision is made that recreational hunting has a role to play, there remains significant discretion to consider the magnitude, objectives, geographic scope, and other constraints that would direct such a hunt. The Commission would ultimately make such decisions in a separate public process that would respect the conservation objectives in this plan.

Sidebar 4. Geography and specialized terminology

As formalized in statute and rule, the State of Montana is committed to managing and conserving grizzly bears so that they are "recovered"—i.e., they no longer require ESA protection. Thus, FWP recognizes a particular responsibility toward bears in the four identified "recovery areas" (USFWS 1993): Northern Continental Divide, Greater Yellowstone, Cabinet-Yaak, and Bitterroot (all termed "Ecosystems" by USFWS 1993). However, this document does not always reference the USFWS designations "NCDE," "GYE," "CYE," and "BE" and avoids excessive focus on these terms, for the following reasons:

1) This is not a "delisting plan" per se. ESA listing decisions are made by federal agencies, not by FWP.

2) In recent years, grizzly bears have increasingly used areas beyond the boundaries that USFWS identified for these four Ecosystems and this document acknowledges that fact.

3) This usage of the term "ecosystem" itself, though widely adopted after the 1982 Recovery Plan, is a shorthand term that is inconsistent with the term's usage in ecology (for details, see the above Definitions section).

4) If and when delisting occurs, conservation strategies for the NCDE and GYE call for these areas to transition from "Recovery Zones" (RZs) to "Primary Conservation Areas" (PCAs) over a period of years. In the future, the PCA designations themselves may become less and less useful.

5) In the future, FWP expects the boundaries around these areas to be seen as increasingly artificial and arbitrary, yet acknowledges that: a) the current NCDE and GYE will, for the foreseeable future, function as population cornerstones; b) the BE has the potential to sustain the next largest contiguous grizzly bear population with relatively low probability of human–bear conflict; and c) the current CYE will, for the foreseeable future, be a focus for grizzly bears in Northwestern Montana.

Table 2. Relevant statutes in MCA Title 87 – Fish and Wildlife

For reference, below is a list of relevant statutes under MCA Title 87 (Fish and Wildlife).

Statute number(s)	Description
87-1-201	Powers and duties of the Department
87-1-214	Disclosure of information -- legislative finding -- large predators
87-1-217	Policy for management of large predators -- legislative intent
87-1-301	Powers of the Commission
87-2-101	Definitions – "Game animals"
87-2-701	Special Licenses
87-2-702	Restrictions on special licenses – availability of bear and mountain lion licenses
87-2-814	Auction or lottery of grizzly bear license (Effective on concurrence of contingency)
87-3-131	Regulation of grizzly bear parts
87-5-102; 87-5-103; 87-5-107; 87-5-108; 87-5-109; 87-5-110; 87-5-111; 87-5-112	Endangered Species Statutes
87-5-301	Grizzly bear – findings – policy
87-5-302	Commission regulations on grizzly bears
87-5-716	Consultation with departments of Agriculture, Public Health and Human Services, and Livestock
87-5-725	Notification of transplantation or introduction of wildlife
87-6-106	Lawful taking to protect livestock or person
87-6-202	Unlawful possession, shipping, or transportation of game fish, bird, game animal, or fur-bearing animal
87-6-205	Waste of game animal, game bird, or game fish
87-6-206	Unlawful sale of game fish, bird, game animal, or fur-bearing animal
87-6-413	Hunting or killing over limit
87-6-701	Failure to report or tattoo
87-6-906	Restitution for illegal killing, possession, or waste of certain wildlife

Alternatives considered in detail

Below is an expansion of the two Alternatives, issue by issue, that were tabulated above under Executive Summary.

Alternative A: No action (status quo)

- **Role of grizzly bears in Montana.**

Grizzly bears would continue to be the "official state animal of Montana" (MCA 1-1-508; a depiction of a grizzly bear head is part of the FWP logo and adorns FWP staff uniforms). The grizzly bear would continue to be categorized as a game animal, but also as a large predator. As a species listed as threatened under the ESA, hunting is precluded. However, state laws and regulations provide authority for a hunting season (subject to Commission authorization) should delisting occur. Other laws and regulations address discrete issues with grizzly bear conservation (e.g., prohibiting commerce in grizzly bear parts, providing for increased penalties for illegal killing). State regulations (ARM 12.9.1401) recognize the importance Montana plays nationally in grizzly bear management, as well as management challenges posed by the species. As such, grizzly bears have increased in both numeric abundance and geographic distribution over the past two decades.

However, as articulated in the FWP "problem statement" from the 2019 SDM process, the Governor's Executive Order establishing the GBAC, and the GBAC's final recommendations, the way to manage this increasing number of bears, particularly in areas other than identified RZs, has remained a topic of contention. Although people would likely continue to vary in how they view grizzly bears and their role in Montana, the lack of an integrated and accepted approach has caused difficulty both for agency managers and for the public, particularly in geographic areas outside of established RZs and DMAs.

- **Numerical objectives.**

As a signatory to both the Greater Yellowstone CS and the Northern Continental Divide CS, FWP has committed to the population objectives contained therein, as both a criterion for delisting and as a long-term, post-delisting objective. In brief, the GYE CS standard is to maintain around 932 bears within the GYE DMA as estimated by the revised Knight/Chao2 protocol.[3] Should the estimated population within the DMA decline to 831 bears, any recreational hunting that had been authorized by any of the states after delisting would be closed. In the NCDE, FWP has committed to manage mortalities from all sources to support an estimated probability of at least 90% that the grizzly bear population within the [NCDE] DMA remains above 800 bears. This means the population will likely be about 1,000 bears, at least, in the NCDE DMA. There are no explicit numerical objectives for grizzly bears outside of these two area-specific Conservation Strategies—although for the CYE, the revised Recovery Plan (USFWS 1993) articulates as a "reasonable goal" a minimum of 100 bears.

These 'quasi-objectives' are likely sufficient to assure the demographic sustainability of the two areas but leave uncertainty regarding how bears elsewhere are to be managed.

- **Grizzly bear distributional objective.**

No explicit distributional objective has been identified in either existing FWP plans or inter-agency Conservation Strategies. Existing FWP planning documents focus on maintaining populations in the CYE, NCDE, and GYE, but articulate

[3] Mortality rates considered to achieve this standard are contained in Table 2 of the CS. A biological review to reassess and, if necessary, adjust these rates is scheduled to be completed by the end of calendar year 2022. The FWP Preferred Alternative would adopt any resulting changes in the Greater Yellowstone CS.

the desirability of long-term connectivity among them (as well as south toward the BE), acknowledging that human–bear conflicts would likely be more common in these relatively less-wild areas. A goal of the NCDE CS is to provide opportunity for connectivity with other ecosystems in Montana, but no explicit objective is articulated. In the GYE, FWP has committed under the GYE CS to allow for populations outside of the federally designated DMA “where biologically suitable and socially acceptable” but no further guidance is provided either internally to FWP staff or externally to other agencies or the general public. The existing augmentation program in which grizzly bears are occasionally moved from the NCDE to the CYE would continue until USFWS and FWP biologists should deem it no longer necessary.

- **Human safety.**

FWP would continue efforts to maintain and enhance public safety. It does so primarily through prevention and response to human–bear conflicts (see below), as well as through educational efforts.

- **Role of private lands in grizzly bear conservation and management.**

FWP would not articulate an explicit direction regarding grizzly bears on private lands but would acknowledge the pivotal role of private landowner support in broader recovery—and the significant contribution private lands already have made in providing habitat for grizzly bears.

- **Conflict prevention.**

FWP would continue to expend considerable resources working with the local citizenry to prevent and minimize human–bear conflicts and to respond to conflicts that do occur. Bear specialists would continue to be focused on the CYE, NCDE, and GYE. At least one bear manager would continue to focus on the geography east of the NCDE, north of the GYE, and in the BE.

FWP staff would continue to prioritize conflict prevention (as detailed in Part III). Specific actions would depend on the nature of potential human–bear conflicts. Typically, “site conflicts” (e.g., access to garbage or pet / livestock feed, depredation on chickens) predominate west of the Continental Divide, whereas livestock conflicts predominate east of the Continental Divide. Boneyards and/or livestock carcasses near human residences or animal pastures can be attractants for grizzly bears. FWP would continue programs that encourage landowners to phase out boneyards. Over the past few decades, FWP has adopted and/or supported both livestock carcass removal and livestock carcass redistribution as alternative means ways to dispose of these attractants.

- **Conflict response.**

FWP staff would continue to respond to human–bear conflicts, both within and outside of RZs. Additional detail on current practice is provided in Part III.

FWP bear managers would continue to record bear conflicts in a standardized, inter-agency database, with data entry completed no later than the end of each calendar year. The database will be a valuable resource moving forward, to better understand human–bear conflicts, as well as the agency’s success in minimizing them. It may allow for future detailed analyses of human–bear conflicts and agency responses. However, because the number of conflicts each year is subject to many variables (e.g., number of human residences and potential attractants near grizzly bears, size of grizzly bear population, abundance of naturally occurring foods), FWP would not necessarily consider changes or trends in the number of conflicts as a measure of the success or failure of prevention efforts.

- **Public certainty vs. agency flexibility on conflict response.**

  Because no additional statewide guidance would be provided, considerable discretion (within the parameters of IGBC 1986) would continue to characterize conflict responses. Case-by-case flexibility in decision making increases the likelihood that the response will match the individual situation—but also makes it more difficult to predict, for the public, what will occur.

- **Destinations of bears involved in conflicts (captured inside RZs) when moving them is planned.**

  When a decision is reached with FWS regarding grizzly bear relocation, the animal would be moved to an area where the probability of additional conflict is low (see Appendix G). Since 2009, 84% of destinations have been in FWP Region 1 and 72% have been in Flathead County.

- **Moving non-conflict bears (captured outside RZs) whose origin is uncertain.**

  Sometimes, in a conflict setting, a bear is captured that was not itself involved in the conflict. At times a decision is made to capture a bear proactively (i.e., preemptively) because its presence in the area predisposes the animal to future conflict. In such cases, generally it is not possible to know how long the animal has been present near the site, nor from which core population it may have originated. Lacking additional direction that would be provided by FWP's Preferred Alternative, considerable uncertainty would continue to characterize decisions on where to move such animals. Typically, they would be moved to the presumptive (albeit not definitively known) population core of origin.

- **Moving non-conflict bears outside of Occupied habitat.**

  There may be situations where it is desirable to move a non-conflict bear into an area that is not currently designated as Occupied habitat, such as in a connectivity area or an unoccupied portion of a recovery zone. If a situation arises and there is a desire to move a bear into unoccupied habitat to facilitate recovery or connectivity, FWP would first complete an environmental analysis of the impacts of such a transplant and would require approval by the Commission before such movement could occur. This situation would require advanced planning and public input and would not be applicable to decisions needing an immediate resolution.

- **Orphaned cubs.**

  Generally, cubs orphaned after September 1 of each year would be left in the wild. Taking younger orphans to MWRC is discouraged by existing policy and must follow MWRC intake guidelines because i) acceptable permanent captive situations are very difficult to find, and ii) re-release into the wild is only permitted with a pre-approved plan and release area, none of which exist currently.

- **Conflict management organizational structure.**

  As currently, bear managers would continue to be based in or near in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell, Missoula, and Red Lodge.

- **Prioritizing information, outreach, and communication efforts.**

  FWP would continue its current efforts aimed at people living, working, and recreating in grizzly bear habitat, targeting both new and long-term residents. As currently, a communication specialist in FWP's Communication and Education Division would plan, disseminate, and coordinate information, outreach, and education programs regarding grizzly bear biology, management, conflict prevention, and safety. Regionally based communication officers would, as now, vary in how they communicated to the public regarding human–bear conflicts, the resolution of those conflicts, recommendations regarding human safety, unlawful take incidents, and other newsworthy events regarding grizzly bears.

- **Population research and monitoring.**

  FWP would continue its existing research and monitoring efforts, as articulated by the GYE and NCDE CS documents. The GYE monitoring effort would continue to be conducted by the Inter-agency Grizzly Bear Study Team (led by USGS), which includes FWP as a member (see Van Manen et al. 2021 for the most recent report, as well as IGBST 2021 for an update on improved population estimators). The NCDE monitoring effort would continue to be led by FWP and would incorporate efforts made by the biological staff of Glacier National Park and the CSKT and Blackfeet Tribe (see Costello and Roberts 2021 for the most recent report and Costello et al. 2016b for details on methods).

- **Resources required.**

  In order to further conservation, management, and educational efforts related to grizzly bears, FWP would anticipate expending resources similar to those currently expended. In fiscal year 2020, there were 13.93 full-time equivalent (FTE) FWP personnel working on grizzly bears. The total funding estimated to support the grizzly bear program was approximately $1.44 million, of which about 70% went toward personal services (e.g., salaries and benefits), 28% toward operating costs, and 2% toward equipment. These funds came from the federal Pittman-Robertson tax on arms and ammunition (54%), hunting license revenue (19%), federal agency sources (19%, primarily FWS), and various private sources (8%).

- **Hunting of grizzly bears: values and beliefs.**

  Grizzly bears would continue to be classified by the State of Montana as a game animal, i.e., one that potentially could be subject to a regulated, recreational hunt should the Commission authorize one. However, hunting would be an available option only for grizzly bears in a population that previously had been federally delisted (i.e., reverted to authority of the State of Montana from current status as threatened under the ESA). Neither of the two existing state grizzly bear plans includes details of how such a hunt might occur in future, but both indicate that a long-term goal would include limited, regulated hunting. No existing plans discuss with any depth the systems of human values that would be presupposed by such a hunt, nor do any plans detail Montanans' diversity of values regarding grizzly bear hunting.

- **A potential grizzly bear hunt: Functions, expectations, and regulations.**

  If delisting occurs, hunting would be implemented within a scientifically sound framework that would maintain a viable and self-sustaining population to garner additional public support and to maintain positive and effective working relationships with stakeholders. Existing plans provide no additional details regarding how FWP might propose to the Commission that a hunt be managed and regulated. However, in 2017, as a requirement for delisting of the Greater Yellowstone DPS, the FWS required the states of Montana, Wyoming, and Idaho to adopt hunting regulations they could point to as adequate regulatory mechanisms to ensure hunting would not jeopardize the delisted population. These are detailed in Part III.

- **Expected consequences if this Alternative is adopted.**

  If this Alternative is adopted, little would change compared with the current situation. FWP expects grizzly bears to slowly continue expanding their geographic distribution and increasingly moving through both public and private lands, including areas far from people and areas closer to residences, farms, ranches, and businesses than in previous years. It is increasingly probable that grizzly bears originating in one core area will mate with grizzly bears in other core areas—but whether, or when, such interactions might occur cannot be known for certain. Similarly, grizzly bears may gradually become more common in and around the Bitterroot Mountains, but whether they will become established as a population is unknown.

Under this Alternative, FWP would expect a gradual increase in human–bear conflicts, and in the need for conflict reduction and response. Uncertainty and inconsistency would continue in how FWP views, and ultimately responds to, grizzly bears in newly colonized areas. We expect public discourse on grizzly bears to become increasingly contested.

Additionally, FWP staff will only relocate conflict-involved grizzly bears within RZs to areas pre-approved by the Commission. The restriction on where such grizzly bears can be released would not apply to federal authorities as long as grizzly bears are federally listed under the ESA, should they become involved in such relocations. Thus, we expect additional uncertainty about where these animals may be released.

FWP would expect continued certainty, both internally and externally, regarding our approach and responses to grizzly bears located in areas not mapped by either of the existing CS documents (Figure 6).

Figure 6. Occupied range—with recovery zones and NCDE management zones

Dark brown outlines are FWP- and USFWS-verified Occupied ranges (2020); orange shading is the four RZs that fall partly or wholly in Montana; and blue outlines are NCDE zones 1, 2, and 3, as identified in NCDE CS document.

Alternative B: FWP preferred

In contrast to the above Alternative A, which would preserve the status quo and take no action, Alternative B is the one preferred and recommended by FWP.

- **Role of grizzly bears in Montana.**

Grizzly bears would continue to occupy a primary role in Montana's cultural heritage as the "official state animal of Montana" (MCA 1-1-508). The grizzly bear would continue to be categorized a game animal, but also as a large predator. As a species listed as threatened under the ESA, hunting is currently precluded. If delisting occurs, Montana state law provides some authority to the Montana Fish and Wildlife Commission to implement a hunting season. Other laws and regulations address discrete issues with grizzly bear conservation (e.g., prohibiting commerce in grizzly bear parts, providing for increased penalties for illegal killing, see below). State regulations (ARM 12.9.1401) recognize Montana's importance nationally in the management of grizzly bears, as well as management challenges posed by the species.

Grizzly bears are both "conflict prone" and "conservation reliant" (with the latter term meaning they will always require intensive management). Due to their need for large areas and limited interaction with humans, FWP expects the core portions of their distribution to coincide with the four RZs (and the adjacent DMAs) identified by the USFWS. However, grizzly bears at lower density in some areas between these cores will facilitate connectivity. As those bears will live closer to people, they must be able to adapt to that reality, and will likely have a higher probability of suffering human-caused mortality. Where connectivity with a population core is not likely, grizzly bear presence would not be an objective, and individual bears would be tolerated only to the extent that they do not conflict with human safety or human uses of the landscape.

- **Numerical objectives.**

As a signatory to the GYE and NCDE Conservation Strategies, FWP has committed to population objectives contained therein, which function both as a criterion for delisting and as a long-term, post-delisting objective. In brief, the GYE CS standard is to maintain approximately 932 bears within the GYE DMA as estimated by the revised Knight/Chao2 protocol. Should the estimated population within the DMA decline to 831 bears, any recreational hunting that had been authorized by any of the states after delisting would be closed. In the NCDE, FWP would continue to manage mortalities from all sources to support an estimated probability of at least 90% that the grizzly bear population within the NCDE DMA remains above 800 bears. This means the population is likely be about 1,000 bears, at least, in the NCDE DMA. There are no explicit numerical objectives for grizzly bears outside of these two area-specific Conservation Strategies, although the Recovery Plan (USFWS 1993) did conjecture that the CYE could support at least 100 bears. There would be no additional and/or explicit population objectives. However, when compared to the No Action Alternative, FWP would anticipate a higher statewide population of bears because of the objective to maintain a lower density of bears in connectivity areas.

- **Grizzly bear distribution and connectivity.**

Grizzly bear presence would be an objective in RZs and DMAs, and management objectives in the NCDE and GYE would follow existing Conservation Strategies. Grizzly bear density in these cornerstone areas would be high enough to provide occasional dispersers. In areas between core populations (i.e., between RZs) and where natural bear movement is likely or is already occurring, an objective would be to manage for connectivity. FWP expects that connectivity will be accomplished over time by bears that are able to live with minimal conflict in these areas. When evaluating a specific response to an individual bear, FWP would consider the importance of the individual bear to the distribution and connectivity objectives in this management plan. But the importance of a single bear to the distribution and connectivity of the species does not obviate the duty of FWP to work with the local community and partners to craft appropriate solutions in each circumstance.

In places where connectivity between cores is unlikely, grizzly bear presence would not be an objective. In practice, this means that grizzly bears living east of a reasonable buffer around the NCDE and GYE cornerstone areas (closely approximating Zone 3 of the NCDE Conservation Strategy [NCDE Subcommittee 2019]) would be tolerated only insofar as they remain conflict free. In such areas, where grizzly bear presence is not an objective, grizzly bears involved in conflicts would be relocated or removed when possible.

The existing augmentation program, in which grizzly bears are occasionally moved from the NCDE to the CYE, would continue until USFWS and FWP biologists should deem it no longer necessary. In addition, FWP would translocate bears with no history of conflict from the NCDE core area to pre-selected and pre-approved areas within the GYE. Areas chose for release in the GYE would be areas where habitat is suitable, where conflict potential is low, and where the translocated bear is most likely to breed. Depending on cooperation from other jurisdictions, release areas may or may not be in Montana. Trapping would be conducted to capture and move bears as resources allow. The frequency of such actions would be unpredictable and would vary annually. The expectation is that approximately 2 to 4 candidate bears would become available and be moved every ten years. There would be no additional expectations or requirements for the timing beyond that. For example, depending upon circumstances, there could be no bears moved for a few years, or there could be more than 1 bear moved in a single year.

This magnitude of capturing and moving bears would result in approximately 3 to 6 bears being moved to GYE per grizzly bear generation. If one-half of translocated bears moved stayed in the GYE, survived long enough to reproduce, and generated a cub that survived to adulthood, approximately 1.5 to 3 effective migrants per generation would gradually be added to that population.

- **Human safety.**

FWP would continue efforts to maintain and enhance public safety. It would do so primarily through prevention of, and response to, human–bear conflicts (see below), as well as through educational efforts. Although FWP would continue to be limited in its ability to alter grizzly bear behavior or the geographic distribution of populations, it would use available discretion to remove or relocate grizzly bears involved in conflicts with humans, particularly in areas where connectivity among population cores is unlikely.

- **Role of private lands in grizzly bear conservation and management.**

The importance of private lands in providing connectivity (where biologically likely) would be acknowledged, with commensurate aid to landowners to minimize or prevent conflicts.

- **Conflict prevention.**

FWP would continue to spend considerable resources working with the local citizenry to prevent and minimize human–bear conflicts, and to respond to conflicts that occur. Bear specialists would continue to be focused on the CYE, NCDE, and GYE. One bear manager would continue to focus on the geography east of the NCDE and west of the GYE. Additionally, one bear manager would continue to work on bear-involved conflicts in the BE.

FWP staff would continue to prioritize conflict prevention (as detailed in Part III), with specific actions depending upon the type of conflict. To the west of the Continental Divide, most such conflicts of concern are “site conflicts” (e.g., access to such anthropogenic food sources as garbage, pet food, livestock food, or chickens)—while to the east of it, one of the greatest conflict concerns is livestock depredation. FWP would prioritize conflict prevention activities in the four cores areas and also the in-between areas where low-density populations for improved connectivity may appear feasible.

Moving forward, FWP will continue to encourage, support, and administer (where appropriate) livestock carcass removal programs as a generally recognized best practice. For long-term disposition of carcasses, composting programs are recognized as the best solution; however, where composting is impractical, secured landfills may suffice. Such programs reduce the risk of bear-involved conflicts, while supporting the general goal of minimizing the bears' option to obtain food from human-related sources.

The FWP livestock carcass redistribution program in Region 4 has been gradually phasing out in recent years. FWP would continue to reduce and ultimately end this program and would discourage activities that facilitate grizzly bears accessing livestock carcasses, even far from people. FWP would work with individual livestock producers to craft site-specific programs for reducing the likelihood of conflicts over livestock carcasses. FWP's operating principle would be that, ideally, grizzly bears should consume natural foods only (acknowledging that it is impossible to totally eliminate the possibility of a grizzly bear finding and consuming a livestock carcass somewhere). Where livestock producers operate their own carcass redistribution sites, FWP would encourage an adaptive management approach, facilitating learning about the effectiveness (or lack thereof) of individual operations in reducing conflicts, as well as how phasing them out would alter the dynamics of human–bear conflict. Given the complexity of possible objectives and consequences of carcass redistribution, Kubasiewicz et al. (2016) suggested that an SDM approach would be useful in assessing whether these sites ameliorate, exacerbate, or have no effect (Steyaert et al. 2014) on human–bear conflicts

- **Conflict response.**

FWP staff would continue to respond to human–bear conflicts, both inside and outside of RZs. Additional detail on current practice is provided in Part III. FWP would continue to document bear conflicts in a standardized, inter-agency database, with data entry completed as promptly as possible. Moving forward, the database will be a valuable resource to better understand human–bear conflicts, as well as all agencies' success in minimizing them. It may allow for future detailed analyses of human–bear conflicts and agency responses. However, because the number of conflicts each year is subject to many variables (e.g., number of human residences and potential attractants near grizzly bears, size of grizzly bear population, abundance of naturally occurring foods), FWP would not necessarily consider changes or trends in the number of conflicts as a measure of the success or failure of prevention efforts.

Generally, when conflicts occur on or near private lands rather than in remote settings, the responses would be more aggressive. In situations allowing discretion, FWP would discourage removal in areas where connectivity between core populations is likely and would encourage removal in areas where it is unlikely.

- **Public certainty vs. agency flexibility on conflict response.**

Compared to the present, under this Alternative the public would have more certainty about how human–bear conflicts would be resolved, as the interests of bears would be given slightly more weight within population core areas, some weight (albeit a bit less) where connectivity among population cores is likely, and less weight elsewhere.

- **Destinations of bears involved in conflicts (captured inside RZs) when moving them is planned.**

Conflict-involved bears would be moved to sites where the probability of additional conflict is low (Appendix G). Since 2009, 84% of destinations have been in FWP Region 1 (72% have been in Flathead County). However, if a non-conflict bear (non-target or preemptively trapped) animal is captured, FWP would consider moving it to an area outside of that RZ where connectivity is an objective and a Commission-approved release site exists. As the known range of grizzly bears changes, FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range to which grizzly bears could be moved. If delisting occurs, bears involved in conflict outside RZs could also be handled in this way.

- **Moving non-conflict bears (captured outside RZs) whose origin is uncertain.**

Sometimes, in a conflict setting, a bear is captured that was not, itself, involved in the conflict. At times a decision is made to capture a bear proactively (or preemptively) because its presence in the area predisposes the animal to future conflict. In such cases, generally it is not possible to know how long the animal has been present near the site, nor from which core population it may have originated. If the situation allows, such bears would be left in place. If moving a bear is required, it would be moved to a Commission-approved release site which provides the best chance for the bear to find life requisites and the least likelihood of conflict with humans. The site selected for release need not be located within the presumptive Ecosystem of origin, particularly if releasing the bear at the selected site would advance the interests of connectivity. Moving bears to such sites would not constitute artificial expansion of grizzly bear distribution in Montana because these sites are within areas that bears have already colonized. FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range (as documented by FWP and/or US Geological Survey—see Appendix G) to which grizzly bears could be moved but would not seek approval of release sites beyond the most recently updated Occupied range.

- **Moving non-conflict bears outside of occupied habitat.**

There may be situations in which it is desirable to move a non-conflict bear into an area that is not currently designated as Occupied habitat, such as in a connectivity area or an unoccupied portion of a recovery zone. If the situation arises and there is a desire to move a bear into unoccupied habitat to facilitate recovery or connectivity, FWP would first complete an environmental analysis of the impacts of such a transplant and Commission approval would be required before such movement could occur. This situation would require advance planning and public input and would not be applicable to decisions needing immediate resolution.

- **Orphaned cubs.**

Cubs orphaned after September 1 of each year generally would be left in the wild. Taking younger orphans to MWRC is discouraged by existing policy and would be required to follow MWRC intake guidelines because i) acceptable permanent captive situations are very hard to find, and ii) re-release into the wild is permitted only with a pre-approved plan and release area (neither of which exists currently). However, if an orphan cub was captured after August 1, FWP would consider moving it to another RZ, DMA, or pre-approved site where connectivity is an objective. If separate plans were approved to use some other location (not MWRC) for overwintering a cub and re-releasing it in the wild as a yearling, such an action could be considered on an experimental basis. However, again, currently there is no facility that can accommodate such an experiment.

- **Conflict management organizational structure.**

As is currently the case, bear managers would be based in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell, Libby, Missoula, and Red Lodge.

- **Prioritizing information, outreach, and communication efforts.**

Under this heading, the response is the same for this Alternative as it was for the No Action Alternative.

- **Population research and monitoring.**

Under this item, the response is the same for this Alternative as it was for the No Action Alternative. In addition, if it becomes feasible to estimate grizzly bear abundance or trends in any of the Occupied core areas, FWP would prioritize attempts to do that. FWP would also increase efforts to understand grizzly abundance and population trends in areas outside of established RZs and DMAs, particularly where biological connectivity is likely.

- **Resources required.**

FWP anticipates requiring somewhat more resources than the current baseline to stay ahead of human–bear conflicts that may arise as bears expand in their geographic distribution (see this section under the No Action Alternative).

- **Hunting of grizzly bears: values and beliefs.**

Grizzly bears would continue to be classified by the State of Montana as a game animal—i.e., one that potentially could be subject to a regulated, recreational hunt should the Commission authorize one. However, hunting would be an available option only in a grizzly bear population that had been federally delisted and was under state management. Because this Alternative prioritizes biological connectivity among population cores, hunting of any delisted grizzly bears would most likely be focused on (although not necessarily restricted to) areas where connectivity is unlikely. In these areas, the values of those who are and those who are not comfortable with a sustainable harvest of grizzly bears would be variously represented.

- **A potential grizzly bear hunt: Functions, expectations, and regulations.**

Ultimately, the Commission would make any decisions on a grizzly bear hunt through a separate public process. FWP believes it useful to take advantage of this current planning effort to consider, with the public, various alternative ideas of how hunting might occur. As outlined in Part III, hunting approach 1, 2, or 3 would be considered for any delisted grizzly bears, while hunting approach 4 would be considered for areas with little chance of providing connectivity between population cores.

- **Expected consequences if this Alternative is adopted.**

A long-term operational plan of moving bears from the genetically diverse and well connected NCDE to isolated and/or smaller populations (along with some track record of those bears surviving and successfully breeding with resident bears), superimposed on an objective of connectivity fostered by a low density of bears between population cores, would likely facilitate the case that adequate regulatory mechanisms were in place other than those implemented by the USFWS.

Although FWP can reasonably expect members of the public to disagree with portions of any plan ultimately adopted, we would expect greater acceptance of the FWP Preferred Alternative than of the No Action Alternative, because the Preferred Alternative offers two advantages: i) it would update our knowledge and intentions; and ii) it would reduce uncertainty regarding how to address conflict situations.

Alternatives considered but not carried forward

The following alternatives were considered but were not carried forward for various reasons, as explained below.

1) FWP could consider an alternative approach in which grizzly bears would not be welcome in the state or were considered an undesirable pest species (such as, for example, feral swine, Sus scrofa). This approach would run contrary not only to such federal laws as the ESA, but also to state law and to FWP's vision. Thus, this plan does not carry forward such an alternative for further analysis.

2) FWP could consider an alternative approach under which grizzly bear recovery within USFWS-designated RZs would be an objective, but outside of those zones grizzly bears would not be tolerated (i.e., would be removed when possible) regardless of their behavior or conflict status. Similarly, there would be no attempt to provide for connectivity among RZs through movement or low-density occupancy of areas between them. Should delisting occur, hunting could be used as a tool to discourage grizzly bear distribution from expanding beyond the RZs. Although such an approach could arguably be viewed as strictly consistent with numeric standards under the ESA and the two existing Conservation Strategies to which FWP is a

signatory, it would be contrary to the clear intent of the USFWS Recovery Plan, to the intent of those two Conservation Strategies, and to FWP's interpretation of its responsibilities under its various mandates. It would also tend to hinder, rather than to facilitate, eventual transfer of management from federal to state authority through delisting. Thus, this plan does not carry forward such an alternative for further analysis.

3) FWP could consider an alternative approach under which grizzly bears' presence would be an objective wherever they are found in Montana. Under such an approach, individual bears involved in conflicts with humans would still be controlled (i.e., hazed, moved, or euthanized, depending on circumstances), but the larger geographic context would not constitute an important part of the decision-making. Rather, the bears themselves would be considered to have indicated, by their presence, where they chose to live. FWP would not emphasize population stability within existing cores, nor would it explicitly prioritize connectivity among those cores (although, if successful, connectivity could occur indirectly). Rather, this approach would view all grizzly bears in Montana as members of an undifferentiated statewide population. Under this alternative, the safety and security of humans and their property would continue to be a high priority for FWP. However, since grizzly bears would be controlled only when conflicts arose, they would likely become more common in areas close to homes, farms, ranches, and other human infrastructure, including parts of the state (especially east of the main Rocky Mountain chain) that grizzly bears historically occupied but have not occupied for over a century. The risk to human safety and security would be higher than in other Alternatives.

Although this alternative would theoretically create the most certainty that grizzly bears would thrive indefinitely in Montana, FWP considers this approach naïve, costly, biologically unnecessary, and irresponsibly dangerous to humans and livestock. The existing grizzly bear population cornerstones are large enough that, with the appropriate level of long-term connectivity, there is no biologically based justification for the larger population that such an alternative would envision. A critical element of FWP's responsibility is to prioritize human safety, and a growing grizzly bear population in increasingly close association with homes and businesses fails that test. Thus, this plan does not carry forward such an alternative for further analysis.

4) FWP could consider an alternative approach in which human–bear conflicts are always resolved in the most favorable way for the individual bear involved, regardless of the cost to human livelihood or safety. Although such an approach could result in increased grizzly bear population, expanded geographic distribution, and quicker and more certain biological connectivity between cores, it would go against Montana law indicating that FWP's first priority in managing large predators (a classification that includes grizzly bears) is to protect humans and livestock. Thus, this plan does not carry forward such an alternative for further analysis.

Issues considered but not differentiated by alternatives

The following issues were considered but were not differentiated by alternatives, as explained below.

- **Motorized access.**

As detailed in Part III, high road density is associated with lower usage of those areas by grizzly bears, and lower survival of bears that do use them. For this reason, public land managers have committed, via Forest Plans, Conservation Strategies, and Habitat Conservation Plans to various limitations on motorized access, primarily within core population areas. FWP holds a small proportion of the public lands that provide grizzly bear habitat, and many roads in or around its land do not fall under FWP jurisdiction. Previous FWP grizzly bear plans (Dood et al. 2006, FWP 2013) have recommended that land management agencies (including FWP) manage for open-road densities of 1 mi/mi^2 or less where grizzly bears might use the habitat and that this matches FWP's statewide approach to managing motorized access for multiple species (e.g., elk). FWP would anticipate maintaining this approach regardless of which Alternative is chosen here.

- **Transportation accommodation.**

As in existing plans (Dood et al. 2006, FWP 2013), FWP remains interested in minimizing the disruptive and demographic effects that highways create for grizzly bears. Because we know that grizzly bears are likely to use only the largest and most open types of crossing structures (Ford et al. 2017) and these are generally the most expensive, careful planning will be required to avoid making a large investment in a structure that provides little benefit to grizzly bears. FWP would not be involved in developing specific proposals for highway crossing structures or other wildlife accommodation but would be an active consultant to the Montana Department of Transportation (MDOT) on priorities and placement. FWP is increasingly engaged in transportation projects to improve the chances that grizzly bears and other wildlife can cross roads safely (Costello et al. 2020).

In March 2020, a Memorandum of Agreement (MOA) between FWP and MDOT on coordination of wildlife and transportation issues was finalized and signed. This high-level MOA provides an umbrella structure under which work groups can share information and coordinate efforts related to reducing the negative effects of Montana's highway system on wildlife. The MOA specifically names one organization, Montanans for Safe Wildlife Passage, as an additional cooperating partner in this effort.

- **Climate change.**

FWP's understanding of how grizzly bears are likely to be affected by climate change is summarized in Part III of this document. The effects would be similar regardless of the management direction under consideration in this document.

- **Approach to public information on grizzly bear conflicts, relocations, and mortalities.**

What happens when there is a grizzly bear conflict, relocation, or mortality? Should FWP regions make individual decisions regarding the public dissemination of information about such events? Or should FWP adopt more consistency across the state regarding whether, when, or how such information is disseminated? The same approach would be applied regardless of management direction under consideration in this document.

Required goals, objectives, and strategies

Below are goals, objectives, and strategies that are viewed as required, and thus not subject to additional planning consideration.

Legal requirements for ESA-listed threatened species

By law, FWP is required to operate as permitted by USFWS when dealing with federally listed grizzly bears. More detailed guidance is provided in the two Conservation Strategies to which FWP is a signatory (see below Sidebar 3), as well as in regulations promulgated by the USFWS regarding mortality of grizzly bears (see Appendix A).

Commitments made under the two Conservation Strategies

FWP is a signatory to the inter-agency MOU implementing the NCDE CS (NCDE Subcommittee 2019), which serves as an inter-agency management plan for the NCDE and surrounding lands. This CS is not a regulatory or statutory document, but rather is a summary of commitments and regulatory mechanisms made by each government entity that would take formal effect upon delisting of grizzly bears within the NCDE DPS and is considered a requirement for eventual delisting by the USFWS. If delisting occurs, the ESA requires the USFWS, in cooperation with the State of Montana, to monitor grizzly bears for at least five years afterwards to assure that recovery is sustainable (a separate monitoring strategy would be developed by the USFWS). The CS, unlike USFWS monitoring, is not considered to be time-limited, but rather to be in effect indefinitely—although reviewed and potentially revised by participants at five-year intervals.

The NCDE CS categorizes the commitments made by each signatory Demographic Monitoring and Management (i.e., population management), Habitat Management and Monitoring, and Conflict Prevention and Response. FWP is primarily involved with the first and third of these and tangentially involved with the second. FWP commitments that relate to Demographic Monitoring and Management (which apply within the NCDE DMA) are formalized by a public process and written into rule by the Commission in ARM 12.9.1403. Additional detail on the NCDE CS is provided in Part IV of this document.

Because the Montana legislature has previously made the finding (MCA 87-5-301) that grizzly bears are a recovered population that is best served under state management and the local, state, tribal, and federal partnerships that fostered recovery and because both Conservation Strategies are considered components of any future delisting rule for the populations, FWP policy should continue to support the commitments made in both the GYE CS and the NCDE CS. Thus, in brief, FWP is committed (including through the Commission-adopted ARM 12.9.1403) to the grizzly bear population objectives contained in the two Conservation Strategies and both of the Alternatives articulated herein reflect that commitment.

In the NCDE, this means FWP, working with partners, will:

a) Maintain a well-distributed grizzly population within the NCDE DMA; specifically, that females with dependent offspring will be documented as present in at least 21 of the 23 bear management units (BMUs) and six of the seven occupancy units will be documented at least every six years. Adherence to this objective will be evaluated by monitoring the presence of females with offspring (cubs, yearlings, or two-year-olds) within defined geographic units of the NCDE.

b) Manage mortalities from all sources, including hunting and the loss of grizzly bears by translocation out of the NCDE, to support an estimated probability of at least 90% that the grizzly bear population within the demographic monitoring area remains above 800 bears, considering the uncertainty associated with all of the demographic parameters and further manage mortality against a 6-year running average within the following threshold objectives.

c) Monitor demographic and genetic connectivity among populations.

Additionally, should the NCDE population be delisted and a hunting season be authorized by the Commission:

d) If the probability of that population remaining over 800 (within the DMA) falls below 90%, hunting would cease and would not resume until the probability is 90% or greater.

e) If mortality thresholds—as outlined in https://rules.mt.gov/gateway/ruleno.asp?RN=12%2E9%2E1403 for ARM 12.9.1403 (b)(ii) and (b)(iii)—should be exceeded in any given year, then hunting would not be allowed the next year.

In the GYE, this means FWP, working with partners, will:

a) Maintain a well-distributed grizzly population within the GYE DMA; specifically with a target of at least 16 of 18 BMUs within the PCA occupied at least one year in every six, and no two adjacent BMUs can be unoccupied over any six-year period.
b) Monitor all sources of mortality for independent females and males (>2 years old) and dependent young (<2 years old) within the GYE DMA and limiting mortality to annual mortality percentages on a sliding scale depending on annual population size estimate using model-averaged Chao2 (per Demographic Criterion 3).

Additionally, should the GYE population be delisted and a hunting season be authorized by the Commission:

c) Maintain approximately 932 bears within the GYE DMA as estimated by the revised population estimation protocol. Should the estimated population within the DMA decline to 831 bears, any recreational hunting that had been authorized by any of the states post de-listing would be closed.

Irreversible and irretrievable resource commitments

A resource commitment is considered irreversible when impacts from its use create limitations to future use options. Irreversible commitments apply primarily to nonrenewable resources, such as fossil fuels or minerals, and to those resources that are renewable only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations. In essence, irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the proposed action or preferred alternative. Such commitments include expenditure of funds, loss of production, or restrictions on resource use.

The programs considered under FWP's Preferred Alternative do not result in any irretrievable commitment of resources. If expansion of bears proves untenable in some areas, FWP has demonstrated the ability to remove bears. Similarly, habitat programs, hunting seasons, and access management can be reversed or revised if needed. Mortality of individual animals will not result in any irretrievable commitment of grizzly bear populations. Because removals can be regulated or eliminated on an annual basis, or even on a short-term basis (if data indicates such action is prudent), the management program poses no threat to the species.

Conversely, because grizzly bears and other wildlife are a major factor in Montanans' quality of life, contributing to the attraction of new residents and an expanding human population, the state is seeing some additional commitment of resources. Subdivisions, energy development, and other developments are slowly but steadily altering grizzly habitat. While FWP can moderate this loss somewhat by allowing grizzly bears to expand into currently unoccupied habitats to meet their needs, it cannot control human population growth.

Finally, grizzly bears are large and potentially dangerous animals. By their presence, they pose some risk to Montana's human inhabitants and visitors. Considering all of the people and activities that currently occur in grizzly habitat, and the comparatively few injuries or deaths, the risk level is low. In addition, the programs outlined in this plan should allow for management and further minimization of the risks of living with grizzlies. Through education, understanding, and science-based wildlife management, we expect to be able to minimize risks of injury and/or death from grizzlies.

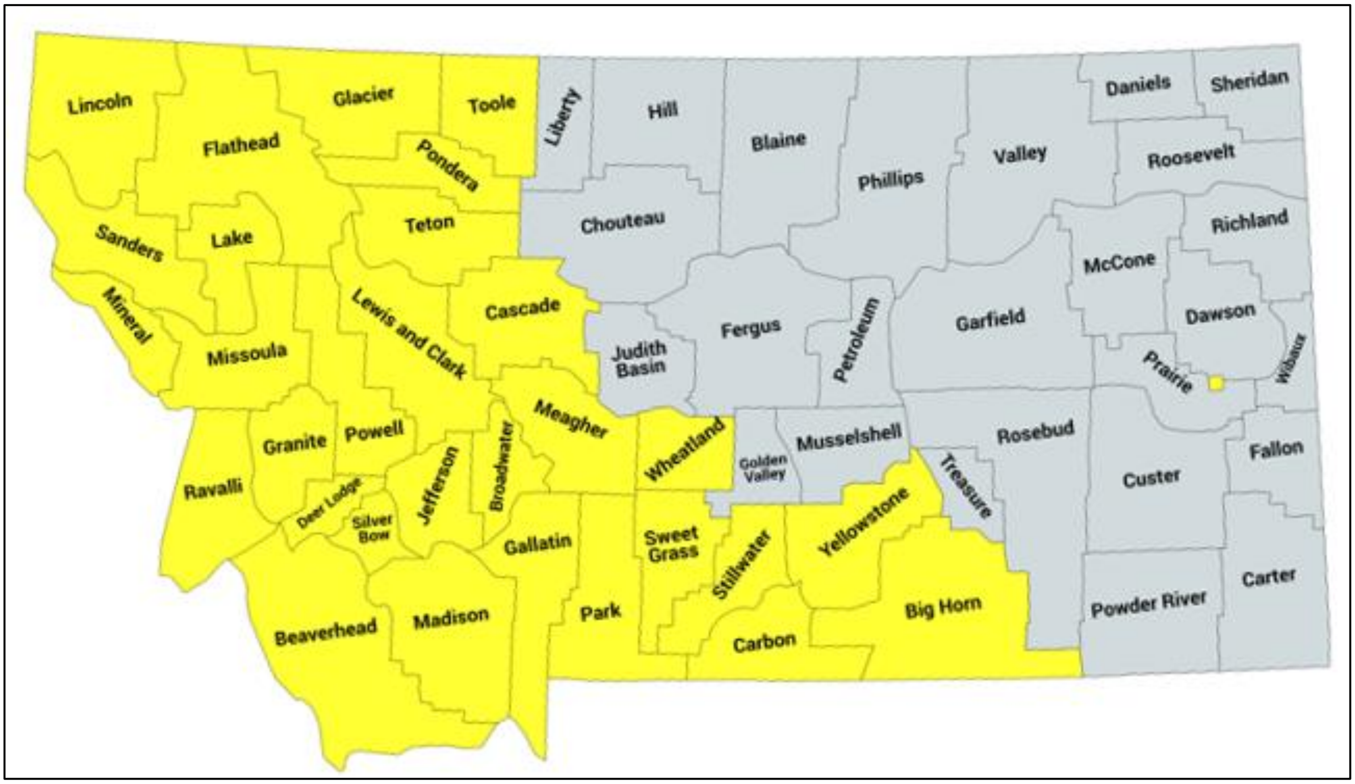
Part III: Context and Background

Geographic setting: Thirty counties in Western Montana

The geographic setting of this plan consists of the thirty counties of Western Montana (Figure). Although possible, it is unlikely that counties further east would be affected, so they are not discussed here. Together, these counties constitute 74,158 mi^2 (192,068 km^2), about 51% of Montana's total area.

Figure 7. Western Montana counties covered by this plan

Montana, highlighting the 30 western counties that are the focus of this plan.



Most counties in this area are characterized by one or more river valleys divided by rugged mountain ranges. Elevations range from 1,820 ft. (555 m) where the Kootenai River enters Idaho near Troy, Montana, to 12,799 ft (3,904 m) on top of Granite Peak in the Beartooth Mountains. Major river drainages in Montana west of the Continental Divide include the Kootenai (which flows into the Columbia River in British Columbia), and the Bitterroot, Blackfoot, and Flathead (all of which flow into the Clark Fork, which itself flows into Lake Pend Oreille in Idaho, and from there into the Columbia River near the Washington/British Columbia boundary). East of the Continental Divide, major drainages in Montana include the Bighorn, Clark's Fork, and Tongue Rivers (all of which flow into the Yellowstone River), and the Beaverhead/Bighole (Jefferson), Gallatin, Judith, Madison, Marias, Musselshell, Sun, and Teton Rivers (all of which flow into the Missouri River). Additionally, the Belly, St. Mary, and Waterton Rivers, which originate in Glacier National Park, are tributaries of the Saskatchewan River system, ultimately flowing into Hudson Bay.

Lower elevation habitats below 6,000 ft. (1,829 m) vary greatly and include large areas of shortgrass/sagebrush prairie, mountain foothills, intensively cultivated areas (grain and hay field agriculture), natural wetlands/lakes, riparian plant communities ranging from narrow streambank zones to extensive cottonwood river bottoms, manmade reservoirs, small communities, and sizeable towns and cities.

In these thirty counties, the mountainous portion above 6,000 ft. (1,829 m) contains all, or portions of, forty-four mountain ranges, including the Absaroka, Anaconda-Pintler, Beartooth, Beaverhead, Big Belt, Bitterroot, Blacktail, Boulder, Bridger, Cabinet, Castle, Centennial, Coeur d'Alene, Crazy, East Pioneer, Elkhorn, Flathead, Flint Creek, Gallatin, Garnet, Gravelly, Henry Lake, Highland, John Long, Lewis, Lewis and Clark, Little Belt, Livingston, Madison, Mission, Nevada, Ninemile-Reservation Divide, Purcell, Rattlesnake, Ruby, Sapphire, Salish, Sawtooth, Snowcrest, Spanish Peaks, Swan, Tendoy, Tobacco Root, and West Pioneer ranges. Mountainous habitats are dominated by coniferous forest (Douglas fir, lodgepole pine, Engelman spruce, western cedar, hemlock, whitebark pine, limber pine, ponderosa pine, juniper), and rocky subalpine/alpine communities found above timberline.

Human population

As of 2021, an estimated 950,071 people lived in the 30-county area of Montana; despite having only slightly more than half Montana's area, these counties comprised almost 89% of Montana's population. The 2021 estimate also reflected a population increase of nearly 24% since the year 2000. During the years 2000–2019, population growth was highest in Gallatin, Broadwater, and Flathead counties; population declined modestly in seven counties (Figure 8 and Table 3).

Figure 8. Western Montana counties: Annual population growth

From 2000-2019.

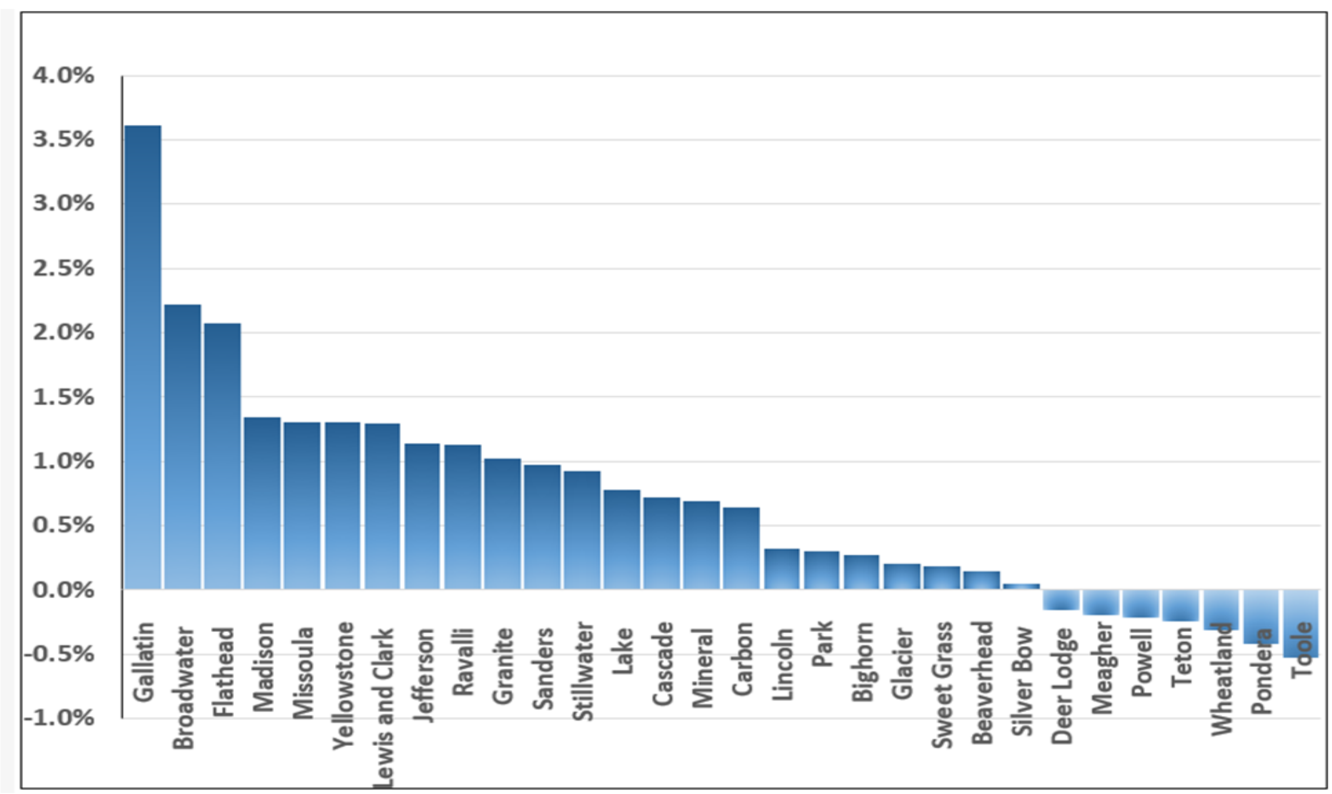


Table 3. Western Montana counties: Population, area, and population density

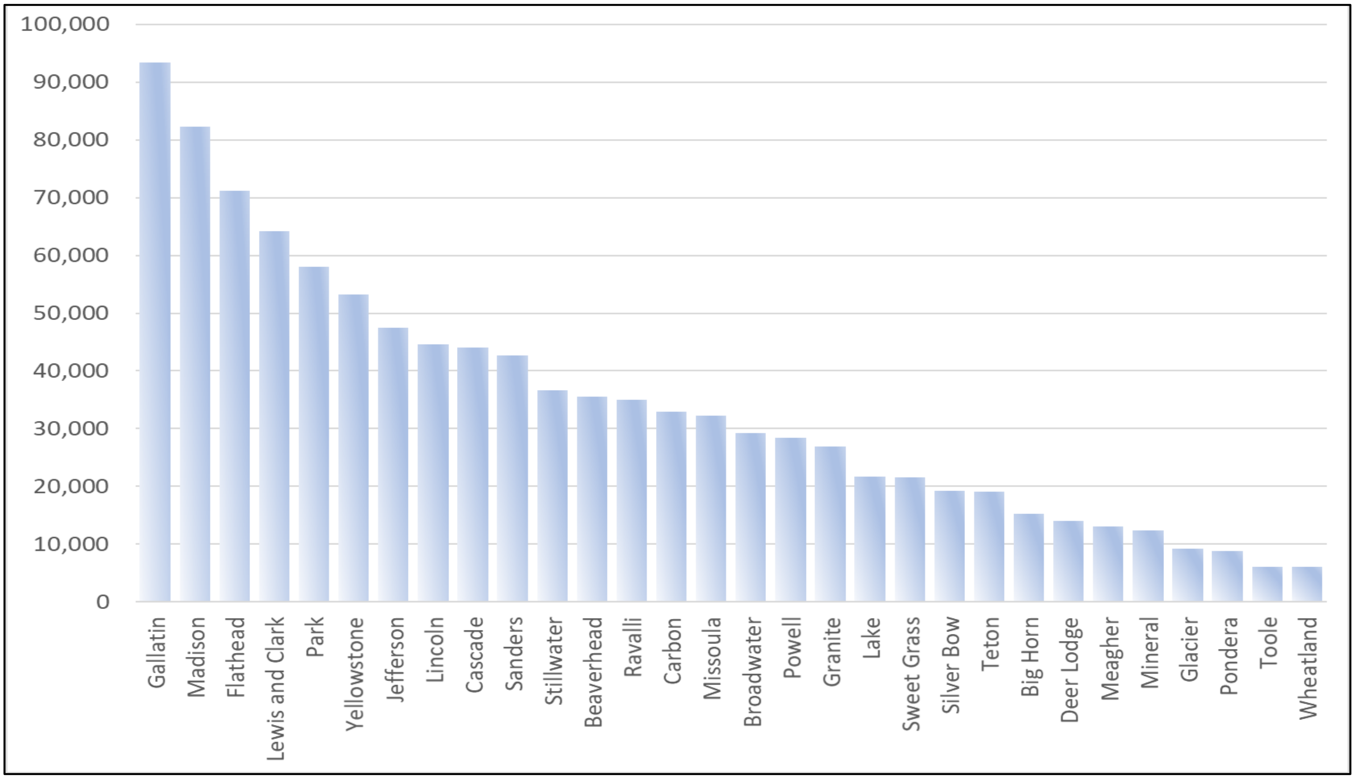
From Montana.gov (2021 January 25). Counties are listed in descending order by 2021 population.

County	Population, 2000	Population, 2021	Annual growth rate, 2000–2019	Area in miles (excluding large water bodies)	Population density
Yellowstone	129,352	161,300	1.30%	2,635	61.21
Missoula	95,802	119,600	1.31%	2,598	46.04
Gallatin	67,831	114,434	3.62%	2,608	43.88
Flathead	74,471	103,806	2.07%	5,099	20.36
Cascade	80,357	91,366	0.72%	2,688	33.99
Lewis and Clark	55,716	69,432	1.30%	3,459	20.07
Ravalli	36,070	43,806	1.13%	2,394	18.30
Silver Bow	34,606	34,915	0.05%	718	48.63
Lake	26,507	30,438	0.78%	1,493	20.39
Lincoln	18,837	19,980	0.32%	3,619	5.52
Park	15,694	16,606	0.31%	2,802	5.93
Glacier	13,237	13,753	0.21%	2,991	4.60
Bighorn	12,671	13,319	0.27%	4,995	2.67
Jefferson	10,049	12,221	1.14%	1,657	7.38
Sanders	10,227	12,113	0.97%	2,761	4.39
Carbon	9,552	10,725	0.65%	2,047	5.24
Stillwater	8,195	9,642	0.93%	1,790	5.39
Beaverhead	9,202	9,453	0.14%	5,542	1.71
Deer Lodge	9,417	9,140	-0.15%	731	12.50
Madison	6,851	8,600	1.34%	3,587	2.40
Powell	7,180	6,890	-0.21%	2,326	2.96
Broadwater	4,385	6,237	2.22%	1,189	5.25
Teton	6,445	6,147	-0.24%	2,271	2.71
Pondera	6,424	5,911	-0.42%	1,626	3.64
Toole	5,267	4,736	-0.53%	1,916	2.47
Mineral	3,884	4,397	0.70%	1,220	3.60
Sweet Grass	3,609	3,737	0.19%	1,855	2.01
Granite	2,830	3,379	1.02%	1,727	1.96
Wheatland	2,259	2,126	-0.31%	1,422	1.50
Meagher	1,932	1,862	-0.19%	2,392	0.78

Although still sparsely populated by national standards, the human population of Western and Central Montana and its associated developmental footprint has expanded greatly in recent decades. In 2016 the 30-county area contained an estimated 292,548 single family homes, with approximately 109,206 (over 37%) built since 1990. Almost 1,025,000 acres (414,803 hectares) of previously open space—slightly more area than Glacier National Park—was estimated to have been converted to residences during this quarter-century. Counties with the largest acreage of open space converted included Gallatin, Madison, Flathead, and Lewis and Clark (see Figure 9 open space to housing), though all counties contributed.

Figure 9. Western Montana counties: Acres of open space converted to housing

For 1990–2016. From 2020, https://headwaterseconomics.org/economic-development/montana-home-construction/.



Economics

In 2010, the median per capita income in the United States was $27,334, and the median household income was $51,914. In Montana, median per capita income was somewhat lower, at $23,836, with median household income of $43,872. All but one of the 30 counties in Western Montana ranked below the U.S. median per capita income in 2010, and all but two ranked below the U.S. median household income. Twenty of the 30 counties in Western Montana ranked below the Montana-wide median for per capita income, and 22 of 30 ranked below the Montana-wide median for household income (Table 4).

Table 4. Western Montana counties: Income – per-capita, median, below poverty line

Data from 2010. Counties are listed in descending order of per-capita income[4]

County	Per-capita income	Median household income	Percent of population below poverty line
Gallatin	$27,423	$50,136	13.5%
Stillwater	$27,168	$57,227	9.5%
Jefferson	$26,437	$56,596	12.8%
Yellowstone	$26,152	$48,641	11.2%
Lewis and Clark	$25,894	$50,238	9.7%
Carbon	$24,983	$49,010	12.2%
Flathead	$24,721	$44,998	11.7%
Park	$24,717	$38,830	13.6%
Missoula	$24,343	$42,887	17.3%
Ravalli	$23,908	$43,000	15.0%
Madison	$23,265	$42,998	11.6%
Granite	$23,222	$36,052	12.1%
Cascade	$22,963	$42,389	13.5%
Sweet Grass	$22,785	$43,723	12.1%
Deer Lodge	$21,921	$35,310	21.2%
Silver Bow	$21,357	$37,986	17.8%
Beaverhead	$21,110	$38,264	10.8%
Teton	$20,509	$39,516	12.8%
Toole	$20,464	$42,949	15.7%
Lake	$20,164	$37,274	21.6%
Lincoln	$19,626	$30,823	18.6%
Broadwater	$19,606	$44,667	10.1%
Mineral	$19,209	$37,256	19.0%
Pondera	$18,989	$36,419	21.5%
Wheatland	$18,474	$30,321	11.5%
Sanders	$18,472	$30,622	21.3%
Powell	$17,849	$39,851	17.3%
Meagher	$17,318	$31,577	19.0%
Glacier	$17,053	$38,075	25.4%
Bighorn	$15,066	$36,550	20.7%

Land ownership

The majority of mountainous habitat (above 6,000 ft., 1,829 m) is located within publicly owned National Forests, corporate timber lands and Glacier and (the Montana portion of) Yellowstone National Parks. Approximately 36% of the 30-county area is managed by USFS, and just over 2% by NPS. All, or portions of, the Bitterroot, Custer-Gallatin, Deer Lodge-

[4] "Selected economic characteristics 2006-2010 American Community Survey 5-Year Estimates". U.S. Census Bureau. A*rchived from the original on 2020-02-12. Retrieved 2012-11-25.*
"Profile of General Population and Housing Characteristics: 2010 Demographic Profile Data". U.S. Census Bureau. Archived from the original on 2019-05-21. Retrieved 2012-11-25.

Beaverhead, Flathead, Helena-Lewis and Clark, Kootenai, Kaniksu (part of the Idaho Panhandle National Forest complex), and Lolo National Forests lie within this 30-county area. The Bureau of Land Management (BLM) manages just under 3% of lands in the area. A small portion (just over 1%) of mountainous habitat is in state ownership (Montana Department of Natural Resources and Conservation [DNRC]). The Blackfeet Indian Reservation constitutes over 3% of total lands, and the Flathead Indian Reservation constitutes an additional 2.6%. Smaller amounts are managed specifically for wildlife by USFWS and FWP. Other lands are in private ownership, including private subdivisions, ranches, land trusts, ski resorts and timber company lands. Communities of various sizes also occupy several thousand acres of low-elevation river-valley habitat.

Land Use

Agriculture

The 30-county area supports a large agricultural economy. In 2017, there were an estimated 16,993 farms and ranches in the 30-county area (Table 5). By far the most common activities of these farms and ranches were raising beef cattle, growing forage (hay) for cattle, and growing grain crops (wheat, oats, barley).

Table 5. Western Montana counties: Agricultural characteristics

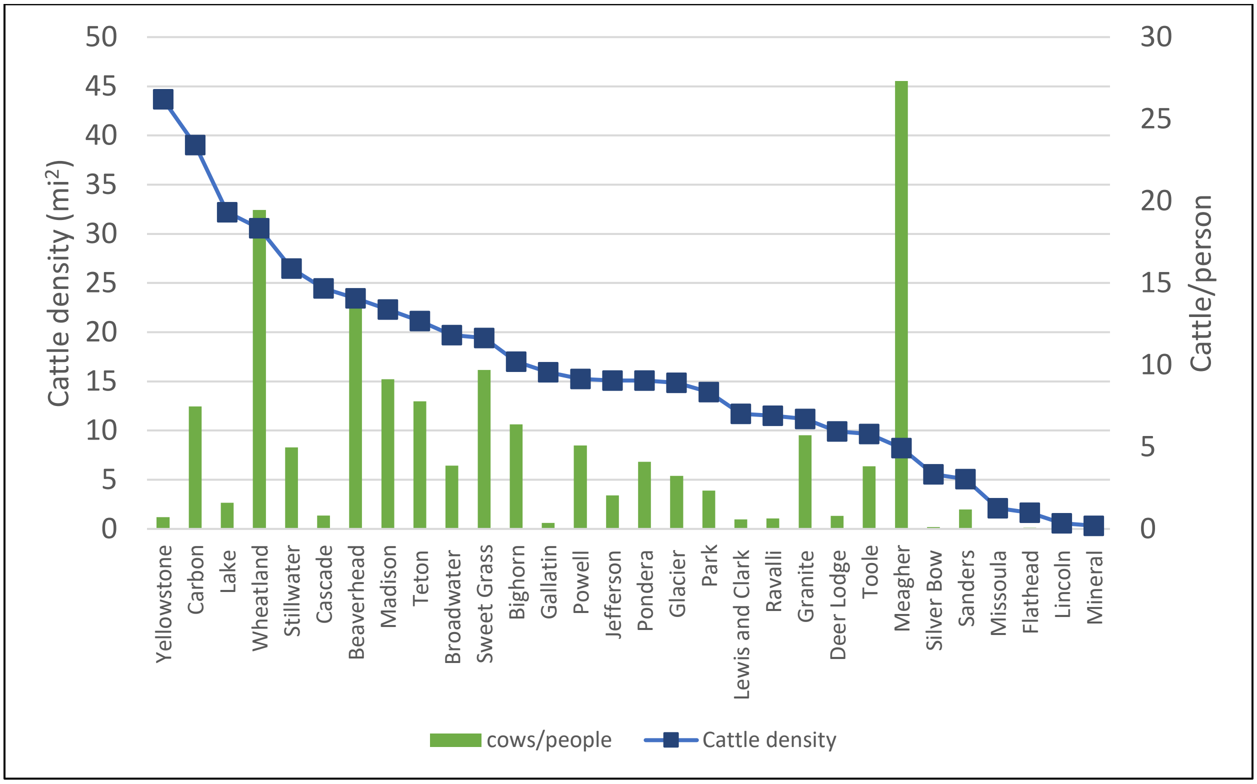
Data from 2017, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Montana/cp30001.pdf.

County	# of ranches / farms (2017)	Average # of acres	Total # of acres in agriculture	% of land in crops	% of land in pasture
Bighorn	353	9,032	3,188,296	7	82
Yellowstone	1,314	1,220	1,603,080	19	76
Cascade	1,027	1,237	1,270,399	33	61
Beaverhead	494	2,498	1,234,012	13	86
Glacier	637	1,862	1,186,094	42	56
Toole	362	3,025	1,095,050	67	31
Madison	605	1,526	923,230	16	80
Teton	686	1,294	887,684	52	46
Meagher	145	6,084	882,180	10	83
Wheatland	174	4,944	860,256	16	80
Sweet Grass	301	2,745	826,245	7	90
Carbon	725	1,125	815,625	17	78
Pondera	486	1,656	804,816	69	30
Lewis and Clark	707	1,132	800,324	10	81
Stillwater	562	1,357	762,634	23	72
Park	575	1,238	711,850	16	76
Gallatin	1,123	624	700,752	30	63
Sanders	521	1,233	642,393	7	29
Lake	1,170	548	641,160	15	39
Powell	254	2,253	572,262	10	62
Broadwater	296	1,577	466,792	24	69
Jefferson	370	952	352,240	16	78
Granite	151	1,892	285,692	10	71
Missoula	576	452	260,352	8	16
Ravalli	1,576	153	241,128	22	53
Flathead	1,146	159	182,214	51	24
Deer Lodge	77	962	74,074	16	73
Silver Bow	142	425	60,350	6	74
Lincoln	345	139	47,955	26	27
Mineral	93	198	18,414	30	13

Sheep, hogs, and dairy cattle were also being raised in smaller numbers. Sheep and beef cattle were grazed on privately owned grassland and on publicly owned (USFS, BLM, DNRC) grazing allotments. Some of these allotments occurred in high elevation habitats occupied by grizzly bears. In 2020, an estimated 1,211,000 cattle (including calves) grazed in the 30-county area, as well as some 92,200 sheep (including lambs). The largest populations of cattle were in Beaverhead (~ 130,000) and Yellowstone (~ 115,000) counties, and the largest number of sheep were in Silver Bow (~ 12,000), Beaverhead (~ 12,000), and Wheatland (~ 11,500) counties. Cattle density was highest in Yellowstone and Carbon Counties; cattle outnumbered people by the greatest proportion in Meagher, Wheatland, and Beaverhead counties (Figure 10).

Figure 10. Western Montana counties: Density of cattle and ratio of cows to people

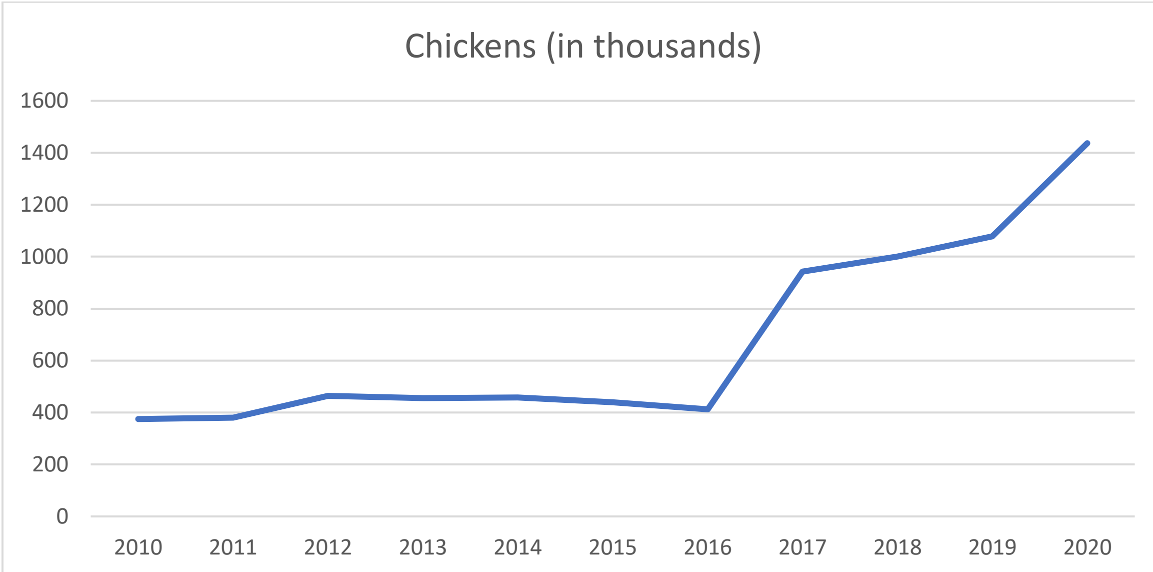
Density of cattle (blue squares) and ratio of cows to people (green bars) in the 30 counties considered in this document.



Although Montana is not known particularly for producing poultry, the number of chickens reported as being raised in Montana has increased in recent years, with a notable increase beginning in 2017 (Figure 11). Most chicken producers are small scale, but even a few chickens can attract grizzly bears, resulting in conflicts.

Figure 11. Chickens raised in Montana

From USDA 2020. Chickens reported as raised in Montana during 2010–2020.



Mining

Large mineral deposits, ranging from talc to gold, are located throughout Western Montana. Of these, metallic minerals provide the largest share of Montana's non-fuel mining income, with copper, palladium, and platinum leading the list of important metals (these 2 being mined nowhere else in the United States). In 2012, there were a total of 53 mines in production, development, standby permitting, or reclamation status, all but 7 of which were located within the 30-count area (these 7 were predominantly coal mines; http://www.mbmg.mtech.edu/pdf/2012ActiveMines.pdf).

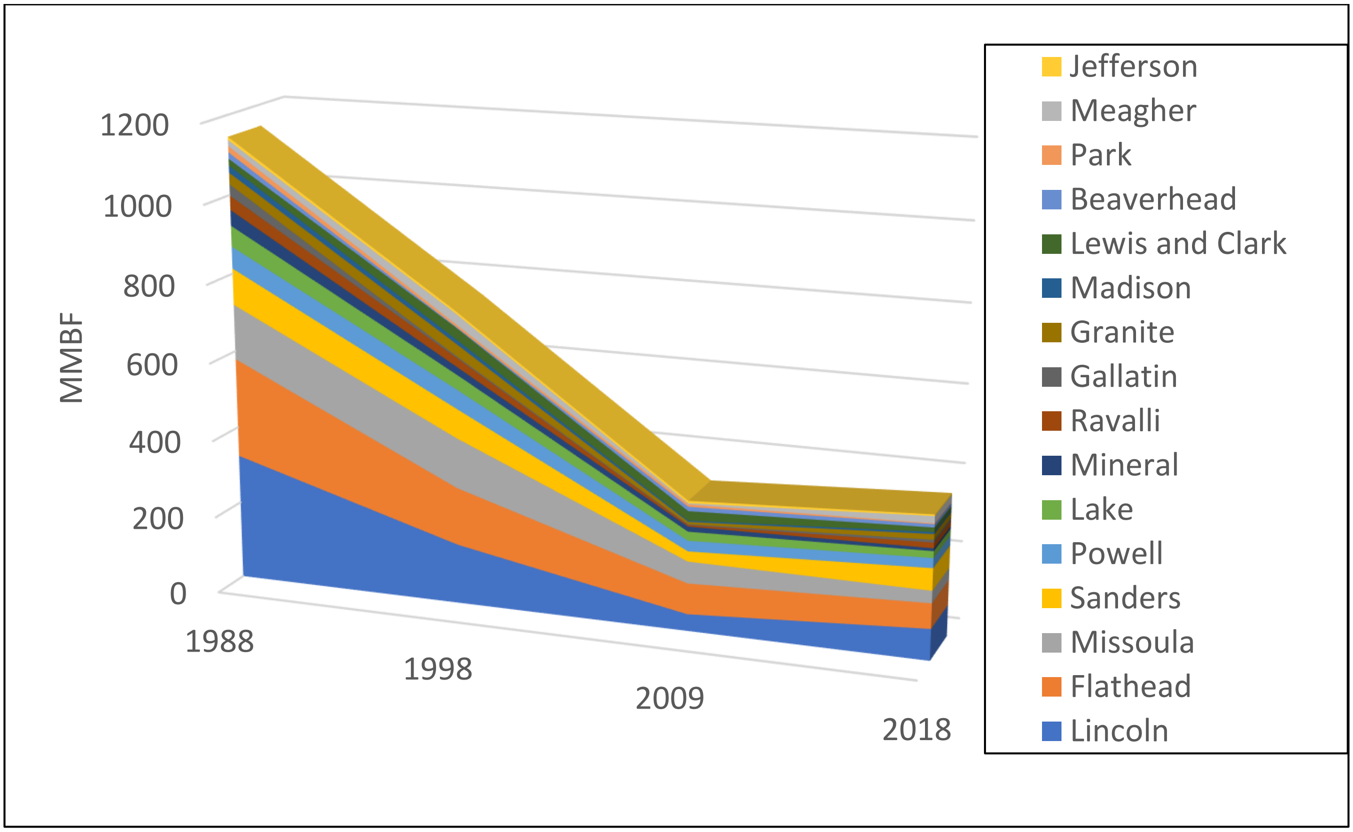
Wood products

The majority of Montana's forested lands (23 million acres) are located within the western part of the state. Nearly 4 million acres of these forest lands are permanently reserved as either wilderness areas or National Parks. Eleven million acres of the remaining forested land is administered by the USFS, with 5.2 million acres of this public estate designated by current forest plans as suitable for timber production. Private forest lands occupy approximately 6 million acres, with 2 million owned and managed by large timber companies. Another four million acres of private forest lands are owned by some 11,000-plus private individuals.

Timber production in the 30-county area has declined since the late 1980s (http://www.bber.umt.edu/fir/s_mt.asp). In 1988, an estimated 1,163 million board feet (MMBF) were produced; this declined to approximately 352 MMBF in 2009, before recovering slightly to 367 MMBF in 2018 (Figure 12).

Figure 12. Wood products – gross output from primary producing counties, all in Western Montana

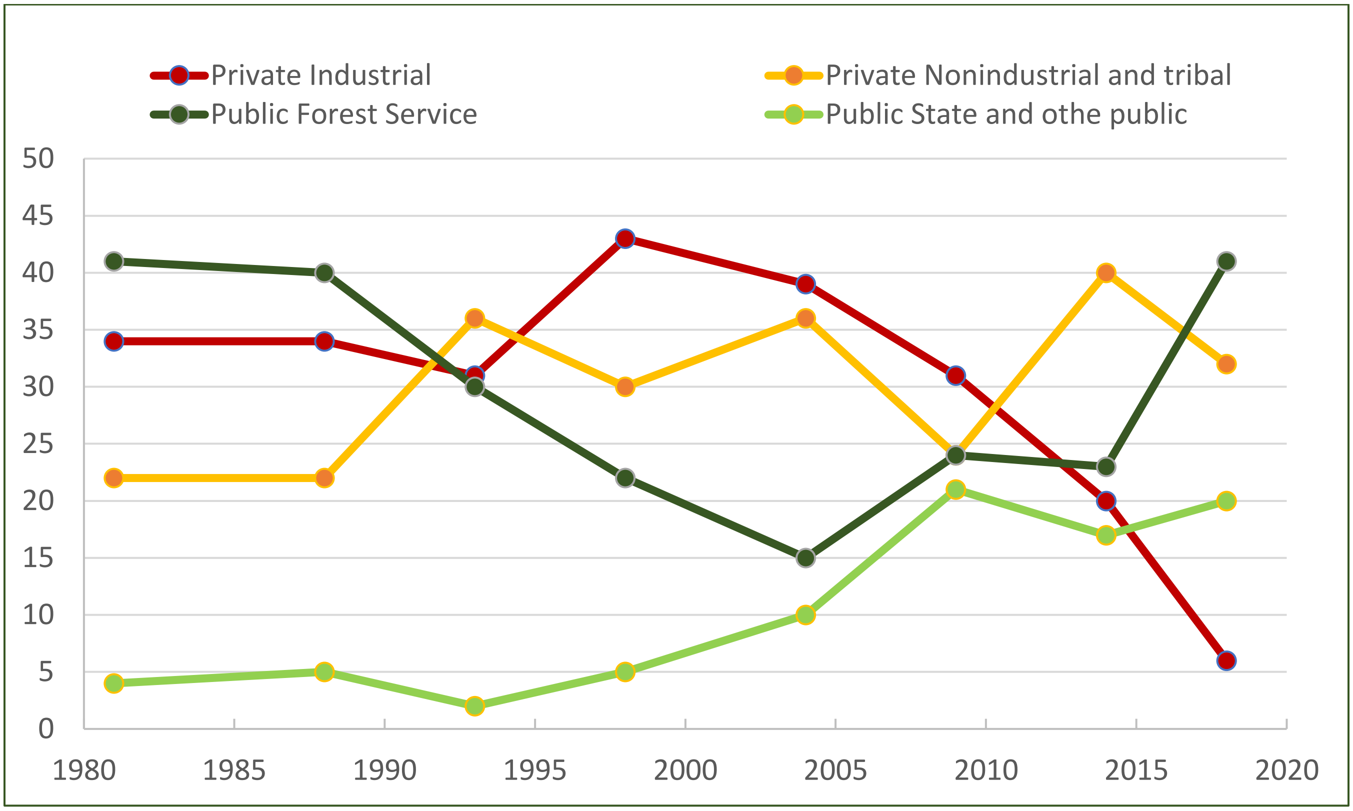
From 1988-2018. Gross output from top sixteen wood-producing counties in Western Montana, in million board feet (MMBF) per year.



Sources for wood products, categorized broadly into public (USFS; state and other public), and private (corporate industrial timber lands; private, non-industrial and tribal) forestlands, has varied over time (Figure 13). During the 1980s, most production came from U.S. Forest Service lands, being almost matched by private industrial forests, with very little coming from state lands. As production on USFS lands declined in the 1990s, the proportion coming from non-industrial and tribal lands increased (briefly becoming dominant in 1994). The relative contribution from private industrial lands peaks in about 1998 as USFS lands continued to decline, but other public lands made up some of that. However, the proportion contributed by private industrial lands has declined markedly in the past 20 years, with the other sources increasing in importance.

Figure 13. Percentage of wood products from four categories of forest producing lands

Data (1985–2020) from University of Montana Bureau of Business and Economic Research (BBER) 2020, http://www.bber.umt.edu/pubs/forest/fidacs/MT2018%20Tables.pdf.



In 2018, the University of Montana Bureau of Business and Economic Research (BBER) estimated that Montana's forest industry accounted for just under 8,000 jobs in direct employment, and an additional 13,300 jobs indirectly associated with wood products. This was up somewhat from employment ca. 2010, but lower than the late 1990s (Morgan et al. 2018).

Recreation

Outdoor recreation and tourism are major components of the economy in the 30-county area. Western Montana is nationally renowned for its high-quality fishing, hunting, camping, hiking, river floating, skiing, snowmobiling, wildlife viewing and sightseeing opportunities. Glacier and Yellowstone National Parks, Flathead Lake, and other public lands attract large numbers of people to the area every year. Many of these outdoor activities are made possible by public ownership of large tracts of mountainous habitat and additional access provided by many private landowners.

Recreationists have largely unhindered access to millions of acres of undeveloped land. Some of this land is currently, or based on documented trends of increasing distribution will be, occupied by grizzly bears. As bear numbers and distribution increase and the number of outdoor enthusiasts grow, contact and interaction with people engaged in outdoor activities is likely to increase.

Value orientations of Montanans relevant to grizzly bear management

Although largely rural (only the Billings and Missoula areas are considered “metropolitan” by the U.S. Census Bureau), and ethnically more homogenous than most states (88.6% white, 6.4% Native American), and older than most (23.2% 62 years or older) Montana’s 1,062,300 people in 2021 contained a populace with diversity of values and attitudes toward wildlife. Based on a large-scale public opinion survey in 19 western states conducted in 2004, Teel and Manfredo (2009) developed a typology of value orientations they termed “traditionalists,” “mutualists,” “pluralists,” and “distanced.” Those with a “traditionalist” orientation tended to score high on such measures as valuing use of animals and hunting, tending to emphasize the wildlife should be used and managed for the benefit of people. Those with a “mutualist” orientation scored higher on measures such as social affiliation and caring, tending to view wildlife as part of their extended social network. Those categorized as “pluralists” scored high on both sets of measures, with context and situations controlling which might dominate in any given issue. Those categorized as “distanced” scored low on both sets of measures, i.e., were more apathetic generally about wildlife.

Based on a nationwide follow-up survey conducted during 2016-18, 28% of U.S. respondents were categorized as “traditionalists,” 35% as “mutualists,” 21% as “pluralists,” and 15% as “distanced” (Manfredo et al. 2018). Montana had a greater percentage of respondents categorized as “traditionalists” than the national average (38.5%), but this was down considerably from the 47% estimated in 2004. Montana had a lower percentage of respondents categorized as “mutualists” than the national average (26.5%) but this was up considerably from the 19% estimated in 2004. Montana had among the highest percentage among the 19 western states categorized as “pluralists” (27.5%), almost unchanged from 2004. Of note is that Montana had among the lowest percentage of respondents among western states categorized as “distanced” (7.5%). In short, Montanans don’t all share the same value orientation toward wildlife, but very few are apathetic.

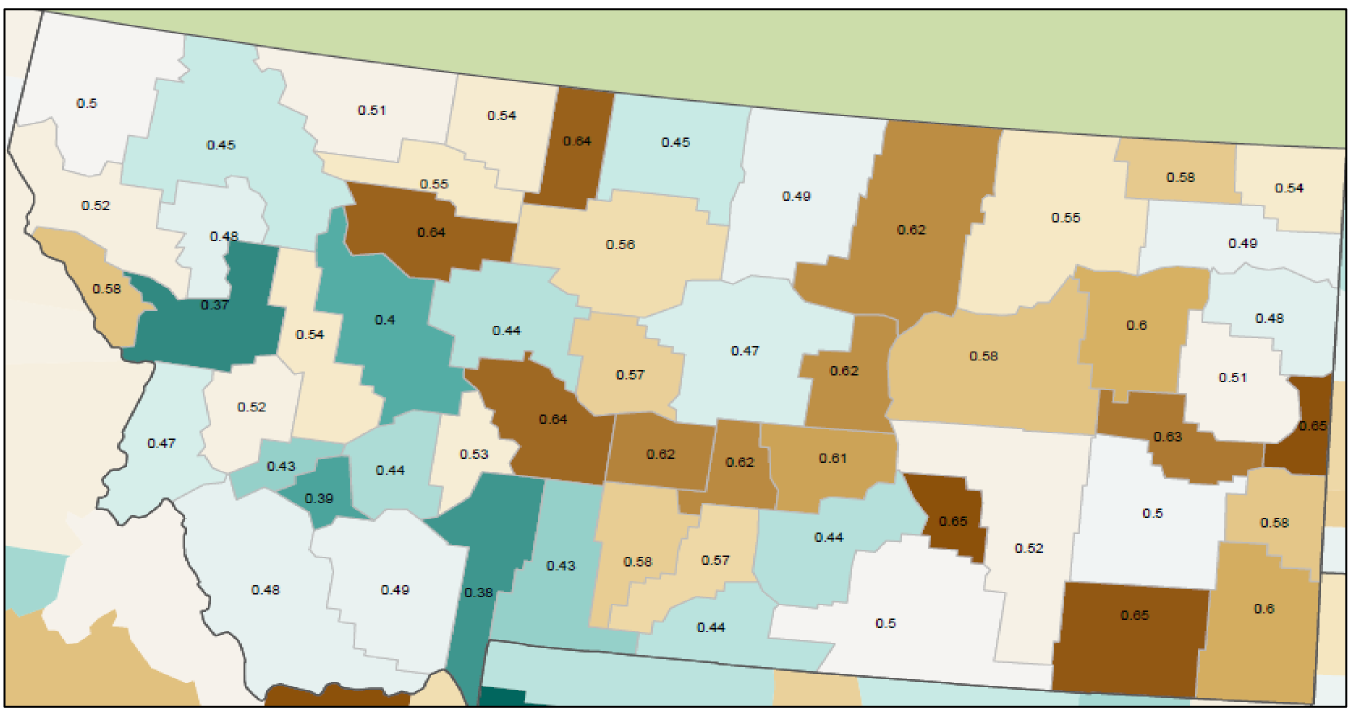
Manfredo et al. (2018) also found that, among all 50 states, only Alaska (62.9%) and Wyoming (62.1%) exceeded Montana’s 60.8% of respondents agreeing that local communities should have more control than they currently do over management of fish and wildlife by the state. Montana was among 6 states with the highest percentage of respondents agreeing that wolves that kill livestock should be lethally removed by state managers (Manfredo et al. 2018). In contrast, Montana clustered close to the mean of all states in percentage of respondents agreeing that a black bear attacking a person should be lethally removed by the state. (The questionnaire did not address grizzly bears specifically, probably because they are present in only 5 of the 50 states). In a somewhat surprising finding, given that FWP’s funding is largely provided by hunters and anglers, and that “traditionalists” outnumber “mutualists,” Montana ranked highly among states in percentage of respondents who prefer a funding model which includes public state taxes (albeit not a funding model that prioritizes public state taxes). Just under 75% of Montana respondents preferred including some public taxes in wildlife funding, similar to percentages in Washington, Arizona, and Michigan, but higher than percentages in Wyoming, the Dakotas, Colorado, or Utah. Almost 14% of Montana respondents reported being active hunters, the 11th highest among the 50 states. Thirty-seven percent of Montana respondents reported being active wildlife viewers, a percentage exceeded only by the 40.7% in Alaska. Montana, Alaska, and Wyoming stood apart as states with high percentages of active wildlife viewers while also having high percentages of “traditionalists” (who might otherwise be assumed to hunt wildlife but not watch it; Manfredo et al. 2018). However, Montana also had the largest decrease in the proportion of self-identified active hunters from 2004 to 2018.

Nationwide, Manfredo et al. (2018) found that trust in state wildlife agencies in 2018 (64%) far exceeded trust in state government generally (41%) or the federal government (25%).[5] "Traditionalists" tended to trust state wildlife agencies more (65%) than "mutualists" (54%), although pluralists were the most trusting of state wildlife agencies (72%). In Montana, trust in the state wildlife agency was higher than the national average among both "traditionalists" (71.5%) and "mutualists" (62.3%), and was 69% among all respondents in 2018. In contrast, trust in the federal government among Montana respondents declined from 41% in 2004 to just 22% in 2018.

At FWP's request, Dr. Michael Manfredo (Colorado State University, Ft. Collins, CO) examined county-level attitudes of Montanans toward lethal control of black bears that attack humans, regardless of circumstances, as well as county-level indices of support for "traditionalist" vs "mutualistic" values. Respondents in Gallatin, Missoula, Lewis and Clark, and Butte-Silver Bow Counties were predicted to be negatively disposed toward lethal control of black bears (Figure).

Figure 14. County-level support for lethal control of black bears that attack humans

Predicted by a statistical model using data from a nationwide survey. See also Manfredo et al. (2021).

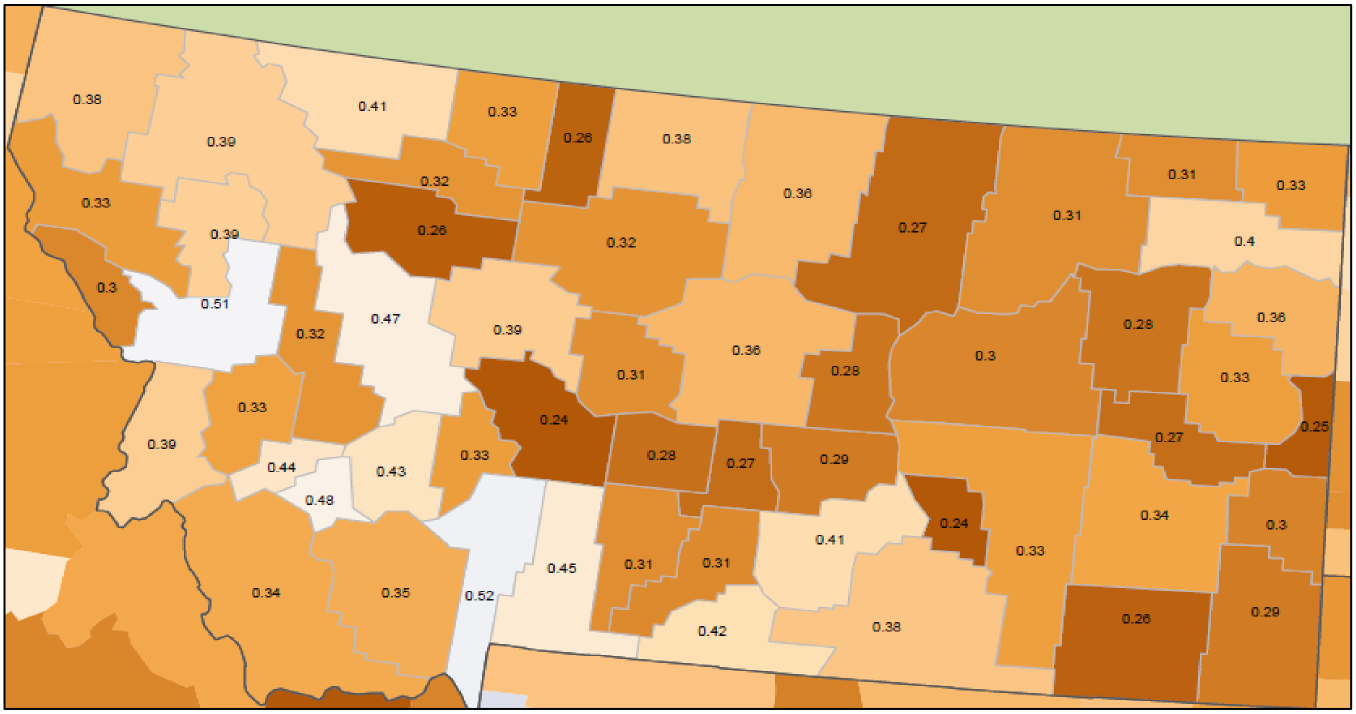


Respondents in Yellowstone, Carbon, Park, Cascade, Flathead, Deer Lodge, and Jefferson counties were predicted to be neutral. Among Western and West-central Montana counties, the most support for lethal control of black bears was found in Meagher, Teton, and Liberty counties, with support also being seen in Mineral, Powell, Toole, Pondera, Sweet Grass, and Stillwater Counties.

[5] Nesbitt et al. (2020) did not use the orientation typology of Manfredo et al. (2018), nor were they able to contrast public attitudes toward FWP with attitudes toward other government entities. However, they obtained data specific to Montanans' trust regarding FWP grizzly bear management. Over 70% either agreed or strongly agreed they trust FWP "knows how to effectively manage grizzly bear populations," over 76% either agreed or strongly agreed they trust FWP "knows how to respond to grizzly bear-human conflict," 80% either agreed or strongly agreed they trust FWP to "provide the public with the best available information on how to reduce grizzly bear-human conflict," and over 67% either agreed or strongly agreed that FWP "tells the truth about grizzly bears and their population status."

Figure 15. County-level social-habitat index

Predicted by a statistical model using data from a nationwide survey. Values exceeding 0.5 indicate a higher percentage of mutualists than traditionalists; values under 0.5 indicate a higher percentage of traditionalists than mutualists. See also Manfredo et al. (2021).



At the county level, support for lethal control of dangerous bears appeared to be highly correlated with (r = -0.95) the "social-habitat index" (i.e., whether values tended more toward mutualistic or traditionalistic; see Figure). Mutualistic values were greater than traditionalistic only in Missoula and Gallatin counties. Among western Montana counties scoring as most traditionalistic were Meagher, Teton, Mineral, Powell, Granite, Sanders, Broadwater, Beaverhead, and Madison.

Manfredo et al. (2017) argued that values, such as summarized above, are resistant to rapid change, at least in the absence of large-scale shifts in people's life circumstances, but that congruence of values is not necessarily a prerequisite to facilitating adaptive behavioral changes that can support long-term conservation. Pointedly (given Montanan's generally high regard for FWP's ability to manage human-grizzly bear conflict), Hughes et al. (2020) argued that "the challenges to grizzly bear conservation success are more about decision-making processes and issues of legitimacy, power, trust, and respect rather than people's attitudes toward bears."

Summary of grizzly bear biology

This summary of grizzly bear biology is not intended to be exhaustive; focus is primarily on aspects influencing their conservation and management status in Montana, as well as current and possible future management responses by FWP and other management entities. Other aspects of grizzly bear biology are not considered in depth here; readers interested in learning more can consult references cited herein, and in Part IV under the summary of science used.

Species and evolutionary history

The Eurasian brown bear and the North American grizzly are considered the same species (Ursus arctos). A number of sub-species are typically recognized within Eurasia (Garshelis 2009), and in earlier days, a number of North American subspecies were also recognized Pasitschniak-Arts (1993). More modern practice has been to accept only 2 subspecies in North America (based on skull analyses by Rausch 1963): the Kodiak subspecies (*U. a. middendorffi*) and all others in North America (*U. a. horribilis*). In the most recently published review of the phylogeography of North American grizzly bears, Miller et al. (2006)recognized only a single extant clade within southern Canada and the U.S. Northern Rockies, and suggested that even the distinction recognized by Rausch (1963) may ultimately not withstand scrutiny, although perhaps the salmon-eating brown bears on the large islands off the Alaska coast might be considered separate (Miller et al. 2006). For purposes of this plan, we simply refer to grizzly bears, Ursus arctos, recognizing that adaptive differences with a genetic component may exist within grizzly bears in the Northern Rockies.

Current theory holds that this species developed its large size, aggressive temperament, flexible feeding habits, and adaptive nature in response to habitats created by intermittent glaciations. It is believed that early grizzly bears migrated to North America from Siberia across a land bridge at the Bering Strait at least 50,000 years ago (Schwartz et al. 2003, Miller et al. 2006). As the continental ice sheet receded about 10,000 years ago, the species began to work its way south over post glacial North America.

In North America, grizzly bears originally inhabited a variety of habitats from the Great Plains to mountainous areas, from central Mexico to the Arctic Ocean. European explorers encountered grizzly bears throughout most of the American West. It is not known exactly how many grizzly bears lived in the U.S. before 1700, but based on historical sightings and modern-day densities, it is estimated that around 50,000-100,000 bears lived in parts of 17 states.

Physical characteristics

Grizzly bears are generally larger than black bears and can be distinguished by longer, curved front claws, humped shoulders, and a face that appears concave (Schwartz et al. 2003, Garshelis 2009). A wide range of coloration from light brown to nearly black is common. Guard hairs are often paled at the tips; hence the name “grizzly” (Sidebar 5). Spring shedding, new growth, nutrition, and climate all affect coloration.

Sidebar 5. On what we call this animal

The term “grizzly bear” may be an unfortunate choice, because the word “grizzly” is often confused with the word “grisly.” The bear’s name, based on the word “grizzled” (from Middle English “grisel,” meaning “gray-colored"), refers to its “grizzled” appearance—an appearance caused by its outer fur typically being dark with light-colored tips. The similar-sounding but unrelated word “grisly” (from Old English “grislic,” meaning “to fear”), is a close synonym for gruesome, ghastly, frightful, hideous, horrifying, macabre, repulsive, or monstrous; it is most often used when describing a bloody scene or a murder. In many minds, the two words have become confused and the “grizzly bear” has come to be seen as a “grisly” animal. (Outside of North America, the most common name for Ursus arctos is simply “brown bear,” although not all are brown in color.)

Grizzly bears are certainly powerful and sometimes aggressive animals that can and do injure or kill people, yet typically they shy away from humans. Remembering that grizzly bears are named for their distinctive grizzled appearance, not for being monstrous, might help people maintain perspective on how to live near them.

In the lower 48 states where few grizzly bears have extensive access to salmon, mean weights of adult grizzly bears are 150-250 kg (330-550 lbs.) for males and 110-150 kg (240-330 lbs.) for females (Schwartz et al. 2003). Variation in body mass is affected by age at sexual maturity, samples from within the population, season of sampling, and reproductive status.

Grizzly bears are relatively long-lived; animals in captivity have been documented as living as long as 37 years or even longer. In general, the oldest age classes are listed at 28 years for males and 23 years for females, although individuals can live longer. More pertinent to conservation and management than maximum longevity are estimates of survival rates among sex/age classes of grizzly bears (see below).

Social organization and behavior

Except when caring for young or breeding, grizzly bears are generally solitary. Strict territoriality is unknown, with intraspecific defense limited to specific food concentrations, defense of young, and surprise encounters (Schwartz et al. 2003, Garshelis 2009).

In contrast to their generally solitary nature, grizzly bears of all ages will congregate readily at plentiful food sources and form a social hierarchy unique to that grouping of bears. Except at concentrated food sources, mating season is the only time that adult males and females tolerate one another, and then it is only during the estrous period. Other social affiliations are generally restricted to family groups of mother and offspring, siblings that may stay together for several years after becoming independent, and an occasional alliance of sub-adults or several females and their offspring (Schwartz et al. 2003, Garshelis 2009).

Individual grizzly bears evidently differ in their tolerance to close approaches by other bears or by people. Surprise is an important factor in many confrontations involving grizzly bears and humans. A female with young exhibits an almost reflexive response to any surprise intrusion or perceived threat to her “individual distance” or that of her cubs. Defense of a food supply is another cause of confrontation between humans and bears. Grizzly bears may defend a kill or carrion out of perceived need.

Predaceous attacks on humans by grizzly bears are exceedingly rare (although they have been documented). Although grizzly bears are the more aggressive species and more likely to cause injury to people, predaceous attacks on people, although still rare, are more common among black than grizzly bears (Herrero 2002). Importantly, grizzly bears are much more likely to become aggressive toward people (with attendant risk of serious injury) if they have first become habituated (Albert and Bowyer 1991, Gunther and Wyman 2008, Gunther et al. 2018), or worse, become conditioned to seek out human food sources or other attractants of human environments (Mattson et al. 1992b, Herrero 2002, Herrero et al. 2005).

Habitats: biophysical characteristics

Grizzly bears do not use forested stands highly for foraging (Mace and Waller 1996, Mattson 1997b, Apps et al. 2004, Milakovic et al. 2012), finding most of their preferred forage in relatively open areas. They will use forested cover for resting (particularly in otherwise open areas, Blanchard 1983), and typically avoid open areas that are far from shrub, forest, or topographic cover. At a finer scale, some studies have shown grizzly bears to use edges between forested and open areas preferentially (Mattson 1997c, Stewart et al. 2013). Numerous studies have shown that grizzly bears tend to use burned areas and areas of high vegetation diversity, including avalanche chutes and areas characterized from remote sensing platform by what has been termed “greenness” (Waller and Mace 1997, Ramcharita 2000, Serrouya et al. 2011). Apps et al. (2004) documented preference for relatively high elevation, steep slope, rugged terrain, and low human access and linear disturbance densities. These landscapes also were comprised of more avalanche chutes, alpine tundra, barren surfaces, burned forests, and less young and logged forests. Riparian zones are often used both for foraging and travel (Servheen 1983, McLellan and Hovey 2001), particularly in otherwise open habitats (Aune 1994, Phoebus et al. 2017), a habitat relationship that has implications for human–bear conflict (Wilson et al. 2005, 2006; Eneas 2020). Relationships with forest productivity and some overstory species were positive at broader scales, while associations with forest overstory and productivity were negative at the finest scale

Although grizzly bears may avoid intensively burned areas for few years after a fire, (Blanchard and Knight 1996, Podruzny et al. 1999), most studies have shown that they use burned areas preferentially, taking advantage of improved foraging substrate (Hamer 1999, Hamer and Herrero 1987, McLellan and Hovey 2001), and availability of preferred forbs (Pengelly and Hamer 2006) and shrubs (Martin 1983). Other forest disturbances (e.g., logging) can also set back succession in ways that are advantageous to plants important to grizzly bears (Nielsen et al. 2004, Kearney et al. 2019, Souliere et al. 2020), but the bears’ tendency to avoid humans, whose presence is typically greater where industrial timber harvest has occurred (or to suffer higher mortality if they do not) can compromise much of this advantage (Zager et al. 1983, Mace et al. 1999, Ciarniello et al. 2007, Berland et al. 2008, Nielsen et al. 2008, Apps et al. 2016, Proctor et al. 2019).

Habitats: human influences

Motorized access: Displacement and mortality risk

Historically, grizzly bear populations have done poorly when in close proximity to humans and have recovered in the most remote habitats (Ciarniello et al. 2007; Lamb et al. 2017, 2018). Although recent work has suggested that human infrastructure is an imperfect surrogate for actual disturbance (Corradini et al. 2020, Goodbody et al. 2021), most research has focused on the effects of motorized access on displacement of bears (Mattson et al. 1987, McLellan and Shackleton 1988, Kasworm and Manly 1990, Mace et al. 1996, 1999; Proctor et al. 2019). That said, not all grizzly bears respond to roads in the same way. High-use roads are avoided more strongly than low-use roads (Chruszcz et al. 2003, Mace et al. 1996); roads open to unlimited use are avoided more strongly than roads open to only occasional or administrative use (Wielgus et al. 2002). Since female bears, especially those with young cubs, tend to avoid male bears and most bears (notably including males) avoid using areas near roads, some females relax their avoidance of roads in order to lessen their chance of encountering males (Mattson et al. 1987, Chruszcz et al. 2003, Graham et al. 2010, Stewart et al. 2013, Boulanger and Stenhouse 2014). Thus, they may trade one dangerous risk (meeting male bears) for another (meeting people).

Apps et al. (2004) examined detection of bears at hair traps, Upper Columbia River Basin, B.C., as a function of human presence, along with other biophysical characteristics. They found a strong association of grizzly bear detection with terrain conditions that would inhibit human access and habitation: high elevations, steep slopes, and complex topography. Later analyses at a larger scale generally confirmed these associations (Apps et al. 2016).

Studies have shown that grizzly bear survival (Mace et al. 1996, Nielsen et al. 2008, Schwartz et al. 2010, Boulanger et al. 2013, Boulanger and Stenhouse 2014, McLellan 2015, Parsons et al. 2021) or density of bears (Linke et al. 2013, Lamb et al. 2018) is negatively correlated with density of motorized access routes. A nuance more recently documented is that many grizzly bears become more nocturnal (particularly in areas that are agricultural, rural, or both) where road density is high but actual road usage is low (Northrup et al. 2012, Lamb et al. 2020). Work by Chruszcz et al. 2003, and by Roever et al. 2008a,b showed that, in some cases grizzly bears actually appeared to prefer being near low-use roads—not because they were attracted to people or traffic, but because roads were themselves associated with habitat characteristics likely to yield better foraging (e.g., early seral communities created by logging).

Ecological traps can occur if attractants near roads bring grizzly bears from secure habitats to places where their survival rate is too low to overcome the advantages those attractants provide (Lamb et al. 2017).

Highways and crossing structures

Grizzly bears, particularly males (Chruszcz et al. 2003), are hesitant to cross high-volume highways (Gibeau et al. 2002, Waller and Servheen 2005), and highways generally are known to be a source of considerable mortality for them (Benn and Herrero 2002, Kaczensky et al. 2003). In the past 30 years, within the NCDE area of Montana, grizzly bear fatalities caused by vehicles have been clustered around US Highway 93 in the Mission Valley, US Highway 2 along the southern boundary of Glacier National Park, Highway 83 in the Swan Valley near Condon, Highway 200 between Potomac and Lincoln, and to a lesser extent, along the East Front north of the Teton River (Costello et al. 2020). Sawaya et al. (2013) and Ford et al. (2017) showed that grizzly bears preferred large overpasses to under-highway structures and their use patterns took some time to develop. Females with cubs appear particularly reluctant to use highway crossings.

Diet

The wide historic and current distribution of grizzly bears in North America, Europe, and Asia (from the Canadian Arctic to Mexico, from Scandinavia to Greece, and from Spain to Siberia) provides a preview of the dietary flexibility of the species. Although bears do have essentially the digestive system of carnivores and they do kill or scavenge animals to eat (Mattson 1997a, Hilderbrand et al. 1999a,b; Zager and Beecham 2006), with carnivory being more pronounced among male than female grizzly bears (Jacoby et al. 1999, Milakovic and Parker 2013), grizzly bears are successful omnivores, consuming a wide variety of plants and animals (Fortin et al. 2013, Gunther et al. 2014). In some areas they are largely herbivorous (McLellan 2011). Forbs (i.e., dicotyledons, or dicots) generally provide more protein and are more digestible than graminoids (Rode et al. 2001). Small-bodied grizzly bears can subsist on a more herbivorous diet better than large-bodied bears (Welch et al. 1997, Rode et al. 2001). Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food source, including ground squirrels, ungulates, carrion, and garbage. In areas where animal matter is less available, they may eat roots, bulbs, tubers, fungi, and tree cambium to meet protein requirements. High quality foods such as berries, nuts, and fish are important in some geographic areas. But grizzly bears diets are not random assemblages of whatever items are available; animals make judicious foraging choices that vary by sex and by age-class, as well as by item availability, and these choices affect reproductive success (Mattson 2000).

Upon emergence from their dens, most grizzly bears seek lower elevations, drainage bottoms, avalanche chutes (Serrouya et al. 2011), and ungulate winter ranges. Herbaceous plants are eaten as they emerge, when crude protein levels are highest. Throughout late spring and early summer, most grizzly bears living in mountainous areas follow plant phenology back to higher elevations. Bears inhabiting prairie environments will concentrate along riparian areas, eating fruits and berries on shrubby vegetation. In late summer and fall, there is a transition to fruit and pine nut sources, as well as herbaceous materials. During late summer and fall, a period termed “hyperphagia,” grizzly bears rapidly gain weight, attaining peak body mass just prior to hibernation. Conflicts with humans can increase during this period, particularly as grizzly bears are attracted to (and some may make temporary movements to access) carcasses and/or gut-piles from hunter-harvested ungulates (Green et al. 1997, Ruth et al., 2003, Haroldson et al. 2004, Ebinger et al. 2016, Van Manen et al. 2019). Because bears rely solely on their stored energy reserves during hibernation, this pre-denning weight gain is essential for reproduction and survival. Bears metabolize fat and muscle during the denning period.

Grizzly bears must not only maximize energy intake while minimizing the costs of acquiring that energy, but must also balance the macronutrients—protein, lipids, and carbohydrates—contained in their diets (Felicetti et al. 2003, Robbins et al. 2007, Coogan et al. 2014, Costello et al. 2016a). Due to their carnivoran digestive system, one might expect grizzly bears to maximize protein sources whenever possible (Rode and Robbins 2000, Robbins et al. 2007), and it is well established that bears with more access to high protein sources—e.g., salmon and ungulate calves—do grow larger and produce larger litter sizes than those with less access to such sources (Hilderbrand et al. 1999a,b; Robbins et al. 2004, López-Alfaro et al. 2015; Costello et al. 2016a; Matsubayashi et al. 2016); although McLellan (2011) provided evidence that the proportion of meat in diets was not correlated with population density in a study area lacking salmon. However, Erlenbach et al. (2014) found that when captive grizzly bears were offered salmon, beef, and other food options, they did not maximize meat consumption but consumed diets that averaged 17% protein by total metabolizable energy (22% by dry matter intake). That is, even given a chance to consume more protein, these bears allocated their intake of the three macronutrients more similarly to humans and mice than to other carnivores such as domestic dogs, cats, or mink. However, grizzly bears did consume lipids in higher proportions than other omnivores, and some of their preferred foods with high lipid content—e.g., whitebark (*Pinus albicaulis*) pine nuts, army cutworm moths (*Euxoa auxiliaris*)—are in decline throughout the Northern Rockies. Among wild bears in the GYE, Costello et al. (2016) found that diets tended to be higher in protein than the optimal levels suggested by Erlenbach et al. (2014), particularly in spring and particularly among males. That said, diets of female grizzly bears averaged about 20–25% protein during summer and fall periods (Costello et al. 2016a).

Erlenbach et al. (2014) also showed that bears with less access to lipid-rich diets used carbohydrate-rich diets with similar efficiency, although the time and energy required to process such small fruits as huckleberries may limit grizzly bears' body growth (Welch et al. 1997). In summary, Erlenbach et al. (2014) suggested that whenever possible, grizzly bears' food selection process tends to follow three broad rules: i) maximize energy intake while optimizing dietary protein content; ii) prefer lipids over carbohydrates in order to limit protein intake and increase energy density (lipids typically contain more calories per unit weight than carbohydrates); and iii) use digestible carbohydrates if lipids are unavailable or difficult to exploit.

Denning

Denning is the period during which a bear hibernates in its den. Generally, among grizzly bears in Montana, den entry can be from late September to early December, while den emergence can be from February to May (Haroldson et al. 2002, Graham and Stenhouse 2014). However, patterns underlying this generality have implications for conservation and management. The duration of denning is longer (starting earlier and ending later) in higher elevations and more northerly latitudes (Pigeon et al. 2016b).

Typically, the sequence of den entry and den emergence is as follows. The first to den are pregnant females, with about half having entered dens by the end of October and almost all having done so by the end of November (Haroldson et al. 2002). Other females (alone or with cubs or yearlings) follow, entering dens from mid-November to mid-December (Graham and Stenhouse 2014). Males enter dens slightly later than non-pregnant females. In spring, den emergence typically is in reverse order: Males (particularly sub-adult males) begin emerging as early as February in the Yellowstone area (Haroldson et al. 2002) and in late March farther north in Alberta (Graham and Stenhouse 2014), with almost all having emerged by late April. Females follow, with a few emerging in late March but most doing so in April. Females with newborn cubs tend to be last to emerge (Pigeon et al. 2016b), most in late April but some not until early May.

Den entry is also affected by food availability in autumn; Pigeon et al. (2016b) showed that in Alberta, grizzly bears entered dens later when berry production was high than when it was low. Den emergence in Alberta was also weakly related to spring temperatures, occurring earlier in colder springs than in warmer ones (Pigeon et al. 2016b). European brown bears subsidized by human food (in the form of feeding stations) spent considerably less time in dens than predicted given the latitude of denning (Krofel et al. 2016). The duration of hibernation in black bears is also shown to be decreasing—likely due to the lengthening growing season associated with climate change, as well as increasing provision of anthropogenic foods (Johnson et al. 2017). Combined, these studies suggest that we can expect somewhat shorter denning seasons among Montana grizzly bears in the future as the climate warms (Cross and Servheen 2010, Servheen and Cross 2010), particularly those bears with access to high-quality anthropogenic foods. That said, we expect grizzly bears in Montana to den for substantial periods annually because of the short growing season and related scarcity of foods during winter.

Population dynamics

Reproduction

Grizzly bears in Montana typically mate between May and July, and cubs are born in the den the following winter. Most litters are 1 to 4 cubs, with the average being 2. Male grizzly bears are sexually mature around 4.5 years of age, but larger, dominant males may preclude young adult males from siring many offspring. Reproductive intervals for females average 3 years (but can be longer or shorter), and animals that lose young before or during the breeding season may come into estrus and breed again that same year. The mean age when females produce their first cubs varies from as young as 4 to as old as 10 years, depending on population; in Montana, the mean has been reported as age 5.8—both in Yellowstone

1983–2001 (Schwartz et al. 2006b) and in the NCDE (Costello et al. 2016b). Offspring typically remain with their mothers for 1 to 3 years before weaning in Montana (most typically at age 2 years), again depending on various factors. Grizzly bears are promiscuous: a male can impregnate multiple females within the same breeding season, while a female can bear offspring from multiple males within the same litter.

Survival

In the great majority of populations where survival rates and mortality causes have been studied, most bears older than cubs are killed by people (McLellan et al. 1999, Schwartz et al. 2003, McLellan 2015), whether by regulated hunting (where legal), by management removals, by vehicles, by self-defense, or by illegal killing. Only in the most remote populations are deaths more often natural rather than human-caused. Thus, except for these very remote areas, the probability of death is a function of proximity to humans and their infrastructure (Johnson et al. 2004; Schwartz et al. 2010; Boulanger and Stenhouse 2014; Lamb et al. 2017, 2020). However, from the perspective of population dynamics, the important question is not what kills individual grizzly bears (all die eventually), but rather how long they live before dying.

Most natural mortality occurs outside of the denning season. Among the primary sources of natural mortality among grizzly bears are other grizzly bears (McLellan 1994, Swenson et al. 1997b, 2001a,b; Schwartz et al. 2003). Adult males sometimes kill juveniles and adults are also known to occasionally kill other adults (McLellan 2005).
Parasites and disease do not appear to be significant causes of natural mortality, but they may hasten the demise of weakened bears. Natural mortality during the denning period is not well documented. Several authors believe some bears die during denning, especially following periods of food shortages.

Density dependence

Documenting density dependence in a long-lived, low-density species is very difficult, so it not surprising that only long-term studies have done so. That said, it is clear that reproduction and survival in grizzly bears, as in most well studied vertebrates, are negatively associated with population density. Where detailed information is available, relationships with density are indirect, being modulated by nutrition and intra-specific competition and aggression. Litter size has been shown to increase with the mother's access to high quality foods (Hilderbrand et al. 1999b, McLellan 2015), age (Gonzalez et a. 2012), and body condition (Keay et al. 2018); and to decrease with population size or density (Miller et al. 2003, Schwartz et al. 2006b, McLellan 2015. Age at first reproduction has been shown to decrease with resource competition among adult females (Støen et al. 2006), population size (McLellan 2015, Keay et al. 2018), and to increase with access to high quality foods (McLellan 2015). Number of years between successive cub litters was shown to be negatively related to population density (McLellan 2015, Van Manen et al. 2016) and to access to high quality forage (McLellan 2015). Growth rate of cubs was shown to be related to body fat of their mothers when initiating hibernation (Robbins et al. 2012); offspring body weight, in turn, was shown to be a predictor of lifetime reproductive success (Zedrosser et al. 2013)

Dependent offspring survival has been documented as being negatively related to population density (Miller et al. 2003, Schwartz et al. 2006c, Van Manen et al. 2014, Keay et al. 2018). Adult survival has not been documented as related to population density, but general pattens among long-lived mammals would not lead to an expectation that such a relationship would be found (Eberhardt 1977, Fowler 1987, Gaillard et al. 1998).

Regarding conflicts between humans and bears (of any species), numerous studies have shown an increase in such conflicts when natural bear foods are scarce, and a decrease when natural bear foods are plentiful (Johnson et al. 2015, 2018; Garshelis et al. 2017; evidence that bears near human settlements are not necessarily food-limited, or using these areas specifically to access human foods even if they do end up accessing such foods; Elfström et al. 2014a, b; Eneas 2020).

Climate change and grizzly bears

USFWS (2021) includes a summary of expected consequences of climate change on hydrology, vegetation, and fire in the U.S. Northern Rockies, as well as anticipated effects on grizzly bears. Here we will reference but will not reiterate that work. Documented and expected effects of climate change on grizzly bear denning are summarized in the above section on denning. A discussion of effects of whitebark pine decline in the Yellowstone area on grizzly bears is included in Part IV, under the summary of science used.

The direct effects of warmer temperatures on grizzly bear behavior, movements, and habitat use are still being researched. Pigeon et al. (2016a) demonstrated that ambient temperatures affected grizzly bear habitat selection, with the bears exhibiting some use of open habitats at night but avoiding those habitats during warm summer days. Rickbeil et al. (2020) found that, post-denning, grizzly bears in Alberta tended to become active sooner in years with early snowmelt. They also found, however, that the phenology of important food plants had advanced in tandem, lessening a concern that grizzly bears active so early in the spring would lack these food resources. Climate change is expected to alter the distribution and abundance of vegetation formations that provide grizzly bear habitat for resting or foraging (Butler 2012). Climate change, directly or indirectly, will also alter the geographic distribution of many plant species used by grizzly bears (Holden et al. 2012, IGBST 2013, Roberts et al. 2014). The best studied example is the decline of whitebark pine caused by blister rust (*Cronartium ribicola*) and mountain pine beetle (*Dendroctonus ponderosae*) which has been ongoing for decades, and which is expected to be exacerbated by continued climate change-induced effects (Fortin et al. 2013, Hansen and Phillips 2015, Buotte et al. 2016, Shanahan et al. 2016).

The relevant questions here are i) what effects, if any, such changes in plant distribution and abundance will have on the nutritive state of individual grizzly bears (Lopez-Alfaro et al. 2015) and, by extension, on the ability of their populations to remain stable; and ii) whether summer drought conditions, projected to become increasingly common, will cause grizzly bears to seek succulent forage closer to humans, thus increasing the likelihood of human–bear conflicts. Roberts et al. (2014) projected that most plant species used by grizzly bears in the Canadian Rocky Mountains will remain relatively stable or will increase in areal coverage under likely future climate change. Elevations of most species are projected to increase, but only two species known to be used by grizzly bears would “run out of room” from this elevational increase, and neither of these—grouse whortleberry (*Vaccinium scoparium*) and black crowberry (*Empetrum nigrum*)—is a preferred food for grizzly bears.

Ransom et al. (2018) studied potential grizzly bear food items in the North Cascades and projected the following effects in the event of future climate change: While some plant species—e.g., glacier lily (Erythronium grandiflorum) and horsetails (*Equisetum species*), which prefer mesic soils—would decline, such other key food items as huckleberry (*Vaccinium species*) and sweet vetch (*Hedysarum species*) would either increase in abundance, move upward in elevation (potentially drawing grizzly bears away from conflict with people), or both.

In contrast, Prevéy et al. (2020) projected a decline in habitat suitability for mountain huckleberry (Vaccinium membranaceum) within its North American distribution, although most of the decline seems to be situated on the periphery of current or prospective grizzly bear distribution in Montana.

Currently, a consensus among biologists is that, although climate change is real and its effects are uncertain, grizzly bears have the advantage of being omnivorous and adaptive, and thus well equipped for change (Cross and Servheen 2009, Servheen and Cross 2010). The primary concerns associated with climate change are whether the adaptations the animals can make will put them at greater risk of conflict with humans, a possibility that management has some ability to mitigate.

History of grizzly bears in Montana

Before 1800, grizzly bears were undoubtedly common in Western Montana. With newly acquired access to firearms by indigenous people and westward expansion of settlers, bears began to be impacted. With no mechanisms to provide protection or management, almost without exception the bears' numbers declined where humans and bears came together for any length of time. The decline of the grizzly bear took less than 60 years, from the end of the trapping era in 1840 to the turn of the century. The decline was due to a number of factors, including: a reduction of prey because of market hunting associated with gold exploration and mining; subsistence hunting associated with gold exploration and mining; construction of railroads, homesteading, and predator control; and loss of habitat related to ranching, farming, and human settlement. Much of the killing was based on the feeling, and in some cases fact, that the grizzly bear posed a threat to people and livestock.

By the 1870s, grizzly bears had disappeared from western states and by the 1880s they had been extirpated from prairie river bottoms. In fact, by the turn of the century, they had disappeared from most broad, open mountain valleys. Fifteen years later, most foothill country lacked grizzly bears.

Grizzly bears were never extirpated from Montana, but their numbers probably reached their lowest levels in the 1920s. At that time, changes were made out of concern for the future of the species including designating grizzly bears a "game animal" in 1923, the first such designation of the species in the lower 48 states. This change, together with early prohibitions on the use of dogs to hunt bears, outlawing baiting (both in 1921) and closing seasons, allowed grizzly bears to survive in portions of Western Montana.

Sidebar 6. Part A of "How many animals are enough?" Simulation models

Though we wish we could, none of us can accurately predict whether a given wildlife population will still exist at some point in the future. We can only say that, for instance, a bigger population is more likely to persist indefinitely than a smaller one. But exactly how big is big enough to attain such persistence? Answering this question would require accurate documentation of animal population sizes over at least several centuries—in other words, data that we have not yet accumulated—and since we lack such data, biologists must substitute models instead.

These models may be either computer simulations, or theoretical calculations (generally to examine the genetic consequences of small population size). In the former, populations are represented numerically and projected over long spans of time, under varying conditions, to see how long it takes before some of the simulated populations go extinct. We'd like to manage for a population large enough that these simulated extinctions are quite rare. Mark Shaffer, a pioneer of this approach, used the analogy of an industrial stress test, in which the modeled population is deliberately exposed to various conditions to see how it responds, much like an industrial product is exposed to extreme environments to see how well it lasts.

Such an approach is informative, but limited when applied to real-world wildlife management. The industrial stress-test analogy says, in effect, "Let's take this population in its current state, put it in a dark room where nobody can intercede, lock the door, run time forward for a few hundred years, and then return, open the door, and see how it did." Thinking of it this way, some characteristics of simulation modeling may become clearer.

First, the simulation results are a projection, not a prediction. In a projection, we take known current conditions, assume they will remain true for years far into the future that we cannot yet see, and—based on those assumed conditions—imagine what we believe will be some likely outcomes. However, projecting current conditions forward in time is like projecting a small bit of celluloid film onto a big movie screen: every detail is exactly what was on the original celluloid, except bigger. The screen merely enlarges the film; it cannot create any new information. By contrast, true prediction is based not on known current conditions but on unknown future ones; and since those are unknown, true prediction actually cannot be done.

Second and relatedly, a simulation procedure doesn't allow people to monitor and, if needed and feasible, adjust conditions as the population under stress varies in size or resilience. Most populations that "go extinct" in such simulations do so only after a few years in which they have been quite small. In these models, there are no simulated managers or concerned citizens who could take remedial action to save the situation before it's too late. Instead, we remain ignorant of the increased danger that (some of) the populations are exposed to until we return to the locked room years later to examine the wreckage. This is not quite the situation facing a society invested in conserving the species.

Third, there is rarely enough data about a population to be confident that the simulated version reflects reality. In particular, most models assume that, on balance, births and deaths stay in long-term equilibrium. (If births outnumbered deaths continually, even a small population would quickly increase toward infinity; while if deaths outnumbered births continually, even a large population would quickly decline to extinction. In neither case would the model address the question we're asking.) The only two ways to accomplish this equilibrium are i) to use unvarying (i.e., density-independent) birth rates that exactly balance unvarying (density-independent) death rates, such that any deviation from this finely tuned, knife-edge balance will tilt the population upwards or downwards; or ii) to devise a set of (density-dependent) birth and death rates that respond to the population's position compared with its carrying capacity. But we almost never know a population's true carrying capacity, nor exactly how its birth and death rates may change as it moves toward, or away from, abundance (it turns out both of those factors matter quite a lot).

Finally, it is sometimes claimed that such modeling, though imperfect, is at least objective and "scientific"—i.e., independent of, say, human hopes or fears regarding the population's survival. But upon close inspection, this claim also fails. This kind of simulation modelling can only tell us a probability of persistence (or, its mirror image, extinction) over some given time period, and is typically expressed by the quantitative objective "x% chance of extinction within y years." But science cannot tell us what numbers to choose for x and y. Rather, this objective attempts to articulate and quantify a value assumed by the modeler. What probability of extinction are we willing to accept? And how many years do we consider sufficient for a "stress test" type? (It is a mathematical fact that the more simulation years to which one exposes a modeled population, the more likely extinction becomes; that is, given enough simulated years, almost any population would eventually go extinct.) These are values questions that science alone can't answer.

Modelers, like the general public, are free to propose for study any given set of acceptable risks and timeframes except one: They cannot mathematically estimate the population conditions needed to render the chance of extinction zero, forever.

If we try to ignore the fact that someone's values are always an integral part of the modeling process (not necessarily a bad thing), then we don't fully understand modeling.

Sidebar 7. Part B of "How many animals are enough?" Two rules of thumb

Here we'll use genetics to revisit the question of "How many animals are enough to ensure long-term persistence?"

One approach is modeling, which we explored earlier. A second approach is to focus on minimizing the erosion of genetic diversity within a small, isolated population, since such erosion could render the population unable to evolve, if needed, to future conditions. We know that in general, larger populations have more genetic diversity — i.e., more options available from which to develop adaptations to differing conditions — than smaller ones. But how large is large enough to maintain the needed evolutionary potential? We don't have the luxury of observing a variety of wild populations, subjected to changing conditions over time, to see which ones successfully coped and which did not. Instead, we must depend on theory, augmented by well-considered simulation models. Accordingly, below we will explore what might be called "the two rules of thumb."

The first rule of thumb is the "500 long-term rule." It comes from geneticist Ian Franklin, who postulated in 1980 that a population of 500 would be large enough to allow beneficial mutations to indefinitely balance genetic erosion (in particular, "genetic drift"), and thus was a useful response to the question of "How many are enough to retain [long-term] evolutionary potential to cope with future change?" This theory has since met some scientific dispute (Jamieson and Allendorf 2012, 2013 and Frankham et al. 2013), but FWP agrees with Jamieson and Allendorf (2013) that it can be useful in considering long-term needs for population size. Importantly, however, the 500 number refers to the "effective" population size (or "Ne" for "Number, effective"), not to the exact number of animals (or "Nc" for "Number, census"). The Ne size is defined as that which will lose genetic variability at the same rate as an "ideal" population. An "ideal" population, in turn, is defined as one which has discrete, non-overlapping generations and virtually no annual variations in size, and in which there is random distribution of each animal's genetic contribution(s) to the next generation (i.e., by what is called a Poisson distribution). In nearly all wild populations, the Ne is smaller than the Nc; thus, to satisfy Franklin's rule of thumb, more than 500 animals would be needed.

What is the relationship between Ne and Nc in grizzly bears? Harris and Allendorf (1989) reviewed various equations relating these 2 quantities and created simulations of grizzly bear populations. They concluded that—based on demographics and breeding structure—Ne was likely to be in the range of 0.24–0.32Nc, depending on assumptions used, and suggested that a population of about 1,560–2,080 was needed to meet Franklin's criterion. Since then, advances in genetics and theory have allowed better, more data-driven estimates of Ne for the greater Yellowstone grizzly bear population. Kamath et al (2015) estimated that the Ne/Nc ratio had, in recent years, been between 0.42 and 0.66 (suggesting that from 760 to 1,190 bears would be needed to satisfy Franklin's rule of thumb). Regardless, the long-term need for occasional genetic interchange between geographically discrete grizzly populations has not seriously been questioned by biologists (and is not questioned by FWP).

The second rule of thumb, "one migrant per generation" (OMPG), addresses a related question: If an isolated population is reachable by occasional migrants from another (presumably larger and more genetically diverse) population, then how many migrants are needed, and how often, for the entire assemblage to remain genetically secure and to retain any adaptive divergence.

Decades earlier, Sewell Wright (1931), one of the founders of modern conservation genetics, had proposed that under a number of simplifying assumptions, just one migrant per generation (OMPG) would be sufficient to prevent loss of heterozygosity and allelic diversity within a vulnerable subpopulation while still allowing it to respond adaptively to local conditions—and that this single migrant per generation could do the trick for a population of any size. The reason for this counter-intuitive postulation derives from fact that in a small population, one migrant would provide a relatively large infusion of genetic material, while a large population would have less need of the immigration because of its already larger gene pool. A number of simulation studies later confirmed that this OMPG rule of thumb maintained its validity under a variety of assumption violations typical of real-world populations (Mills and Allendorf 1996, Wang 2004), and thus that one migrant per generation, or maybe just over one, remained a useful long-term goal. A genetic metric to reflect the balancing between assuring that the target population would maintain its evolutionary potential while still maintaining necessary local adaptations is called FST--which under OMPG would, after a sufficient number of years, equilibrate at 0.2.

Of course, in the OMPG theory, each migrant must be "effective"—i.e., after entering the vulnerable population, it must contribute to the gene pool by breeding with a resident.

What about the 'G' in OMPG? How long is a generation for grizzly bears? Using methods similar to those used to estimate Ne for Yellowstone grizzly bears, Kamath et al. (2015) estimated a generation to be at about 14 years. To date, we have no evidence that any migrants, effective or otherwise, have made it from the NCDE to GYE area populations. Haroldson et al. (2010) estimated that, at the time, FST was just under 0.1; however, given the lack of migrants, it is likely that this level of similarity is the legacy of historic connectivity.

Current status of identified grizzly bear populations in Montana

Yellowstone area – including parts of Wyoming and Idaho

Abundance

In 2019, population size within the Yellowstone DMA was estimated to be approximately 737 bears (95% confidence interval 657—818) as extrapolated from the number of females-with-cubs estimated using the "Knight-Chao" method, which is known to be biased low (Schwartz et al. 2008). An unbiased mark-resight approach using marked females-with-cubs and systematic observation flights to estimate unmarked females-with-cubs suffers from poor precision, thus making estimates of each year's abundance unreliable. Averages using mark-resight across multi-year periods since 2002 suggested point estimates of between 70 and 80 females-with-cubs (suggesting roughly between 800 and 900 bears). However, these latter estimates have not counted females-with-cubs feeding on aggregations of army cutworm moths, which in 2014 and 2015 numbered roughly 20% the estimate of those observed beyond moth areas. Those females-with-cubs were excluded because counting them would have violated the assumption of the mark-resight approach, that the proportion of the target population marked is similar throughout the system.

In a thorough re-assessment of protocols used to estimate population sizes from observed females-with-cubs, IGBST (2021) considered both the distance rule used to differentiate "unique" from "previously accounted for" females who otherwise could not be differentiated each year, and the statistical approaches used both to interpolate any given years' best estimate and to infer population trends from a time series of such counts (as corrected by the Chao2 frequency-of-capture method). An objective of this work was to move from an algorithm that prioritized minimizing false positive identifications of females-with-cubs (ensuring that any bias in the resulting estimate would produce under-estimates rather than over-estimates of true abundance, but at the cost of decreasing sensitivity to changes in abundance with true population increase) to one that balanced the objectives of accuracy (thus increasing sensitivity to true population change) with minimizing the probability of over-estimation. IGBST (2021) recommended that this balancing was best achieved by revising the distance criterion (by which otherwise undifferentiable females-with-cubs were considered unique) from 30 to 16 km. This revision reduced under-estimation bias considerably, while limiting to probability of any given year's estimate being biased substantially high to between 3% and 12%. For 2019, the point estimate of 737 grizzly bears (Haroldson et al. 2020), would be replaced with a more accurate estimate of about 1,040.

We have less information about abundance of grizzly bears in the Yellowstone area beyond the DMA boundary. During the years 2012–2019, the number of females-with-cubs estimated outside the DMA averaged about 7% of the number estimated within the DMA and other information suggests that males are disproportionately represented among bears outside the DMA. Thus, while we lack a widely accepted procedure to estimate total population size with both precision and accuracy, it seems likely that total population size currently exceeds 1,000 bears.

Ecological status

The preponderance of evidence is that grizzly bears are in approximate equilibrium with the ability of natural habitats to sustain them within Yellowstone National Park and most of the largely wild areas in Wyoming, Idaho, and Montana surrounding it (for references, see Part IV under the summary of science used). Population growth within the 49,931 km^2 (19,278 mi^2) GYE DMA defined by the USFWS has evidently slowed from the rate estimated during the 1980s, 1990s, and early 2000s. Within the DMA, the survival rates of adult grizzly bears have approximated those during the earlier period of rapid increase. However, cub production and juvenile survival during 2002–2012 were lower than during 1983–2001. These latter vital estimates were shown to be negatively associated with estimated grizzly bear density, as was female home range size. These factors, in addition to the slowing of population growth within the DMA, have led to the consensus conclusion that proximity to long-term carrying capacity have led to density-dependent effects being observed on the population scale.

In the Yellowstone area, some of the grizzly bear's historic food resources (particularly whitebark pine seeds and cut-throat trout) have declined and may continue to decline in the future. This may, in time, reduce the long-term capacity of the area to support grizzly bears. However, to date, grizzly bears have been able to adjust their diet and continue to reproduce successfully, producing offspring that can survive to adulthood and reproduce in turn.

Habitat and range expansion

As of 2019, grizzly bears had expanded their area of occupancy to include almost all of the suitable habitats within the boundaries of the DMA. As of 2015, about 27% of the total area Occupied was beyond the DMA boundary. By definition, we know less about the abundance of bears beyond the area where monitoring occurs, but it is likely that density is lower than closer to the more strictly protected core area (at least in part due to lower survival resulting from greater proclivity to conflict with humans), and that the gender balance disproportionately favors males. Within the area designated by the USFWS as the RZ, human access, availability of attractants, and other industrial or commercial activities that tend to displace bears are limited to the point where they are unlikely to cause negative population-level effects. Human access and incompatible activities are less strictly controlled beyond the RZ and ultimately will limit grizzly bear density but—we believe—will not preclude occupancy that is sufficient to provide a population buffer, as well as connectivity to other grizzly bear populations.

Mortalities

In the Yellowstone area, the vast majority of deaths among grizzly bears over age 1 have been caused, directly or indirectly, by humans (typically more than half by agency staff following otherwise unresolvable conflicts). Is this mortality rate too high to achieve a sustainable population—and/or is it an indicator of something inherently "wrong" in the system? Either way, can FWP take any steps to reduce it?

FWP's view is that human-caused grizzly bear deaths are an unfortunate but inevitable result of an expanding bear population that is increasingly closer to agriculture, livestock, residences, and suburban areas. Only the most sparsely populated portions of North America have enough space between humans and bears to keep conflicts to a minimum. Thus, even the relatively large, secure areas of the U.S. Northern Rockies are too small to fully immunize grizzly bears against the risks associated with human populations.

This does not, however, mean that these secure areas are too small to provide the cores needed for grizzly bear populations to slowly increase, and thus to add dispersers to connectivity areas that eventually allow for an interconnected metapopulation. From the perspective of population dynamics, the question is not how grizzly bears die, but rather how long they live before dying. To date, mortality rates have not been so high as to produce a long-term population reduction or to deter continued geographic expansion. Still, each grizzly bear death is unfortunate and FWP, along with other government agencies and non-governmental organizations (NGOs), have made and will keep making strong efforts to prevent, reduce, and mitigate human–bear conflicts. These efforts are the most effective way to reduce human-caused bear mortalities.

Genetics, isolation, connectivity

Grizzly bears living in the Yellowstone area have been isolated from other grizzly bear populations for over 100 years, raising concerns over the genetic effects of small population size. No immigrants into the Yellowstone area population have been documented and both heterozygosity and allelic diversity are among the lowest of North American grizzly bear populations for which data are available. However, these two metrics of genetic diversity declined only very slowly, if at all, from 1985 to 2010. Based on direct estimates from genetic data, the rate of inbreeding has been very low since 1985, and no physiological, behavioral, or demographic effects associated with, or indicative of, inbreeding have been detected. Importantly, compared to estimates from 1910–1960, estimates from 1985–2007 indicate that effective population size (the summary metric best suited to consider genetic effects) has continued to increase, and is well above the level where the short-term effects of reduced genetic diversity would be expected. Currently, all indications are that Yellowstone grizzly bears are genetically well adapted to their existing environment and facing no immediate threat related to population genetics.

However, from a genetic perspective, the Yellowstone population is sufficiently small that isolation from other populations poses risks for long-term viability exceeding 100 years. Although no genetic issues currently limit the ability of grizzly bears in Yellowstone to survive and reproduce normally, their ability to respond evolutionarily to unknown future challenges, including environmental ones, may be limited by low allelic diversity combined with isolation. Thus, introduction of genetic material from other grizzly bears is ultimately required to reduce long-term risks associated with the loss of allelic diversity in the Yellowstone grizzly bear population.

Best estimates are that this long-term genetic risk can be ameliorated by the effective migration into Yellowstone of as few as 1–2 animals per generation (with a generation considered to be about 10–15 years) if continued indefinitely into the future. Thus, genetic connectivity is required over the long-term, but such connectivity can be thought of as a slow and continuous trickle of bears rather than a sudden and dramatic increase of gene flow.

Recent geographic expansions of Yellowstone-area grizzly bears in a northwesterly direction and of NCDE-area grizzly bears in a southeasterly direction, have increased the probability of natural genetic connectivity in the future. A major impediment to achieving connectivity is the rapidly increasing human development associated with Interstate Highway 90 and with other major transportation arteries (see the beginning of Part III, on the geographic setting of the thirty focus counties in Western Montana). Thus, increasing the ability of humans and bears to safely share the Montana landscape is the great challenge that FWP intends to meet.

Northern Continental Divide area

Abundance and trend

Using mark-recapture analyses—with marks being DNA recovered from hair—Kendall et al. (2009) estimated the 2004 population of grizzly bears within their 33,480 km^2 survey area as 765 (95% CI = 715–831). Mace et al. (2012) used vital rates from bears monitored during 2004–2009 to estimate λ, the annual rate of growth, as approximately 3% per year (1.031; 95% CI = 0.928–1.102). Projecting this rate of growth to the estimated abundance in 2004, they estimated population size (including some areas adjacent to the NCDE area) at greater than 1,000 in 2009. Costello et al. (2016) used similar methods in updating the rate of growth during the 2004–2014 period. Depending on how the analysis handled independent females whose fates were undetermined, λ was estimated as 1.020 or 1.027 (with a mean of 1.023). Stochastic simulations yielded a similar mean, with 95% confidence limits of 1.015–1.029. These analyses suggested a 2014 population size, within the 42,600 km^2 DMA, of 960 bears (95% CI = 946–1,089). Independently, and using mark-recapture and DNA approaches similar to those of Kendall et al. (2009) but in a spatially-explicit framework, Kendall et al. (2019) estimated λ during 2004–2012 within their 33,300 km^2 study area as 1.043 (95% 1.017–1.069), although it was slightly higher for females than for males. Updated population trajectories or estimates are not available since that time. However, within the DMA, survival of independent females—by far the most important driver of population trending—averaged 0.94 (SE = 0.01) during 2014–2019. With female survival at this level, fecundity and/or juvenile survival would have had to decline dramatically from their estimates during the 2004–2014 period for the population to have declined. Most likely, the population was at least stable and possibly increasing slowly during 2014–2019.

Habitat and range expansion

Using methods similar to those developed by Bjornlie et al. (2014a), Occupied range in the NCD area increased from 1994 to 2018, when it was estimated to be over 60,000 km^2. The percentage of this Occupied area beyond the DMA boundary increased from about 15% in 2004 to over 35% in 2018. Most of this spatial expansion occurred in an easterly direction and a substantial portion also occurred along the eastern frontier of the NCD population's core. Although grizzly bears far east of the mountains in agricultural areas can avoid conflicts with humans by restricting their movements to riparian areas, they are likely to conflict with human use beyond those linear areas, either by foraging on growing or spilled grain or by seeking shelterbelts or shady areas for daybeds (Skuban et al. 2018) which are typically situated near houses and other structures used by people. By 2018, more of the NCDE population's Occupied range was on private land than was on public land.

Genetics, isolation, connectivity

Unlike in the Yellowstone, Cabinet-Yaak, and Bitterroot areas, we have very little short- or long-term concern about the genetic health of the NCD-area bear population, not only because the metric of genetic diversity provides no reason for concern but also because this population is connected to, and fortified by, Canadian populations to the north. Expected heterozygosity among selected genetic microsatellites in NCD area bears (Kendall et al. 2009, Mikle et al. 2016) was above the mean expected for that latitude (Proctor et al. 2012: 16) and was similar to that observed in large, connected populations in northern British Columbia. Kendall et al. (2009: 10), in noting genetic discontinuities among sections of the NCDE population, pointed out that these differences were similar to those observed between NCDE bears and those in the Prophet population of northern British Columbia, some 1,150 km distant. With population growth and expansion, genetic diversity within the NCDE has increased (Mikle et al. 2016).

Proctor et al. (2012: 25) considered NCD-area grizzly bears north of US Highway 2 to be within the same genetic grouping as those in Alberta and British Columbia south of Canada Highway 3—which Proctor and Morehouse (2021) estimated as numbering approximately 210 bears. Although it would be naïve to view grizzly bear populations on the Canadian side of the border (or those north of Highway 3) as a reliably unending and problem-free connection all the way to the Yukon, there does appear to be sufficient connectivity to provide for occasional genetic exchange. On the British Columbia side, density of grizzly bears in the upper Flathead drainage (studied for over 40 years) has varied, largely in response to huckleberry abundance (McLellan 2015); yet it was among the highest recorded among southern interior grizzly bear densities during the late 1990s, and even at its lowest ebb it was comparable to densities estimated in the NCD area. In the Castle Bear Management Area (between Alberta's southern border and Canada Highway 3), which faces issues similar to those on Montana's East Front, density was estimated as approximately 20 bears per km^2 in the "core" conservation area and 17 per km^2 in the adjacent Support Zone (Morehouse and Boyce 2016c), similar to recent estimates in the NDE area, and was probably growing slowly.

Although Proctor et al. (2012) showed that Canadian Highway 3 reduced demographic connectivity among bears on either side of it, their Fig. 9c also showed considerable genetic overlap among genetic signatures of bears north and south of the highway (with most such overlap produced by male migration, but some caused by relocation of conflict bears north across Highway 3). Efforts are currently underway to reduce the limitations placed on grizzly bear movement by Highway 3 (Proctor and Morehouse 2021). In turn, these southern Canadian populations, while affected by highways and development that constrict connectivity and facing conservation challenges of their own, are not entirely isolated genetically from populations further north.

Cabinet-Yaak area

Abundance and trend

The population of grizzly bears in the CY area, although slowly increasing and fully capable of persistence, remains small. As of the end of 2018, approximately 55–60 grizzly bears were estimated to inhabit the CY area, with slightly more than half of these in the Yaak portion of the area. In 2020, based on the known existence of 30 males, the total population was estimated at over 60 animals. One-half of the 22 bear management units within the USFWS recovery area were occupied by females with young during at least one year during 2014–19 (but only 5 in 2019). The population has been estimated to be growing at a rate of approximately 1% annually. While reproductive rates have been comparable to other grizzly bear populations in Montana and elsewhere in the Rocky Mountains, survival rates have only recently risen to a level supporting population growth.

Beginning in 1990, concerns about low population size led to a program called "augmentation"—meaning the augmenting of a bear population by adding a new bear from outside it. Under this program, grizzly bears occasionally were moved from other areas into the Cabinet portion of the CY area. From 1990 to 1994, the USFWS augmented the CY area with an initial 4 bears (3 of which remained for over 1 year) from British Columbia and from 2005 to 2019—after FWP began cooperating with USFWS on this program in 2005—another 18 (10 females, 8 males) from the Flathead River drainage. Of these 22 total bears, 16 stayed at least 1 year, while 3 (2 females, 1 male) are known to have produced offspring in the area and 6 are known to have died. The augmentation program is considered to have saved the Cabinet sub-section of the CY population from extirpation.

Genetics, isolation, connectivity

Concerns about genetic diversity for grizzly bears inhabiting the Cabinet-Yaak area differ qualitatively from those for Yellowstone grizzly bears. Grizzly bears in the CY are known to be susceptible to deleterious effects of inbreeding because i) the population size is small, and ii) most animals are descended from only a few males. Thus, the short-term effects associated with having an Ne of under 50 are relevant for this population. However, unlike in Yellowstone, CY grizzly bears are genetically indistinguishable from those in the NCDE because of the history of moving bears from the latter into the former. Thus, if the risk of inbreeding can be overcome, there is, unlike in Yellowstone, no particular concern for loss of alleles, putting the CY population at risk of inability to respond adaptively to future environmental stresses.

In recent years, some male—and fewer female—grizzly bears from British Columbia population units called Yahk, South Purcell, and South Selkirk, as well as from the U.S. Selkirk and NCDE areas, have been documented as immigrating naturally into the CYE (Proctor 2018, Proctor and Morehouse 2021). However, outside of the three animals from the augmentation program (in the section immediately above), relatively little gene flow into the CY area has been documented (and, as of this writing, none from the NCD or Selkirk areas). Three bears (two males, one female) are known to have immigrated from the Purcell Mountains into the Yaak portion of the CY, producing four cubs. Although contiguous with the Yaak portion of the CY area on the U.S. side, the Yahk grizzly bear population unit in British Columbia is small (estimated in 2005 to be about 20 bears, with a density of approximately 6.5 bears per 1,000 km^2), and little movement of females has occurred between it and the adjacent South Purcell unit north of Highway 3 (Proctor and Morehouse 2021). Efforts to increase the permeability of Highway 3 to grizzly bears (particularly females) could bolster the conservation prospects of the Yahk area (and, in time, the Yaak and potentially the Cabinet sections of the CY area), because the Purcell area is less affected by constraints to connectivity with larger populations to the north than is the Yahk area (Proctor and Morehouse 2021).

Bitterroot area

Due largely to its many miles of remote and protected habitat, the Bitterroot area (primarily in Idaho, but also extending east to the foothills of the Bitterroot Mountains in Montana) has long been identified as a priority area for grizzly bear recovery (Mattson and Merrill 2002, Roy et al., 2001, USFWS 2000). Merrill et al. (1999) identified the Idaho portion of the Bitterroot area as potentially suitable for grizzly bears. Extrapolating from Resource Selection Function models developed in Yellowstone and the Swan Mountain Range, Boyce and Waller (2003) projected that the Bitterroot area could potentially support over 300 grizzly bears. Using a more general predictive model, Mowat et al. (2013) predicted that the Bitterroot area could support over 400. Boyce et al. (2002) used theory and estimates of the potential population size in the Bitterroot to bolster the case that even a small population in the greater Bitterroot area would substantially buffer grizzly bears against complete extirpation in the U.S. Rocky Mountains, assuming low levels of dispersal among the NCDE, Cabinet-Yaak, and Bitterroot populations.

As of autumn 2022, there is not a population of grizzly bears in the Bitterroot system. However, individual animals have been documented within, or very close to, the Bitterroot system, including from the Cabinet-Yaak and the NCDE (Missoulian 2019, USFWS 2019, Kasworm et al. 2020, Nadeau 2020). Thus far, apparently these animals have left the area in one of three ways: they have naturally returned to their place of origin; they have been moved by management agencies; or they have been killed by humans. Recent reports continue to suggest that a few individuals may be finding their way to the Bitterroot area. Evidence from GPS collars suggests that male bears are capable of occasionally moving among grizzly bear core areas: A bear originally captured near Whitefish and placed in the Cabinet-Yaak area moved back and forth across Interstate 90 in two successive years, spending a few months during summer 2019 in the Bitterroot mountain range, before ultimately losing its tracking collar in the Whitefish range. However, in order for grizzly bear recovery to occur in the Bitterroot area, additional demographic connectivity from other populations, particularly for female bears who are unlikely to travel as widely as males, will be required.

Additional background on issues and alternatives

Numerical objectives

FWP has developed numerical objectives, often specific to regions or hunting districts, for some species (e.g., elk) but not for others (e.g., mountain lions, mountain goats). Indices of grizzly bear abundance in the GYE and NCDE have been developed by the USFWS as part of assessing progress toward recovery and these form part of FWP's planning efforts. At recovered levels, the number of grizzly bears in Montana would be sufficient to assure long-term persistence, assuming continued habitat security and continued work to minimize human–bear conflicts. However, independent of requirements under the ESA and commitments to the two Conservation Strategies and understanding that some Montanans believe there are too many grizzly bears in the state and others believe there are too few, FWP views the grizzly bear as a species for which detailed numerical objectives would not be useful.

Distributional objectives and population connectivity

As mentioned elsewhere, Montana FWP is a signatory to the two completed Conservation Strategies and is a member of the IGBC subcommittees for Montana's four Ecosystems (GYE, NCDE, SCE, BE). As such, Montana FWP has committed to do its part to achieve and sustain recovered grizzly bear populations in the 4 RZs. (FWP takes the position that grizzly bears in and around the GYE and NCDE areas have reached federal recovery goals).

However, a fundamental tenet of responsible wildlife management is to avoid managing for isolated populations that number as few as Montana grizzly bear populations currently do (and would into the foreseeable future). Thus, even if federal delisting rules were to eschew such considerations, FWP recognizes the value of providing functional connectivity between population cores. Connectivity in this sense should not be interpreted as requiring one seamless group of animals stretched across the various population cores; instead, occasional migrants among the cores will suffice and these can be provided by a long-term average density of bears that is lower than the density in the population cores. FWP recognizes that lands on which this connectivity would occur are not managed with grizzly bears as a recognized priority; public lands are more heavily roaded and used than are areas identified as "secure" by inter-agency plans, and human–bear conflicts on private lands must be avoided. FWP favors working with partners to gradually increase the capacity for coexistence (recognizing that this will require efforts from people and entail some suffering for bears), and remains optimistic that, long-term, the level of coexistence will provide for the needed connectivity. However, if connectivity cannot be achieved in this way, artificial connectivity (occasionally moving bears among cores) can be used to achieve the goal of increased genetic diversity.

Considering that the landscapes between secure areas are more heavily populated, developed, and traveled than are the cores that have supplied the engines of grizzly bear recovery, and that deaths of grizzly bears older than cubs are overwhelmingly caused by people, a reasonable question is whether this vision can work biologically. We can expect that, even with effective conflict prevention and public education about coexistence, grizzly bears will encounter a higher risk of dying (directly or indirectly) due to interactions with people, particularly in the areas between cores that are not subject to restrictions on human use (other than restrictions designed to reduce attractants). Will this higher mortality doom the efforts to allow for long-term connectivity? Or alternatively, is there a feasible future that acknowledges the inevitably higher risks for animals that are between core areas, while still providing the desired connectivity between those cores?

Population biologists use the term “source-sink dynamics” to describe populations overlaying some habitats that create conditions in which reproduction exceeds mortality and other habitats in which mortality exceeds reproduction (Pulliam 1988). A number of studies linking grizzly bear population dynamics to habitat conditions (particularly those highly influenced by human activity) have shown or postulated the existence of such source-sink dynamics (e.g., Schwartz et al. 2006d, 2012; Ciarniello et al. 2007). Although the presence of habitats in which additions fail to balance subtractions raises legitimate concerns about overall sustainability, readers should keep in mind that the source-sink concept was developed to explore conditions under which populations could persist in their presence. It would be erroneous, if understandable, to equate a population “sink” with an unstopped “drain” through which all the animals disappeared. Whether a population can persist in the presence of “sinks” depends on the strength and proximity of sources, the “depth” of the sinks, the proportions of the population using sources and sinks, and the details of movements and dispersal of individuals among them.

A related concept, sometimes conflated with source-sink dynamics, is that of an “ecological trap” (also termed an “attractive sink”). In this concept, habitats exist that not only provide insufficient safety or resources for animals’ recruitment to balance mortality but are also attractive to those animals (Battin 2004). That is, the evolutionarily developed cues that animals use to tell them where they’ll do well are no longer a good match for the existing conditions in these habitats; animals are “lured” in (perhaps from better habitats), as it were, despite these habitats not actually providing for their life requisites. For grizzly bears, human attractants in populated areas have the potential to create such ecological traps. (For North American grizzly bear populations, see Northrup et al. 2012 and Lamb et al. 2017; for European contexts, see Steyaert et al. 2016, Penteriani et al. 2018.)

The distinction between the two concepts (source-sink vs. ecological trap) is important: grizzly bears in the U.S. Rocky Mountains can plausibly persist within a source-sink system but would likely be on a downhill trajectory if too many of the sinks became ecological traps. The primary way to prevent this would be to reduce or secure attractants to grizzly bears that are likely to ultimately result in their deaths. In contrast, the presence of a population sink doesn’t necessarily doom the overall population as long as the population trajectory within it isn’t too strongly negative, and the sink is close enough to sources that are, in turn, strong enough to maintain occupancy. That is, a patch of land may be a “sink” but may also, at the same time, serve to provide or enhance connectivity.

An empirically based model of grizzly bear persistence in Western Montana

The most applicable examination of how source-sink dynamics appear to be operating for grizzly bears in Western Montana is that of Lamb et al. (2020). These authors used a large data set of grizzly bear studies in British Columbia (with almost 2,700 individual bears followed, either genetically or through telemetry, in 41 different studies) to understand how survival and reproduction varied by the magnitude of human influence on each individual landscape. In addition to finding (as other studies have) that grizzly bears tend to become more nocturnal when in closer proximity to humans and their infrastructure, Lamb et al. (2020) found that a freely available database called the “Human Influence Index” was a good predictor for the rate at which grizzly bears would die. This resource allowed them to develop a map that predicted the growth or decline of a given grizzly bear population in any given part of British Columbia. Lamb et al. (2020) summarized their findings as “a striking paradox of coexistence: The mobility of [grizzly] bears averts extirpation through demographic rescue, yet these same animals face considerable risk once they arrive near people…connectivity to wilderness[6] is a critical mechanism of coexistence…bear density in human dominated landscapes often remains an order-of-magnitude lower than in wilderness areas…and would rapidly be extirpated without continual immigration… [and without] social tolerance for [grizzly bears], and creative solutions for coexistence.”

In the figures, we applied the model developed by Lamb et al. (2020) to Montana west of the Continental Divide (see Sidebar 8. for methods). These maps can be interpreted as providing insight into two important questions: i) If the “seed” of a population of grizzly bears has been initiated outside of a Recovery Zone, then according to the Lamb model, what would be that population’s expected trajectory (λ)? and ii) If the expected trajectory is negative, how far away is that population from a putative source that could supply immigrants?

We caution readers against focusing on the exact λ values; those values are derived from studies in British Columbia, and thus may be higher or lower than values observed in Montana. Instead, readers should focus on the fact that the relative differences in growth rates most likely reflect what we can expect, given current levels of human influence. It would be incorrect to interpret the λ in a given area as indicating the rate at which the grizzly bear population is changing now (the map includes areas with no extant grizzly bear population). The λ values are conditional; they illuminate the underlying long-term trend we would expect to see, should there be enough animals to constitute a population considered capable of having a trend. Similarly, areas other than those shaded in dark blue should not be considered as areas where grizzly bears cannot possibly be found at any time, but instead as areas where persistence requires immigration. (Of course, FWP cannot directly increase immigration—but it can take steps to facilitate coexistence, increasing the probability that immigrants will survive.) Finally, we caution that these maps do not predict where grizzly bears will find connectivity, but instead depict the likely source-sink dynamics underlying, and informing, the management approaches available to FWP. The maps can help FWP prioritize conflict reduction resources by suggesting: i) where survival rates are consistent with sustainability; ii) where the mortality of bears must be reduced if connectivity is a goal; and iii) where it makes little sense to prioritize connectivity (because human influence is already so high as to make connectivity infeasible).

FWP interprets these maps as providing optimism that, assuming the continuation of conflict prevention and response programs and the continuation of approximately current levels of human infrastructure, grizzly bear connectivity (at least west of the Continental Divide) can gradually be accomplished—even in the presence of human–bear conflicts, and some resultant deaths of bears.

[6] “Wilderness” here is a general term, not necessarily equated with federally-designated wilderness under the U.S. Wilderness Act of 1964.

Sidebar 8. Development and interpretation of home range estimates

Development

To develop Figures 16 and 17, FWP downloaded from https://doi.org/10.7927/H4BP00QC the raster format GIS Human Influence Index (HII) and, with one exception (explained below). applied from Lamb et al. (2020a) the summary relationships between HII and asymptotic population growth (λ) that ignore minor differences in grizzly bear reproduction associated with vegetative productivity. (In the Lamb models, this vegetative productivity was indexed by the Normalized Difference Vegetation Index, abbreviated as NDVI, which accounted for a small proportion of variance.)

In consultation with Dr. Lamb, we began by comparing Montana's grizzly bear habitats that lie west of the Continental Divide (which are characterized by human-dominated valleys with roads, homesites, small communities, and small-scale agriculture) to those that lie east of the Divide (which are characterized by livestock-dominated areas) and decided to focus on the former, which are more similar than the latter with the British Columbia study areas that informed Lamb's model.

The HII values in turn reflect human population density, infrastructure, and access, and vary from 0 (no human impact) to 64; in the areas of study, generally the HII values were below 40. HII does not model grizzly bear mortality directly, but the model does account for the relationship between HII and mortality.

We altered the mapping protocol used by Lamb et al. (2020) in one respect: Rather than apply the predicted λ at the smallest possible (i.e., 1 km^2 pixel) scale, we used a moving-window protocol to assign to each pixel the λ resulting from the mean HII at the scale of the average home range, reasoning that these were more meaningful spatial scales on which to envision population growth rates. (Note: As shown respectively in Figures 16 and 17, the mean home range for a female is 358 km^2, and for a male is 1,364 km^2.

Regarding any possible analogies to areas east of the Continental Divide: Again, we excluded those areas due to different conditions (e.g., more livestock and other agricultural attractants) and thus different reasons for grizzly bear mortality. Thus, we lack an analogous model to illustrate how, and indeed whether, such source-sink dynamics might play out there.

Interpretation

Figure 16 is for female grizzly bears, while Figure 17 is for males.

- Both depict Montana (west of the Continental Divide) and show, based on Lamb et al. (2020), extrapolated rates of grizzly bear population growth outside recovery zones.
- In both, the NCDE and CYE recovery zones are considered sources.
- In both, the color key is the same: Dark blue areas (should they become colonized) are seen as able to sustain sustaining grizzly bears even without immigrants; other colors indicate λ of less than 1.0, so they are considered sinks—i.e., not sustainable without a certain proportion of occasional immigrants from sources to prevent population decline. White isopleths indicate distances from the presumed source.
- In both, human influence is assumed to drive bear mortality (and thus λ) at the spatial scale of the mean home range in the NCDE; again, Figures 16 and 17 show the mean home range for a female (358 km^2) and a male (1,364 km^2).

Figure 16. Averaged within female home ranges: Extrapolated rates of population growth, NCDE and CYE

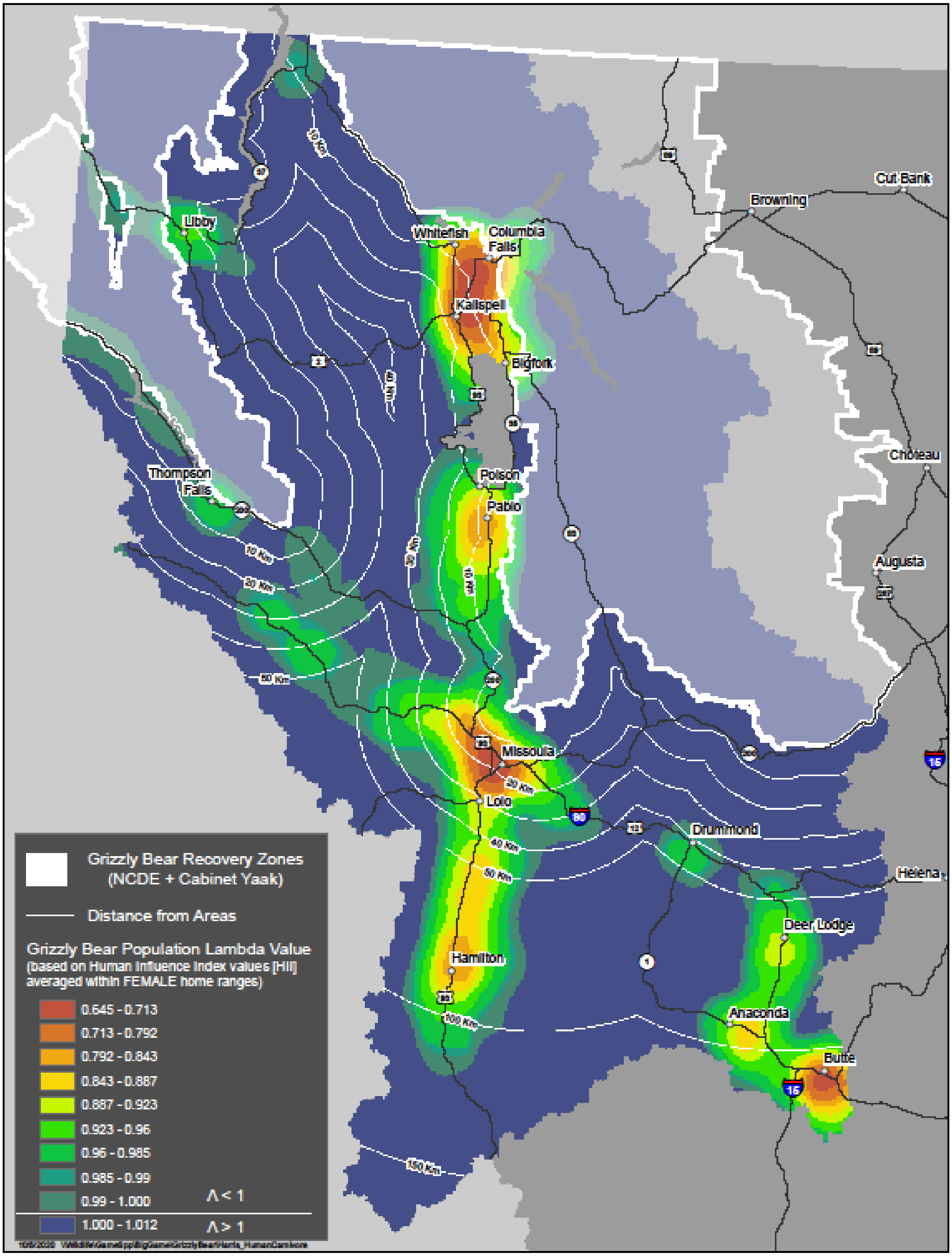
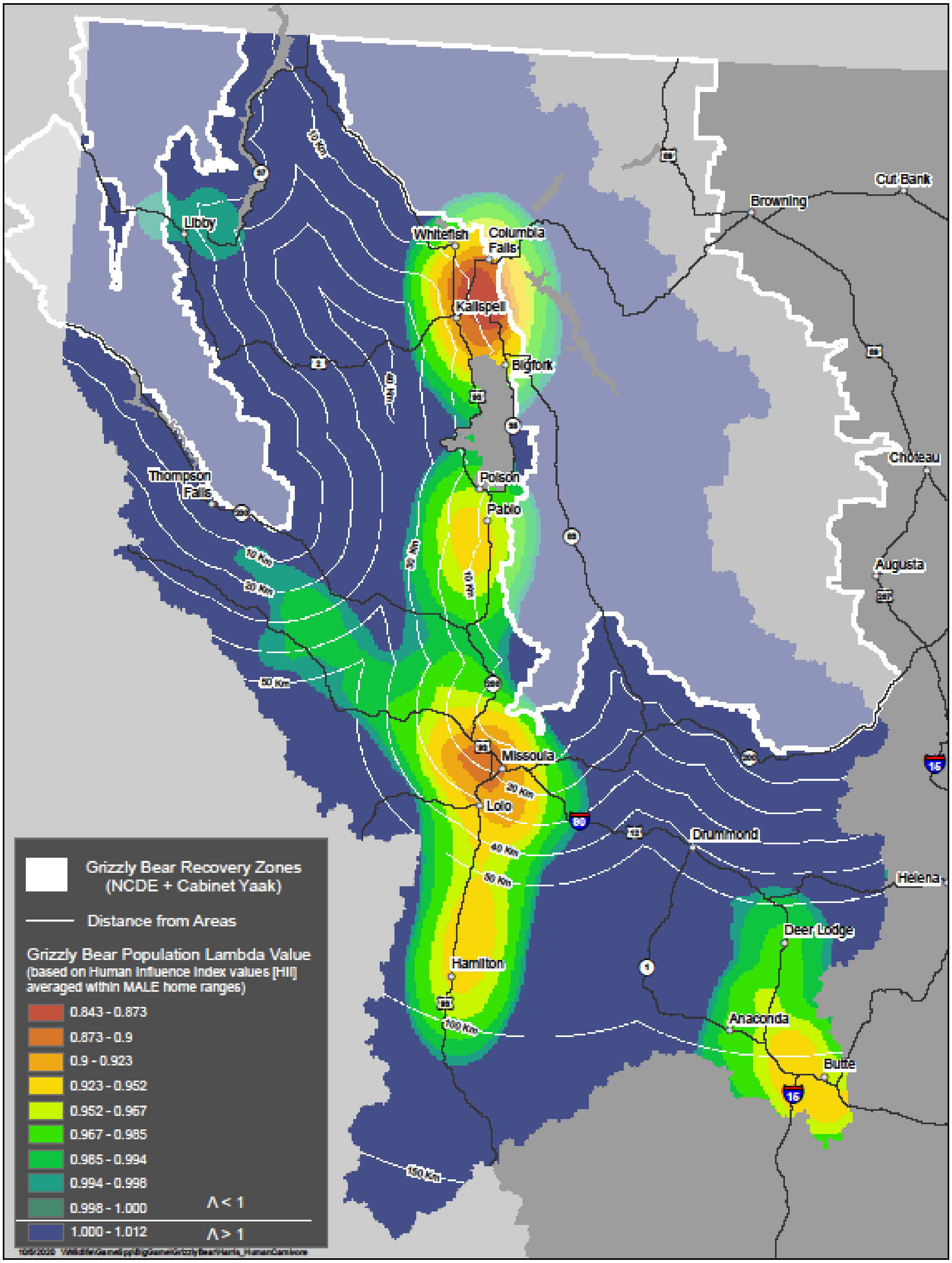


Figure 17. Averaged within male home ranges: Extrapolated rates of population growth, NCDE and CYE



Human safety

It hardly requires restating that grizzly bears are dangerous animals. According to statistics compiled by the FWS for the decade 2011–2020, there were 32 incidents in Montana that were categorized as "attacks." The locations of these incidents were as follows: 17 were in the GYE; 13 were in the NCDE (of which 4 were within Glacier National Park); and 2 were in the CYE. The severity of human injury from these incidents was as follows: in 15, severity was minor (i.e., less than 24 hours in hospital); in 12, severity was major (i.e., more than 24 hours in hospital); in 1, severity was fatal; and in 4, severity of injury was not recorded. The human activities just before these incidents were as follows: In 17 (53%), hunting (or related activities); in 10, hiking; in 2, bicycling; and in other cases, gathering, working, or involved in unknown activities. Bear spray was carried, either by the victim or by someone in the victim's party, in 12 of the incidents and was used in 8. In 2021 there were 15 incidents and 1 human fatality in the Montana portion of the GYE; and 18 incidents and 1 human fatality in the NCDE.

Bear spray, which has an active ingredient of some form of capsaicin pepper, is generally considered highly effective in deterring a grizzly bear attack (Herrero and Higgins 1998, Smith et al. 2008). Although not difficult to use, some people do not understand that it is a deterrent rather than a repellent or that it is only useful within a short range (typically 10–12 m). Most practitioners recommend practicing using bear spray (particularly becoming adept at removing the safety device), keeping it from extreme temperatures, and acquiring fresh bear spray after about four years of storage. Although windy or extremely cold conditions can compromise the effectiveness of bear spray, Smith et al. (2021) concluded that it would still have utility under most adverse conditions.

Conflict prevention

Regarding conflicts with grizzly bears (and sometimes with black bears or mountain lions as well), FWP has been a leader in both prevention and response efforts. The term "human–bear conflict" (or "conflict" for short) is rarely defined rigorously, if at all, when invoked in everyday speech or even in reports and technical papers. This plan provides a definition (see Definitions) but acknowledges that the word is often used generally, without rigorous definition, in common parlance. Thus, readers should keep in mind the looser, less precise usage often adopted.

As of summer 2021, FWP supported a total of 10 bear managers in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell (2), Libby, Missoula, and Red Lodge. Despite uncertain funding, FWP has also supported assistants (some only seasonally) for many of those locations. In Region 2 , FWP also provided in-kind support and close technical assistance through a bear management specialist and range-rider employed by the landowner-led Blackfoot Challenge group. Thus, during the non-denning season, a team of 14 staff have actively worked with landowners to address conflict issues and to respond to individual grizzly bears involved in conflicts.

These FWP staff, in turn, coordinated closely with similarly trained and tasked staff on the Flathead and Blackfeet Reservations (both of which employ fully trained, full-time bear managers), and at Glacier and Yellowstone National Parks. They also coordinated closely with a statewide conflict prevention specialist employed by USDA-Wildlife Services (based in Missoula). Where large livestock were involved in potential or actual conflicts with grizzly bears, they also coordinated closely with USDA-Wildlife Service conflict response staff.

The contributions of non-governmental organizations (NGOs) in helping to minimize human–bear conflicts cannot be overstated: FWP staff routinely coordinates with many NGOs who conduct their own activities to educate and support landowners, recreationists, and citizens to prevent conflicts. In addition to the internationally recognized work of the Blackfoot Challenge (noted just above), indispensable contributors in their various regions have included (in alphabetical order):

- Big Hole Watershed Committee, which employs a range rider and operates a livestock carcass collection program;
- Bitterroot Bear Aware Collaborative, which helps subsidize bear-resistant sanitation receptacles for communities and provides education about bears;
- Blackfeet Nation Stock Growers Association, which has provided education about electric fencing and ranching near grizzly bears generally along the East Front;
- Clearwater Resource Council, which works in the Seeley Lake area to install electric fencing and bear-resistant sanitation tools, thus helping to prevent future food rewards and habituation there;
- Conservation Science Collaborative, which helped to facilitate a range rider and information about livestock guard dogs on the East Front;
- Defenders of Wildlife, which helps provide electric fencing by cost-sharing and by assisting in installation;
- Great Bear Foundation, which has organized volunteer-drive fruit pickups, to discourage bears from congregating around feral apples and other fruit trees;
- Greater Yellowstone Coalition, which has helped fund a range rider in the Gravelly Mountains and also helped to facilitate bear-resistant sanitation receptacles on public lands;
- Madison Valley Ranchlands Group, which supports construction of a livestock composting facility in Madison Valley;
- People and Carnivores, which provides education, works with selected landowners to implement conflict prevention, and has pioneered new approaches to secure attractants from grizzly bears;
- Swan Valley Bear Resources, which helps landowners to prevent conflicts by providing fruit gleaning, bear-resistant sanitation receptacles, electric fencing, education, and more;
- Tom Miner Basin Association, which works to secure attractants in the area northeast of Yellowstone National Park;
- Watershed Restoration Coalition, which supports construction of a livestock composting facility near Deer Lodge;
- Western Landowners Alliance, which has provided support programs to help ranchers living with difficult predators.

Many of these organizations have received financial support from the Vital Ground Foundation or the Montana Outdoor Legacy Foundation. The latter is also a major funder and supporter of FWP's own conflict prevention work, which continues to incorporate new technologies and new lessons learned from experience. Although there is statewide consistency in the overarching goal (conflict-free coexistence of people and bears) and in many of its supporting strategies, the focus and activities toward that end are somewhat variable among FWP regions and individual bear managers, largely due to different sources of human–bear conflicts.

FWP bear managers' conflict objectives and recent related activities are summarized below.

The below objectives have been articulated:

- work with landowners to identify and secure attractants;
- work with government agencies to promote food storage on public lands;
- work with city, county, state, and federal governments to minimize conflicts;
- provide information and outreach about conflict prevention to the media;
- educate the public about how to live and recreate safely in grizzly bear country;
- respond to conflicts on private and public land; and
- build relationships of trust with and among landowners, NGOs, agency staff, and the public.

The below activities have been pursued as well by bear managers, who have worked with landowners to erect over 400 temporary or permanent electric fences to separate bears from potential attractants. In 2020 alone, managers responsible for the northwest section of the NCDE (and surrounding lands) performed the following activities:

- worked with waste management staff from the counties of Flathead, Lake, Lincoln, and Missoula, as well as from the municipality of Whitefish, to improve resistance to bears in various waste transfer stations;
- installed permanent electric fencing to protect small livestock for 10 landowners;
- loaned temporary electric fencing to 8 additional landowners;
- worked on developing electric screens and mats, to fortify electric fences and to prevent access to grain bins;
- loaned motion-activated noise makers ("Critter Gitters") to landowners on 24 occasions;
- loaned 10 bear-resistant sanitation containers;
- continued to lead and facilitate a locally based group to pick excess fruit (which otherwise would attract bears),
- helped lead public "bear fairs" in 4 small communities and made presentations at twelve public meetings.

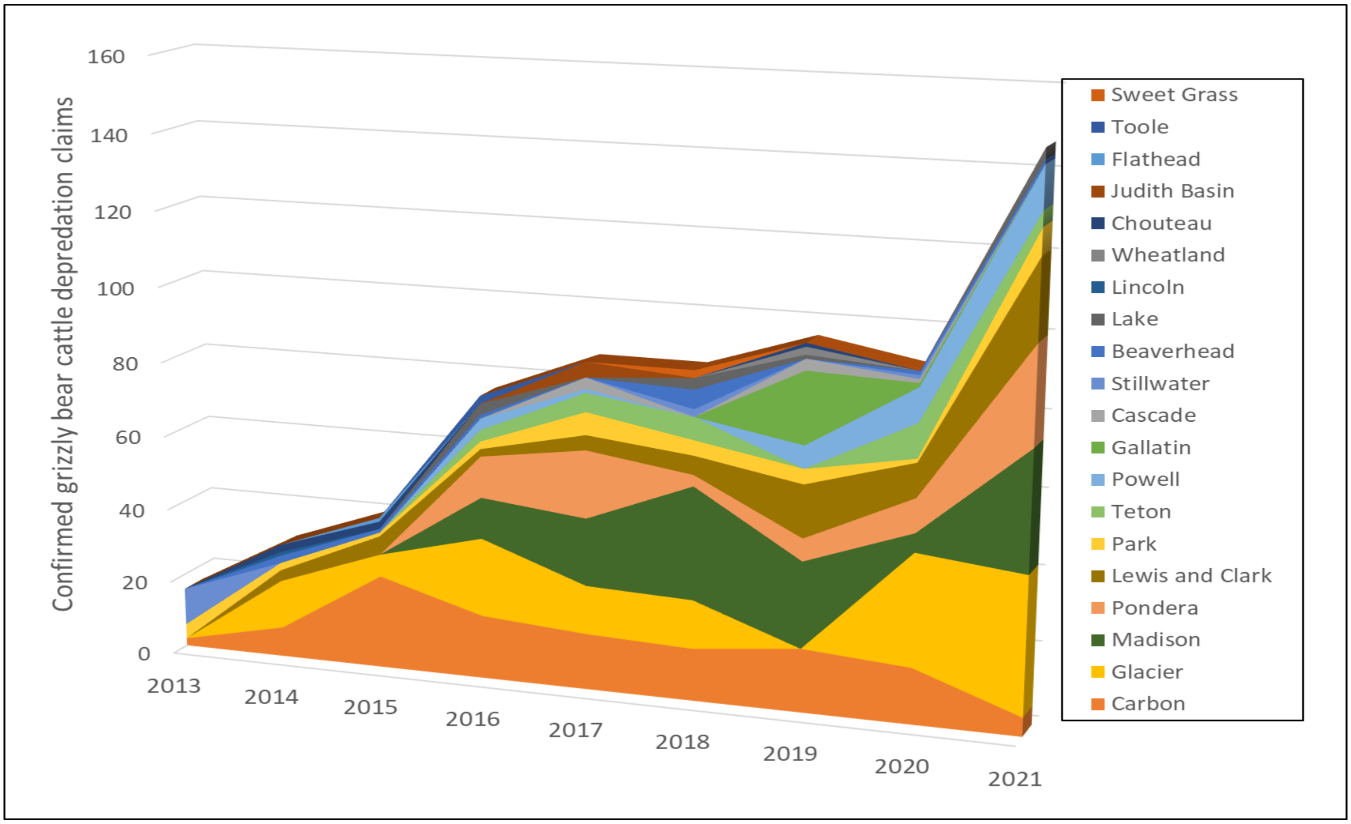
In 2019, FWP bear managers responsible for the CYE provided education or training in minimizing conflicts at 32 events or meetings.

Because not all depredation by grizzly bears on livestock is discovered, reported, or confirmed, we lack a complete census of livestock lost (Harris 2020). The most rigorously vetted data set is that compiled by the Livestock Loss Board (LLB, Montana Department of Agriculture, https://liv.mt.gov/Attached-Agency-Boards/Livestock-Loss-Board. Since 2013, LLB has reported claims of livestock losses to wolves, grizzly bears, and mountain lions. To determine eligibility for compensation, each claim must be verified by USDA-WS.

From 2013 to 2021, LLB statistics show 676 claims of individual cattle (mostly calves, although these are not distinguished in the data set) killed by grizzly bears. During this period, the number of individual cattle losses claimed by county were: Glacier, 133; Madison, 119; Carbon, 118; Pondera, 73; Lewis and Clark, 63; and the rest scattered throughout the remainder of the 30 counties. Claims by county varied annually, probably reflecting the idiosyncratic nature of human–bear conflict generally, but clearly increased almost linearly during the nine-year period (increasing, on average, by about 14 cattle claims annually—see Figure 18). Harris (2020) reviewed the literature on predator-induced losses of livestock, concluding that verified losses almost certainly understated true losses.

Figure 18. Montana cattle (including calves) lost to grizzly bears

From 2013–2021—verified by USDA-US. Montana Livestock Loss Board, https://liv.mt.gov/Attached-Agency-Boards/Livestock-Loss-Board/Livestock-Loss-Statistics-2022.



Also during 2013–2021, a total of 250 sheep were verified and claimed as lost to grizzly bears—mostly from the counties of Pondera (66), Teton (54), and Toole (53). Temporal and spatial patterns of depredation are more variable for sheep than for cattle, likely due to wide variations in the number of animals involved: most sheep depredations involved fewer than six animals, but some involved dozens.

Livestock carcasses

Especially in early spring, when bear hibernation ends and livestock are most likely to die, grizzly bears will feed on available livestock carcasses—bringing the bears closer to livestock and humans (Newsome et al. 2015) and increasing the likelihood of conflicts. Bear managers have used one of three responses: i) move the carcasses to remote locations, thus diverting bears from coming near people; ii) by remove carcasses and deposit them in secured locations where bears cannot gain access; or iii) electric fencing for private boneyards to prevent bear access and aggregation.

There is little doubt that it is undesirable to leave such attractants as livestock carcasses and boneyards near human infrastructure (Wilson et al. 2005, 2006). Some ranchers have, either on their own initiative or as a result of agency recommendation, moved carcasses from lands they control to areas that are somewhat more remote. FWP and NGO programmatic approaches have included either preventing bears from accessing these resources entirely (either by moving them to protected dumps or compost piles) or redistributing them to remote areas where it is expected they serve to detain bears from moving closer to people while also providing a supplemental source of food (Madel 1996). Electric fencing of private boneyards has also been effective at reducing bear use of ranches (Wilson et al. 2005). Livestock carcass removal programs have been initiated by the Blackfoot Challenge (with indirect support from FWP) in the Blackfoot River drainage (Wilson et al. 2014, 2017), on the Rocky Mountain Front by FWP, and in the Big Hole areas (by the Big Hole Watershed Committee).

The only organized program of livestock carcass redistribution known to us is that begun by FWP Region 4 in 1987 and continuing through at least 2017 (Madel 2017). Aune and Kasworm (1989:262) suggested such a program could serve to detain grizzly bears in the East Front foothills during spring, thus reducing bears' use of private lands further east. They envisioned this program as a transition step toward altogether removing livestock carcasses as a source of bear food, adding that the program should not be a general "feeding program" and should not redistribute more than 10–20 carcasses per year.

Madel (1991, 1996) considered that livestock carcass redistribution reduced conflict compared with private boneyards near residences (although evidence of success was anecdotal) and that it also functioned as a substitute protein source for grizzly bears who historically would have had greater access to spring carcasses from ungulates (bison and elk). The livestock redistribution program implemented by FWP along the East Front of the Rockies gradually has been reduced in recent years. The number of carcasses involved per year was 222 in 1989–1990, 139 in 1991–1994, and only 22 in 2017 (Madel 1991, 1996, 2017), as privately-operated boneyards providing carcasses for redistribution were phased out. It is unknown, however, to what extent private boneyards have been replaced by smaller-scale, privately-operated analogues of FWP's carcass redistribution program.

There are no reports of rigorous, controlled studies comparing the effects on human–bear conflict of diversionary use of carcasses versus carcass removal (Garshelis et al. 2017). Feeding of bears is a common practice in Europe (typically using both maize and livestock carrion), often conducted in association with hunting but also with the objective of diverting bears from settled areas and reducing depredation on sheep. After the European Union banned the use of carrion in feeding stations in 2004, Kavĉiĉ et al. (2013) found that bears in Slovenia continued to use feeding sites (now supplied only with maize) at similar rates as before the ban, and that depredation rates on sheep did not change. Kavĉiĉ et al. (2015) used this finding—along with concerns that supplemental feeding could increase reproductive rates and thus could indirectly increase bear-human conflicts—to urge caution when considering continued supplemental feeding in the European context. Jerina et al. (2015, cited in Garshelis et al. 2017) found an inverse correlation between time Slovenian bears spent near feeding sites and time spent near settlements during autumn, although not at other times of year. See also Robbins et al. 2004:168.

In spring 1998, the provincial government of Alberta began moving road-killed ungulate carcasses to remote sites (1,430–2,013 lbs., or 650–915 kg, per site per year) in a quest to reduce springtime livestock depredation. After this program ended in 2014, Morehouse and Boyce (2017b) examined its effectiveness. During the program's last two years of operation, they found that 12 monitored sites were used by 22 uniquely DNA-identified grizzly bears (roughly one-quarter of resident grizzly bears and about 13% of all detected grizzly bears). During the first year after the program's end in 2014, none of those 22 bears was identified from available hair samples obtained opportunistically at spring conflict sites, suggesting that there was no immediate rush by the bears to replace the suddenly unavailable carcasses with living livestock at the conflict sites.

Throughout the study period, livestock depredations had been increasing in areas further east from the mountains in Alberta (as in Montana), but this trend did not change with cessation of the carcass intercept program (Morehouse and Boyce 2017a). Spring livestock depredation incidents were fewer in the 2 years post-program than in the program's final year, although more than in other years of the program's existence. Assessing the possible effects of the program on conflict incidence, always a difficult proposition, was further complicated in this case by the increasing effectiveness of community-based conflict prevention efforts (Morehouse et al. 2020).

Conflict response

Many calls received by FWP bear managers do not require a conflict response. These calls may involve requests for information, observations of a bear that the reporting party does not consider threatening, or other issues that can be handled by telephone. Among incidents that are appropriately considered conflicts, most are addressed with site visits and efforts (such as securing attractants) to prevent bears from returning. If the bear in question is still nearby during the site visit, sometimes an attempt is made to use hazing (informal aversive conditioning) to discourage it from returning. However, in many cases these measures alone do not resolve the issue, and the possibility of capturing the bear is considered.

At this point, FWP staff members generally begin communication with the USFWS grizzly bear recovery coordinator to discuss options. If there is a failure of conflict resolution efforts that do not involve handling bears, then it often occurs that the joint decision is made to set traps and attempt to secure physical control of the bear(s) in question. When depredation upon livestock is suspected, USDA-WS is involved in the investigation and makes the determination as to whether depredation by grizzly bears is confirmed. If a bear is successfully captured, further discussions ensue regarding which of four dispositions of the bear is most appropriate.

Release onsite

In this option the bear is released back to the original site, typically with a radio collar to facilitate tracking. This option may be appropriate for several reasons: i) sometimes the captured bear was not the one understood to be involved in the conflict; ii) sometimes the mere act of capture and release will deter the bear from further conflict behavior; iii) sometimes only some members of a bear's family group were captured.

Short-distance relocation

In this option the bear is relocated to a new site that is far enough away from the original site to eliminate (at least temporarily) the conflict potential, but not so far away that the bear is unlikely to know how to procure resources and avoid aggressive conspecifics. The relocation sites are selected—based on safety, accessibility, and capacity to absorb additional bears—from a list of sites previously approved by the land manager. Even if the bear returns to the conflict site, this option may buy time for FWP staff to work with people on such steps as removing or securing attractants.

Long-distance relocation

In this option the bear is relocated to a more distant site, where it is less likely to return to the conflict site (Milligan et al. 2018). Sometimes these relocated bears settle into their new home; other times they wander widely, eventually establishing new home ranges or settling in areas that cannot be predicted in advance. Other times they eventually return to the previous home range. As with short-distance relocation sites, the relocation site is selected—based on safety, accessibility, and capacity to absorb additional bears—from a list of sites previously approved by the land manager.

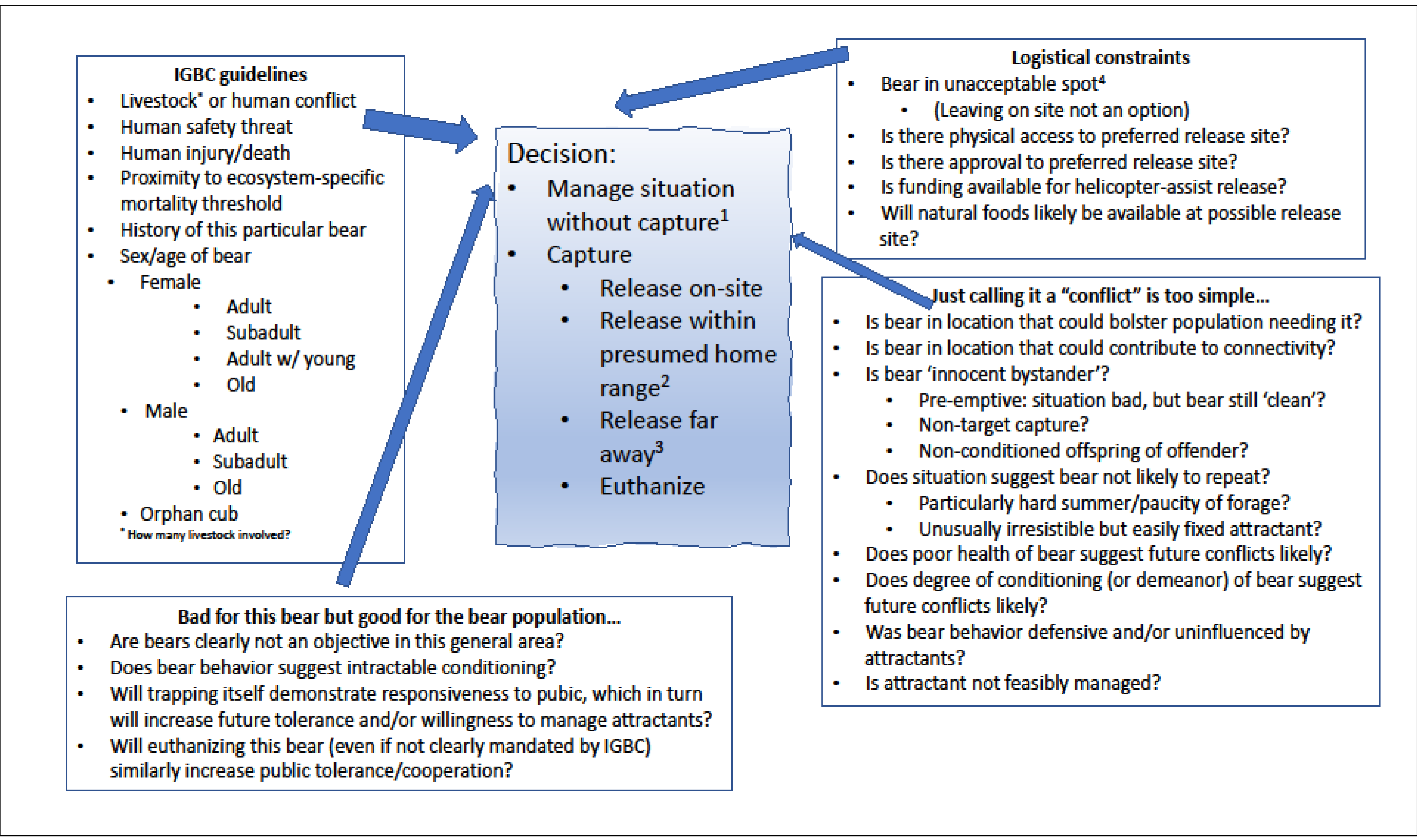
Euthanization

In this option the bear is euthanized. Typically, hides, skulls, or other parts are retained by the agency and donated for educational purposes.

Figure 19 shows the factors considered once a decision has been reached that a bear requires hands-on attention.

Figure 19. When human–bear conflict is verified: Flow of considerations and responses

1 includes attractant management and, often, also hazing or aversive conditioning.
2 is short-distance relocation—releasing the bear a short distance away and encouraging it to return to natural foods in the area.
3 is long-distance relocation—releasing the bear farther away, allowing time to manage attractants and otherwise reduce conflict potential even if the bear returns later; alternatively, some bears will settle in the relocation area.
Note: Relocation could be unsafe for people (if near human infrastructure like a golf course) or bears (if near a hazard like a cliff).



Sometimes traps are set before a conflict is documented, in situations where a decision is made that a bear is in a risky place (even if it never causes damage). These are typically termed "preemptive captures." At other times, a bear other than the targeted one is captured. On rare occasions, orphaned cubs are captured and transferred to a temporary holding facility, and a permanent facility is found for them.

During the four non-denning seasons from 2017 to 2020, FWP staff led or were heavily involved with 176 "management" or conflict captures. Of these, 145 (82%) were inside of, or closest to, the NCDE recovery zone (and of these, 84 (58%) were in the northwest (FWP Region 1), 12 (8%) in the southwest (FWP Region 2), and 49 (34%) east of the mountains (FWP Region 4). Twenty-seven captures (15%) were within or associated with the GYE, and only 4 (2%) were within or associated with the CYE. These 176 capture events resulted in bears being transferred to captivity on two occasions (1%), released onsite on 11 occasions (6%), relocated on 104 occasions (59%), and euthanized on 59 occasions (34%).

Because the reasons for initiating a capture were varied and often complex, quantification of those reasons is imprecise and sometimes unclear. Of the documented primary reasons for deciding to capture and handle the bear, the most common were: depredation on livestock (42); killing of poultry, usually chickens (21); exhibiting bold or extremely habituated behavior or being near residence (20); damaging property (15); accessing garbage (12); and accessing fruit or fruit trees (8). There were also 14 cases of preemptive capture—i.e., the bear was considered to be in a situation that risked a future conflict, although no conflict had yet occurred. Additionally, there were 37 cases of incidental capture—e.g., the bear captured was one not implicated in the conflict, in some cases a juvenile.

During this period from 2017 to 2020, for the 173 incidents in which a primary reason for capture was clearly documented, in 42 incidents (24%) the primary reason was depredation of large livestock (cattle or sheep). Of those 42 incidents, in 33 (79%) the offending bear was euthanized when captured. Two additional bears involved in livestock depredations were euthanized after one attempt at relocation.

In early 2021, the 67th session of the Montana legislature passed Senate Bill 337, which amended MCA 87-5-301 in two ways that affect the relocation options available to FWP bear managers for federally listed grizzly bears. Newly enacted subsection (3)(a) limits FWP bear managers to moving a grizzly bear only to sites previously approved by the Commission. Newly enacted subsection (3)(b) prohibits FWP bear managers from relocating a grizzly bear involved in conflict outside of a Recovery Zone. The legislation does not preclude USFWS, or other entities permitted by USFWS, from relocating or translocating bears (see Appendix C). The new legislation does not speak to restrictions on relocating grizzly bears that are not under ESA protection.

During the 4 non-denning seasons 2017-2020, 129 of the 173 captures for which specific geographic locations were available (75%) that FWP personnel led or were heavily involved with occurred outside of recovery zones. These 129 capture events resulted in bears being released onsite on 5 occasions (4%), relocated on 84 occasions (65%), and euthanized on 40 occasions (31%).

Among the most common documented primary reasons for deciding to capture and handle bears outside of recovery zones were livestock depredation (29), killing poultry (most often chickens, (20)), exhibiting bold or extremely habituated behavior or near residence (14), property damage (9), accessing garbage (8), and accessing fruit or fruit trees (8). In 11 instances, bears were captured preemptively—i.e., they were considered to be in a situation that risked a future conflict, although no conflict had yet occurred. Additionally, in 26 captures the bear captured was categorized as incidental—e.g., a bear other than the captured one had been the capture target or the captured bear was a juvenile that was not implicated in the conflict.

Among the 29 captures in which depredation of large livestock (cattle or sheep) was cited as a primary reason for capture outside of a recovery zones, the bear was euthanized in 21 (73%) cases.

Moving non-conflict grizzly bears (captured outside RZs) whose origin is uncertain

FWP's Preferred Alternative would allow managers to move such bears to release sites considered to provide the best chance for the bear to avoid future conflict, even if that site were not within the animal's presumed population core of origin, as long as the site had previously been approved by the Commission and was included within Occupied range. Thus, the Preferred Alternative envisions increased use of the Occupied range boundaries. Whereas they are currently used primarily to document change in range, an added use would be their role in determining whether or not specific release sites could be used in situations such as envisioned here.

It is thus appropriate to clarify how Occupied range maps are (and would continue to be) produced. Following Bjornlie et al (2014a:183), Bjornlie and Haroldson (2021), and Costello and Roberts (2021), data used to develop the boundary of grizzly bear "Occupied range" includes all GPS and VHF telemetry locations, locations or observations of tracks reported or verified by experienced agency personnel, remote camera photos confirmed by agency personnel locations associated with grizzly bear-human conflicts, mortalities, and opportunistically collected samples of grizzly bear scats, blood, tissue, or hair samples confirmed as grizzly bear via DNA analysis.

For both the GYE and NCDE, Occupied range maps are produced by applying zonal analysis in a GIS (Geographic Information System) and ordinary kriging (Bjornlie et al. 2014a) to grid cells environment with verified grizzly bear locations documented during a 10-year window up to the current year. Cells are considered "Occupied" if either they, or any of 8 neighbor cells (i.e., those touching either the size or corner of the cell) have a verified observation within the time period considered. Doing so has the effect of "smoothing" the resultant boundary line and also minimizing the probability of "holes of absence" occurring within the Occupied range. In the GYE, grid cells are 3 x 3 km in size, in the NCDE grid cells are 7 x 7 km in size. Collared bears that make particularly notable exploratory movements are either censored from the calculations, or their movement track is rarified to reduce the influence of such movements on the resultant map. Doing so reduces the probability that a single bear can greatly influence the Occupied range boundary's location or shape.

The algorithm developed by Bjornlie et al. (2014a) was designed to provide the "most parsimonious balance of inclusion and exclusion of low-density peripheral locations ….[while allowing]…for annual updates of grizzly bear distribution…." FWP finds it a good choice when the objective is to identify a boundary that distinguishes where grizzly bears are verified to have colonized from where they have not, but that excludes occasional observations that are separated from the contiguous Occupied area by unoccupied areas (i.e., outliers). Note that the Occupied range boundary is unaffected by the intensity of location points, but also contains no information about density within the boundary. Note also that the Occupied range map is deliberately not as inclusive as USFWS's "may be present" concept (Figure 4).

In the CYE, verified observations (i.e., those ranked 4 or 5 by Kasworm et al. 2020) within a 16-year moving window are used to populate Hydrologic Unit Codes (HUCs) at the 6th order watershed scale (Allen 2011). The outer-most boundary of HUCs with verified observations are then merged with the CYE Recovery Zone to create the Occupied range. As the case with the GYE and NCDE maps, the CYE's Occupied range map is updated biennially. This process develops a map at finer scale than that of Bjornlie et al. (2014a), but shares with it the characteristics of being objective, repeatable, and updateable.

Protocols for moving grizzly bears when needed

As a listed species, decisions about capturing and moving grizzly bears are ultimately made by the USFWS. In practice, this occurs following a consultative meeting (typically by telephone) involving FWP staff and USFWS staff (as well as staff from USDA-WS and tribal biologists, if relevant). Release locations are typically on public lands to sites previously approved by land management agencies (typically in multi-year agreements). Before a relocation or translocation occurs, land managers are consulted and bears are moved only to selected sites that are deemed appropriate by the land management officials at that time.

The Commission has authorized, for use by FWP staff, a suite of potential release sites in Montana (Appendix G).

The occasional translocation of individual non-conflict grizzly bears from the NCDE to the GYE for purposes of genetic augmentation is included in the currently operative Tri-State Agreement (between Montana, Idaho, and Wyoming, see Appendix H). Guidance provided by an inter-agency team of biologists and managers regarding the best candidates bears, opportune timing, and most appropriate release settings has been documented in a briefing paper (see Appendix I).

Destinations of bears captured in conflict settings

FWP Region 1 operates under a relocation plan jointly developed with the Flathead National Forest, dated June 2007, which provides local detail to the guidelines in IGBC (1986). It includes a list of 38 sites where grizzly bears can be released. (In practice, FWP bear managers almost always obtain specific permission from USFS officials before animals are released). FWP Region 2 operates under a "Relocation protocol and interim decision-making process for grizzly bear occurrences in outlying area," jointly developed with FWS, BLM, DNRC, CSKT, Blackfoot Challenge, and the Lolo, Helena-Lewis and Clark, Bitterroot, and Beaverhead-Deerlodge National Forests, and dated September 2019. It also provides additional detail to the guidelines in IGBC (1986) but does not identify specific relocation sites. However, bear managers in FWP's Region 2 maintain a list of sites, and as required, obtain land-owner permission prior to releasing bears. As of March 2022, FWP can only relocate conflict bears if captured within federally identified recovery zones.

As required by legislation signed into law in 2021, the Commission approved a list of sites to which grizzly bears may be released at their meeting on October 28, 2021. Maps of these sites are included as Appendix G. As of March 2022, FWP can only translocate conflict bears if captured within federally identified recovery zones.

Moving bears to initiate new or support existing populations

FWP has not moved any grizzly bears with the intent of starting a new population. Beginning in 2005, FWP, in close coordination with FWS, has taken the lead in capturing and moving occasional bears from NCDE to CYE (see above section, Current status of grizzly bear populations in Montana, CYE subsection).

FWP has not, as of this writing, moved any grizzly bears into the GYE from other populations. However, the Commission approved, in concept, moving a few grizzly bears from the NCDE to GYE populations at their meeting on December 14, 2021. A more detailed protocol document articulating the purpose and need for the augmentation program as well as providing guidance to field staff regarding the type of bear, circumstances around its capture, time of year, and likely release areas, has been drafted and is now under consideration by both the GYE and NCDE subcommittees of the Inter-agency Grizzly Bear Committee (IGBC). The protocol calls for:

- Translocating ‘non-conflict’ bears from other populations in Montana to pre-selected and pre-approved areas within the Greater Yellowstone Ecosystem. Areas chosen for release would be those judged most likely to allow the individual to meet its biological needs without conflicts with humans, and also most likely to breed.
- Trapping would be conducted to capture and move bears as resources allow. “Conflict” bears would encompass not merely bears known to have history of conflict, but also non-target animals captured at or near the site of a conflict. Thus, animals available for this program (i.e., “non-conflict”) bears would be those captured in remote settings, typically resulting from specific efforts to identify appropriate candidates for the genetic augmentation program.
- The frequency with which such animals would become available would vary annually, and not be predictable. The expectation is that approximately 2 to 4 candidate bears would become available and be moved every 10 years. There would be no additional expectations or requirements for the timing beyond that. For example, if opportunities arose, more than 1 bear might be moved in any given year; conversely, a few years might pass with no good opportunities.
- This magnitude of capturing and moving bears would result in approximately 3 to 6 bears being moved to the Yellowstone area per grizzly bear generation. If one-half of the bears moved stayed in the Yellowstone, survived long enough to reproduce, and produced (or sired) a cub that survived to adulthood, approximately 1.5-3 effective migrants per generation would gradually be added to the Yellowstone population.
- Translocated individuals would be considered experimental[7] animals, and either moved or euthanized should they cause conflicts with humans.
- For any translocated individuals that survive and remain in the Yellowstone area at least 1 year, the allowable mortality limit for that gender for the GYE (per the Conservation Strategy) would be increased by one (to account for the unanticipated addition of that individual, reinforcing that the augmentation is for genetic, not demographic purposes).

Orphaned cubs

FWP policy on orphaned grizzly bear cubs is provided in Appendix F, which is a part of the larger policy on accepting wildlife for rehabilitation at the MWRC. Although MWRC has accepted orphaned grizzly bear cubs in the past and may do so in future, placing these animals in appropriate captive facilities is difficult and time-consuming. The policy appended here clarifies field protocols as well as the rare circumstances that FWP anticipates accepting orphaned grizzly bear cubs to its captive facility under either Alternative.

Conflict management operational structure

FWP’s bear manager position in Libby is co-funded by the National Fish and Wildlife Foundation and the Hecla Mining Company.

[7] Not to be confused with the legal definition of an “experimental population” in ESA 10(j).

Prioritizing information, outreach, and communication

It seems clear that rural residents, recreationists, ranchers, farmers, and all others with the potential to interact with grizzly bears would benefit from more knowledge about bears and how to minimize adverse interactions with them. Thus, educational efforts will be an important component of FWP efforts moving forward. That said, it would be risky to assume that education is invariably successful in changing behaviors that lead to human–bear conflicts (Gore et al. 2008, Baruch-Mordo et al. 2011, Dietsch et al. 2017). Without well designed research to monitor actions (rather than merely attitudes) of the intended education recipients, we should not assume that education by itself will yield the desired results (Gore et al. 2006, Baruch-Mordo et al. 2009). Work with reducing black bear-human conflict has shown, however, that educational programs can augment the effectiveness of proactive enforcement (Baruch-Mordo et al. 2011) or direct provision of bear-proofing materials (Johnson et al. 2018).

Resources required

See an explanation of this issue in Part II, under the No Action Alternative.

Hunting of grizzly bears: Values and beliefs

FWP acknowledges that, to many Montana citizens (as well as to many outside the state), any hunting of grizzly bears is offensive to their deeply held values. While rarely articulated clearly, FWP understands at least some of these values to hold that the grizzly bear is different from other species of wildlife in Montana (and different even from the closely related black bear) and should not be considered a game species (which are legally protected but subject to recreational hunting when specifically authorized by the Commission). For people holding these sets of values, details regarding the type of hunt considered, the number of animals killed, potential negative or positive effects on conservation prospects of grizzly bears, on the safety of people, and on security from property damage are unlikely to be important influences on their views toward future FWP recommendations. These values are legitimate, need to be taken seriously, and should be part of any consideration of possible hunting in the future.

Sidebar 9. Would a grizzly bear hunt be a "trophy" hunt?

Many who are critical of the notion of instituting some kind of public hunt for grizzly bears in Montana use the word "trophy hunt" to describe what they object to. Numerous surveys of public attitudes have concluded that while there is typically majority support for hunting that results in meat for the table, hunting solely or primarily for a "trophy" (a non-edible part of the animal's body, typically displayed afterward) enjoys much less public support. Would a potential public hunt of grizzly bears in Montana be a "trophy" hunt? This depends on how the word is defined and how people other than the hunter perceive it. FWP doubts that attempts to probe the motivations of participating hunters would be fruitful, because hunters probably have diverse reasons for hunting (and we suspect many individual hunters have multiple, possibly even conflicting motivations for hunting). Montana statutes and rules do not define "trophy" hunting per se; similarly, this document does not use the term. However, MCA 87-2-701 requires successful grizzly bear hunters to purchase a trophy license. However, as a game animal, any successful hunter would be prohibited form wasting edible meat. In this sense, hunting a grizzly bear would not be different from hunting deer or elk.

For other Montana citizens (and others outside the state), a more nuanced description of various alternative ways hunting might take place and how FWP would view hunting if it occurred could inform their support or opposition. Still others support hunting grizzly bears unreservedly, such that a nuanced description of how it might take place would not be important. Some of these people would feel disenfranchised by a FWP that did not take advantage of a future legal structure that allowed for hunting, considering it to have become an agency they no longer recognize or feel speaks to them.

Previous FWP plans have indicated that grizzly bear hunting may promote acceptance and tolerance. This may still be true, but FWP has no expectation that enhanced acceptance or tolerance would occur among all segments of Montana's citizenry. Acceptance and tolerance are embedded in attitudes, and attitudes in turn are embedded in fundamental values and cultural identities. These change slowly, and typically not as a result of a single management decision or activity.

However, FWP does find evidence that providing a place for hunting within the overall management and conservation scheme may, for those whom hunting forms an important part of their identity, foster a sense that the agency is empathetic with those values (Manfredo et al. 2017). FWP believes this sense of inclusion, particularly among rural landowners who would be asked by Montanans generally to allow grizzly bears to travel through, and sometimes live on their lands, can serve to improve their cooperation[8] with programs to reduce conflicts even if their attitudes toward grizzly bears have not changed. Reducing conflicts, in turn, benefits all Montanans for whom managing for an interconnected grizzly bear population is a value.

Thus, there is an argument to be made that a feeling of inclusion, control, engagement, and agency – which hunting may engender even if the vast majority of landowners never draw a permit or if hunting never occurs on or near their land -- is particularly important for landowners because they have outsized influence to affect grizzly bear conservation. Their cooperation in grizzly bear conflict prevention is critical. Grizzly bears obtaining human rewards on their land are much more likely to continue that behavior elsewhere, and repeat offenders almost always die years before they otherwise would. Thus, increasing the level of trust between landowners and an agency or organization working toward grizzly bear conservation carries much greater conservation impact than would a similarly scaled increase in trust between a randomly selected citizen and the same agency or organization.

Considering the values of those who prize hunting, and/or of rural landowners whose cooperation in reducing human–bear conflict is key to success (but impossible to mandate) does not mean that those values are the only ones considered by FWP. FWP expects that various aspects of its ultimate strategy will be supported more by some members of the public than others and has no illusions that any plan will unify the attitudes and values of all Montanans. The fundamental goals of the plan must be broadly acceptable to most Montanans, but it is unlikely every aspect will find favor among all Montana's citizens.

[8] Some indirect evidence for this comes from Lewis et al (2012). They reported that tolerance for having wolves on Montana's landscape remained low as of 2012. Among a cross-section of Montana residents, 37% reported being "very intolerant" whereas 23% reported being "very tolerant". Percentages reporting being "very intolerant" increased to 45% among deer/elk license holder, 48% to wolf license holders, and 63% to rural landowners (defined as owning at least 160 acres). Notably however, Lewis et al. (2012) reported increased satisfaction (and decreased dis-satisfaction) among all 4 groups following the 2011 wolf hunt (although it is possible that these attitudes may have changed for other reasons). Dissatisfaction among Montanans generally decreased from 39% to 22%; among deer/elk license holder from 51% to 21%; among wolf license holders from 67% to 25%, and tellingly, among rural landowners from 64% to 34%.

A potential grizzly bear hunt: functions, expectations, and regulations

Under any realistic scenario including a future hunting season, the following general principles would apply to FWP and any citizens affected by hunting: (i) The hunting program would be small in scope; (ii) The general approach of FWP toward grizzly bears would remain very similar to its current approach to the species. Grizzly bear hunting would be added to the scope of what FWP considers and does but would not dominate that scope. FWP anticipates that, as now, the overwhelming majority of attention and resources would be spent on conflict reduction and, under the Preferred Alternative, in furtherance the objectives of interconnected populations that are consistent with prioritizing human safety and minimizing disruptions to Montana citizens' ways of life and livelihood; (iii) If hunting occurred, it would be embedded within and consistent with FWP's overarching goal of maintaining thriving grizzly bear populations within their core areas, under the Preferred Alternative in encouraging connectivity among those areas where doing so is most likely to result in biological benefit and where bear-human conflicts can mostly likely be kept to manageable levels, and maintaining public support for both of those goals.

History of grizzly bear hunting in Montana

Montana recognized grizzly bears as a game animal in 1923, initiating the regulation of harvest by requiring a hunting license to harvest a bear and by designating hunting seasons and units. Additional regulations were enacted over time (Table 6). Wildlife managers began estimating the total annual kill of grizzly bears (including hunting) in 1947. Assuming hunting accounted for 60% of annual kill, the approximate numbers of bears harvested statewide by hunters during 1947 and 1966 ranged from to 6 to 36 and averaged 22 (Greer 1972). Until 1967, a general big game license allowed a hunter to harvest either a black bear or a grizzly bear.

In 1967, when grizzly bears were recognized under the Endangered Species Preservation Act, Montana introduced a special grizzly bear hunting license. A mandatory check was also established to monitor annual harvest more closely. During the years 1967–1974, hunters' annual harvest in the GYE was 0–9 bears with an average of 3, and in the NCDE was 9–28 bears with an average of 19 (Figures 21 and 22).

In 1975, when grizzly bears were listed as threatened under the Endangered Species Act (ESA), hunting seasons were closed outside of the NCDE. The NCDE hunt was permitted to continue as long as human-caused mortalities from all causes, including hunting, did not exceed a quota, which was set at 25 at that time.

In 1983, a subquota of 9 human-caused mortalities was established for females. In 1986, this subquota was reduced to 6 and the overall quota of human-caused mortalities was reduced to 21. Concurrently, costs of grizzly bear hunting licenses were increased, and more restrictions on the date of license purchase were enacted.

During the years 1975–1990, the number of grizzly bear licenses sold, and the number of grizzly bears harvested, gradually decreased (Figures 21 and 22), and 60% of bears harvested were males. Hunters' success rates (i.e., bears harvested per license issued) showed a range of 0–3.4%, and an average of 1.6%.

In 1991, a limited-entry spring grizzly bear hunt was implemented on the Rocky Mountain Front, designed to target conflict bears. This special hunt resulted in the harvest of 3 males with a hunter success rate of 5.9%. Responding to a lawsuit, a court injunction closed the fall hunting season in 1991. Subsequently, authority for Montana to establish a grizzly bear hunting season in the NCDE was removed by USFWS in a federal rule.

Table 6. Timeline of changes to grizzly bear hunting in Montana

- Items in regular type represent changes enacted by Montana law or by Commission regulation or rule.
- Items in bold type represent changes enacted by federal law or rule.

Year	Management event or regulation change
1923	Bears (grizzly and black) are declared game animals.
	Anyone with a general big game license may harvest one grizzly or black bear within defined seasons and areas.
1942	Spring grizzly bear hunting season is closed statewide.
	Grizzly bear hunting season is modified to coincide with fall big game hunting season.
1947	Harvest of cubs or females with cubs is prohibited.
	Managers begin estimating annual harvest number.
1948	Baiting of bears is prohibited.
1967	**Grizzly bear is listed as endangered under Endangered Species Preservation Act of 1967.**
	Managers begin maintaining grizzly bear mortality records in one central location.
	A requirement is established for a special grizzly bear hunting license, obtainable before or during the season; license fee is set at $1 for residents and $25 for non-residents.
	A requirement is established for hunters to purchase a $25 trophy license within 10 days of harvesting a grizzly bear.
	A harvest limit is established of 1 grizzly bear per license, per person, per year.
1969	Mandatory reporting of grizzly bear kills, with presentation of hide and head, is implemented.
1970	Last date of license purchase is set at September 15 (one day before first general big game hunting season).
1971	Grizzly bear license fee is raised to $5 for residents and $35 for non-residents; the $25 trophy license remains.
	Waiting period of 7 years established for next purchase of a grizzly bear license by successful grizzly bear hunters.
1972	Last date for grizzly bear license purchase is set at July 1.
	Baiting with livestock, using trapping devices, and pursuing with dogs are prohibited in the harvest of grizzly bears.
1975	**Grizzly bears are listed as threatened in the lower 48 states under Endangered Species Act (ESA).**
	Grizzly bear hunting is closed in all areas except NCDE; in NCDE, 10 hunting districts and an annual quota of 25 human-caused grizzly bear deaths, including from hunting, are established.
1976	Grizzly bear hunting license fee is raised to $25 for residents and $125 for non-residents.
	Regulation is enacted: hunting season closes within 48 hours of notice after the number of human-killed bears reaches 25.
1978	Last date of license purchase is set at June 15.
1980	Grizzly bear hunting license fee is raised to $150 for non-residents.
1982	Grizzly bear hunting license fee is raised to $175 for non-residents.
	Last date of grizzly bear license purchase is set at August 31.
1983	Annual subquota is set at 9 human-caused deaths (including by hunting) of female grizzly bears in NCDE.
1984	Grizzly bear hunting license fee is raised to $50 for residents and $300 for non-residents.
1986	**USFWS special rule adjusts annual quotas related to grizzly bear hunting along Rocky Mountain Front. Quota for all human-caused grizzly bear deaths is adjusted to 21; subquota for NCDE females is adjusted to 6.**
	Three bear management units are established in the NCDE, each with an additional female subquota.
1987	State law is passed, limiting harvest to one grizzly bear per person per lifetime.
1991	Limited-entry, spring (April 1– May 4) grizzly bear hunting season is implemented on the Rocky Mountain Front; the harvest limit is 3 grizzly bears total, after which the season closes. Fifty permits are issued (46 used by hunters) with approximately two-thirds of hunting effort occurring on private lands. Harvested are 3 males, aged 4, 5, and 21; the older two previously had been captured and marked, and had a history of human–bear conflicts. A few days before being harvested, the 21-year-old is believed to have depredated calves nearby.
	Fall hunting season for grizzlies is canceled, due to federal court preliminary injunction on hunting them.
1992	Commission omits grizzly bear hunting season from biennial regulations for 1992–1993.
	State's authority to establish grizzly bear hunting season in NCDE is removed by USFWS in federal rule.

Figure 20. Grizzly bears harvested in Montana

Numbers are estimated for 1947–1966,and observed for 1967–1991.

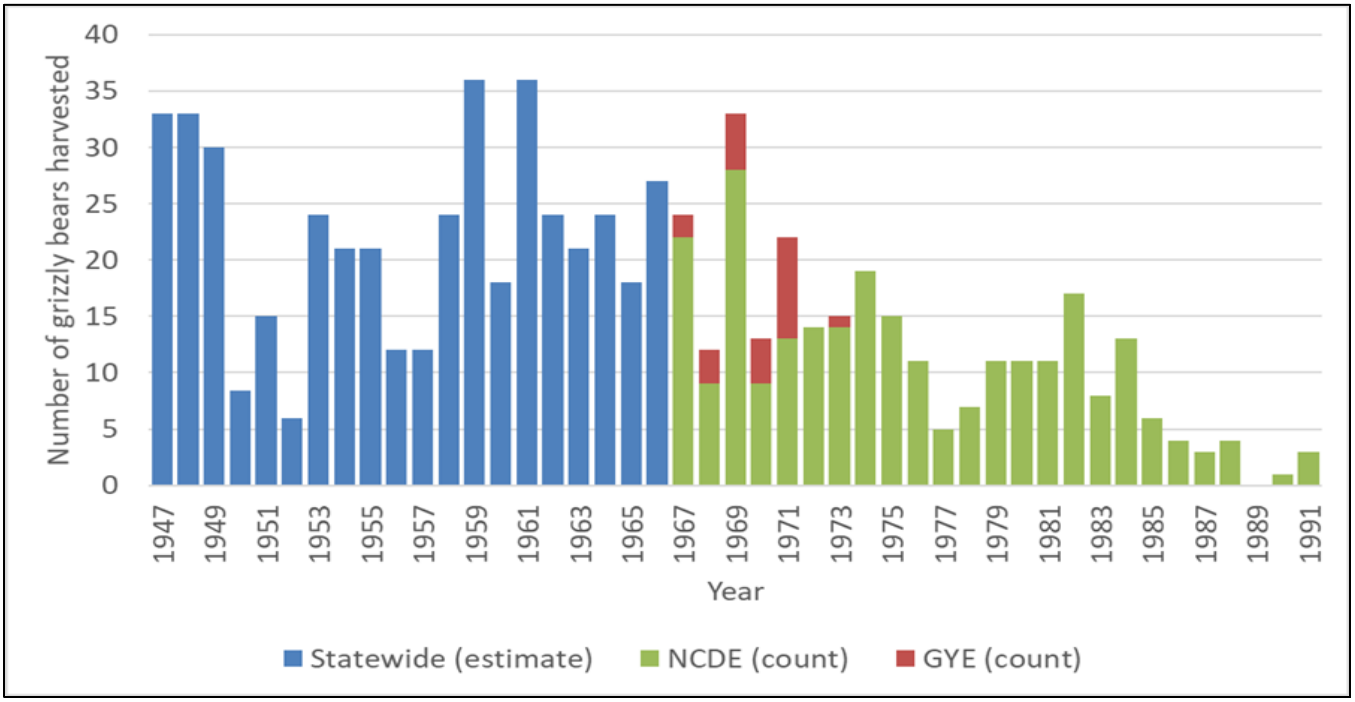
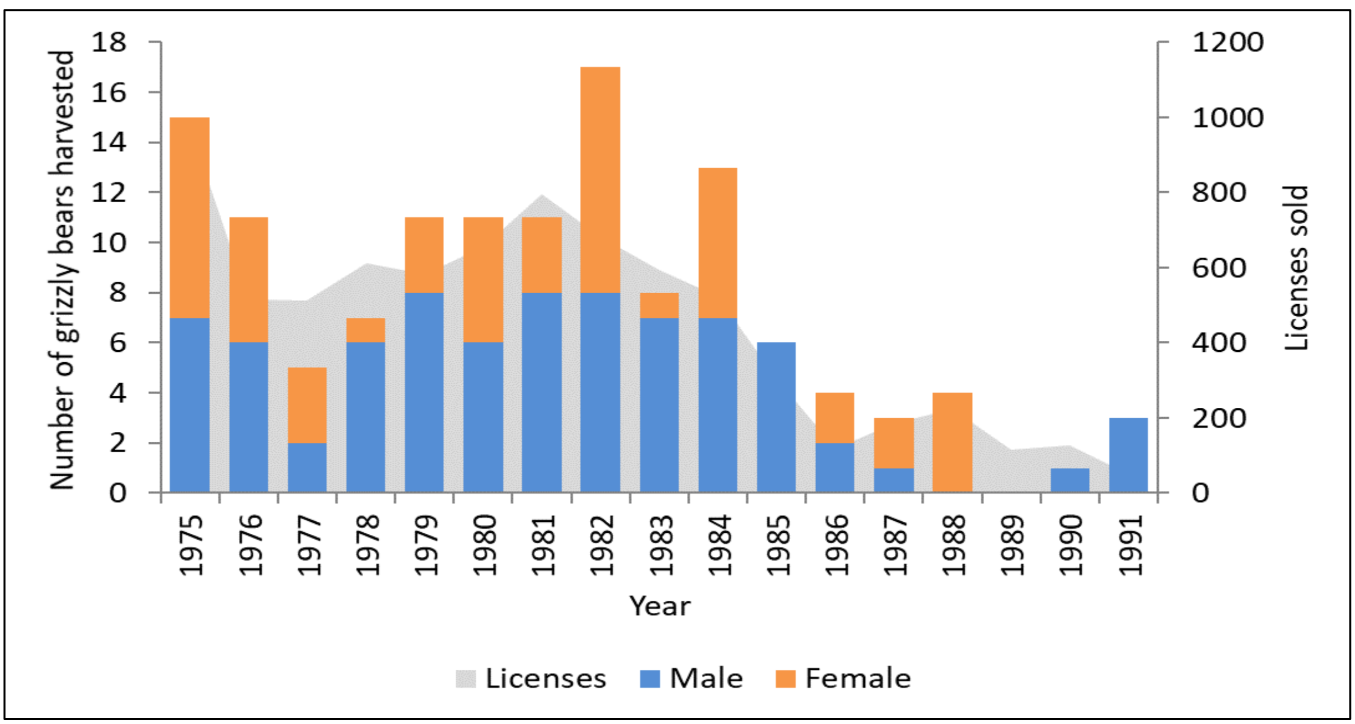


Figure 21. Observed numbers of grizzly bears harvested and licenses sold in NCDE

From 1975–1991.



The 2017 draft proposed hunting season

Any hunting of grizzly bears in Montana would occur under regulations adopted by the Commission through a public process. In 2017, as a requirement of delisting the GYE DPS, the USFWS required Montana, Wyoming, and Idaho to propose hunting regulations they could point to as adequate regulatory mechanisms to ensure that hunting would not jeopardize a (future) delisted population. Montana adopted regulations that provided a structure for a future hunting season and were viewed both by FWP and the Commission as conservative. Montana, Wyoming, and Idaho entered into an MOU (since updated, see Appendix H) whereby the three states agreed to annual maximum mortality limits applies within the GYE DMA based on the estimated population size and sex/age structure. These mortality limits would include all sources of mortality (including estimated unreported mortality) and would be applied separately to females and males that are independent of their mothers (i.e., over 2 years old). If, after all other sources of mortality were accounted for, there were bears that could be killed without exceeding these limits, they could be allocated among the states and available for hunting. This system would ensure that no one state could cause the mortality limit overall to be exceeded. Hunts could occur inside or outside of the DMA, but the applicable mortality limits were those within the DMA (that is, even hunts outside the DMA were subject to the mortality limits applying in the DMA, there were no permits allocated specifically for bears outside the DMA). The guiding principles of Montana's hunting season structure that was adopted by the Commission in May 2017 included:

- Maintain a viable grizzly bear population in the Montana portion of the GYE under state management;
- Increase broad public acceptance of sustainable harvest and hunter opportunity as an effective part of successful, long-term grizzly bear conservation; and
- Maintain positive and effective working relationships with stakeholders.

Upon FWP's recommendation, the Commission ultimately decided to delay the adoption of the proposed hunt, a decision that was rendered moot by litigation that suspended the FWS delisting rule. See Sidebar 10 for FWP's 2017 hypothetical hunting structure for GYE, should delisting occur.

Sidebar 10. Hypothetical GYE hunting structure (FWP, 2017) in case of delisting

Seasons and overall structure
- Spring (Mar. 15 – Apr. 20) and fall (Nov. 10 – Dec. 15), designed to limit exposure of female grizzly bears to hunting
- Mandatory hunter reporting within 12 hours of harvest
- Quotas by hunting district, with district to close upon 24-hour notice when quota reached
- When female quota is reached, all hunting districts close (regardless of whether the male subquota had been reached)
- Maximum harvest equal to the number of permits (i.e., hunter success assumed to be 100%)
- Mandatory orientation for all permit holders; taking a bear in a den prohibited
- Taking of females with young prohibited, as would be use of dogs, baits, or scents

Geographic limitations

- Seven possible hunting districts in the GYE, with two (the western-most and eastern-most) closed to harvest to minimize probability of removing a genetic migrant

Estimation of number of permits
1. Use Chao2 estimate of population size for year t (known to be biased low)
2. Calculate total sex-specific mortality limits (from GYE CS table) for population size in year t
3. Calculate "discretionary" mortality allowable in year (t+1) by subtracting the total estimated actual sex-specific mortality in year t (which includes an estimate of unknown deaths) from sex-specific mortality limits
4. Allocate 34% of resultant discretionary mortality to Montana (assumed proportion of GYE grizzly bear population)
5. For example, in 2017, Chao2 estimated population size was 718. Montana would have proposed offering 6 permits, with subquotas of 5 males and 1 female (i.e., hunt would have closed within 24 hours of a female being harvested).

Would hunting grizzly bears reduce human–bear conflict?

As reflected in ARM 12.9.1401 from 1977, a reasonable thought is that hunting of grizzly bears could be useful in reducing bear-human conflicts, and that hunting could modify the behavior of bears so as to reduce their danger to humans. FWP is not aware of definitive research that could support or refute either assumption for grizzly bears in Montana. However, work on black bears in a number of North American jurisdictions can be instructive for considering the possible effects on conflict complaints generally. The below quote on the topic comes from a committee of the International Association for Bear Research and Management (IBA), in their March 2017 position paper entitled "Hunting as a tool in management of American black bear populations" (IBA 2017):

> The efficacy of hunting as a means of reducing nuisance complaints is subject to considerable scientific debate and is situation-dependent. Some studies have linked hunting and trapping to reduced human–wildlife conflict, suggesting that they reduce populations from biological carrying capacity, remove some problem individuals from the population before they would ordinarily die, and alter the behavior of wildlife (Conover 2001). In New Jersey, the occurrence of a hunting season was linked to decreases in human–bear conflicts the following year (Raithel et al. 2016), and in one Ontario study area, nuisance complaints increased substantially during the 5 years following the closure of a spring hunting season (Hamr et al. 2015), though neither study considered the likely confounding effects of local food conditions on complaint numbers. Conversely, studies in Wisconsin and across Ontario as a whole found no evidence that increasing harvest reduced subsequent human–bear conflict; instead, conflict levels were tied to underlying population growth in Wisconsin (Treves et al. 2010), and in Ontario, to annual variation in natural foods, with complaints increasing in years of poor food supply (Obbard et al. 2014).

The position paper concludes that "[w]here the primary management objective is to slow population growth or limit population size or distribution, then increasing human-caused mortality is the only option. A regulated and monitored hunt can do this effectively…Conversely, if the primary management goal is to reduce human–bear conflict, the crucial and, arguably, only efficient and long-term way to do so is through education, outreach, and implementation of practices and regulatory policies that remove bear attractants….”

The papers cited by IBA (2017) provide reason to doubt that hunting per se would reduce conflicts generally. Hunting itself is very unlikely to solve all bear/human conflicts and thus reduce the need for our active bear conflict reduction program. However, there are four aspects of the situation in Montana deserving consideration for the possibility that they could plausibly provide some reduction in bear/human conflicts. We note here that only the fourth of these has been supported by empirical data, so urge that these be viewed as hypotheses, to be examined later if hunting were to occur:

1) It is true that a dead bear cannot behave in any way once killed and that — not being herd animals — animals other than the one removed cannot “learn” from the death of the hunted animal. However, it is not necessarily the case that every instance of hunting results in the death of the targeted bear. Hunting may, in some cases, serve a similar function as does purposeful hazing, if the animal is pursued by humans but not killed and if the animal senses that it is being harassed. This would seem particularly true if shots are fired close enough to provide negative stimulus, but the animal not hit.

2) Although it is probably true that “conflict” animals per se would rarely if ever be specifically and deliberately targeted by hunters, it is nonetheless possible that subtle behavioral attributes with a genetic component may make some animals more vulnerable to hunters than others. We routinely accept this concept when hunting other animals (e.g., mule deer more vulnerable on a per capita basis to an “either deer species” hunt than white-tailed deer, due in part to their less wary nature). If some bears are genetically wired to be less wary than others – or have been taught by their mothers that the reward of being near people outweighs the risks – they may indeed be more vulnerable to hunting. Thus, it is conceivable that hunting bears that are exposed to human attractants could disproportionately remove some of those most apt to respond to those attractants.

3) If hunting removes primarily dominant males (as a guided hunt might do), this could reduce the imperative felt by females with cubs to get out of their way. If, as has been shown with some data in Scandinavia, males appropriate the most secure and best food patches, relegating females with cubs to refuges near people where adult males are less willing to venture, a reduction of dominant males could allow some of these females with cubs to spend longer in these secure areas.

4) Some hypothetical hunts could have the effect of reducing population density at a local geographic scale. Garshelis et al. (2020) have shown that among Minnesota black bears (often hunted over bait), population size – largely dictated by hunting pressure - added to the effects of annual variation in food abundance and efforts to secure attractants in explaining variation in conflict reports. Reductions in population size caused by hunting reduced conflicts; thus, on a local scale, it is plausible that this could occur with grizzly bears as well – although Garshelis et al. (2020) caution that this could be difficult if attractants remain unsecured. These authors concluded that “A recommendation stemming from experiences in Minnesota is to mitigate local conflicts through targeted measures aimed at changing human behavior, reducing availability of attractants, and increasing tolerance of people, while at the same time managing and monitoring the population on a larger scale at a socially-acceptable level.” (Garshelis et al. 2020: 16). Thus, although hunting itself would be unlikely to be sufficient to reduce conflicts to tolerable levels, it could be of minor assistance in that cause.

Hypothetical hunting structures approaches and their rationales

- **Issues and attributes common to all.**
  - Any such hunts would be structured so as to bias off-take in favor of males.
  - Under delisted status, any grizzly bear hunt would only be authorized by the Commission after thorough public process.
  - FWP does not envision offering hunts within the planning horizon in hunting units in, or near, the Cabinet-Yaak or Bitterroot grizzly bear areas.
  - FWP envisions recommending little or no hunting in connectivity areas if bear presence is unknown, density is believed to be very low, and evidence of desired connectivity is lacking.
  - FWP envisions that hunting may be used as a tool to limit grizzly bear population density in areas where potential for connectivity is low and potential for human-grizzly bear conflict is high.
  - Under the Preferred Alternative, hunts would be sustainable (i.e., not intended to reduce population abundance) where providing for connectivity between the current NCDE, GYE, CYE and/or BE populations is a high priority.
  - Grizzly bear hunts would be once-in-a-lifetime opportunities for successful applicants (MCA 87-2-702).
  - As with all hunts of animals classified as a game animal, no edible portion of the carcass could be left in the field or wasted (MCA 87-6-205(4)).
  - Sale or purchase of the head, hide, or mounts of a grizzly bear legally taken by a hunter would be prohibited (MCA 87-6-206).
  - Any successful applicant for a grizzly bear hunting license would pay the applicable license fee; in addition, any successful hunter over 12-years of age would be required to purchase a trophy license within 10 days after the date of kill (MCA 87-2-701).
  - A mandatory orientation session would be required of all hunters licensed to kill grizzly bears.
- **Approach 1: No hunting.**

  Description:
  - No recreational hunting. Bears that die from the deliberate activities of humans would be those that required removed when conflicts could not be resolved by non-lethal means.

  Characteristics:
  - Although allowable by statute and regulation, no hunting season would be proposed by FWP or approved by the Commission.

  Projected benefits:
  - No additional mortality to any grizzly bear population over and above natural mortality, and mortality made necessary by management actions.

  Projected challenges:
  - Defending the lack of hunting to Legislators, Commission members, and/or members of the public who would expect it if delisted, given existing policies.

  Projected downsides:
  - Loss of opportunity to provide additional source of funding for bear management and conservation.

- Loss of a sense of involvement and engagement among landowners living near the bears subject to this kind of hunt. FWP anticipates that a sense of disengagement among landowners affected by grizzly bear presence ultimately makes communication and cooperation with FWP bear managers and NGO staff working to minimize human/bear conflicts more difficult and may make grizzly bear conservation more difficult in general.

- **Approach 2: Limited draw, sustainable off-take hunt.**

  Description:

  - A limited number of tags would be available via random lottery for licenses to take a single grizzly bear during short spring- and fall-seasons in specified areas where populations from the Greater Yellowstone cornerstone and/or the Northern Divide cornerstone (depending on listing status) have shown evidence of density-dependence. (This would be very similar to the (never-implemented) model used in 2017 for the GYE at the request of FWS).

  Characteristics:

  - The number of permits would be limited to the maximum discretionary mortality allowable under a multi-agency conservation strategy.
  - The maximum discretionary mortality under multi-agency conservation strategies would be determined after accounting for all known and estimated mortality from other sources and based on a population estimate considered to be conservative. Thus, best available models project that this hunt would not reduce the underlying growth rate of the population affected.
  - For any hunt in or near the GYE, the number of permits would be limited by the 3-state MOA allocating discretionary mortality among Wyoming, Idaho, and Montana.
  - Hunting units would not be geographically confined to a DMA, but any animals take would count against the maximum prescribed within that DMA.
  - Hunts would end within any given hunt unit when the limit for females harvested in that unit is reached. For hunts involving multiple hunting units, the entire hunt (i.e., among all hunt units) would end when the limit for females harvested is reached in any hunt unit. Hunters would be required to report harvest within 12-hours and closures would occur upon 24-hour notice when a limit is reached.
  - Season dates would be designed to limit female mortality by targeting periods when most females are denning and primarily males are out of dens.
  - Taking of any bear in a group would be prohibited.
  - Taking of a bear in a den would be prohibited.

  Projected benefits:

  - The primary anticipated benefit would be an enhanced sense of involvement and engagement among landowners living near the bears subject to this kind of hunt. FWP anticipates that an enhanced sense of landowner engagement that would accompany this type of hunting would help foster communication and cooperation with FWP bear managers and NGO staff working to minimize human/bear conflicts.

- A secondary anticipated benefit would be the generation of revenue from the sale of a limited number of licenses and potentially from non-refundable application fees; these revenues would be ear-marked for supporting regionally placed grizzly bear managers.
- A tertiary anticipated benefit would be providing a modest amount of hunting opportunity for those interested in legally taking a grizzly bear.

Projected challenges:

- Complex rule-structure.
- The need to adjust allowable mortality and, in the case of the GYE, coordinate with 2 other states annually.
- Workload involved with FWP staff checking harvested bears, and publicizing hunting season closures (if needed) rapidly.

Projected downsides:

- Frustration and disagreement from those opposed to such a hunt.
- The potential that a harvested animal might have been one that would have contributed to connectivity later had it lived longer. (FWP believes this probability is small because of the geographic restrictions in this type of hunt, as well as the limited number of animals hunted).
- The potential that the social benefits anticipated above (i.e., fostering a sense of engagement and cooperation among landowners and others who feel burdened by co-existing with grizzly bears) would not be realized, in part because of the modest number of bears removed.

• **Approach 3: Auction hunt.**

Description:

- Either in conjunction with hunts described above or as a stand-alone program, a single statewide permit would be offered at auction (as authorized under MCA 87-2-814), with the highest bidder obtaining authorization to take a single grizzly bear from within a number of potential locations. It is likely, albeit not mandated, that the permittee would prioritize taking a large male bear and would hire an outfitter/guide to assist. The auction could either be conducted directly by FWP or outsourced to a qualified organization which would be allowed to retain up to 10% for administrative costs.

Characteristics:

- One grizzly bear, statewide, annually.
- Hunting units would not be geographically confined to a DMA, but any animals taken would count against the maximum prescribed within that DMA. Hunters would be required to report harvest within twelve hours. If occurring in conjunction with a hunt under Approach 2 (as described above), the limit in would be reduced by 1 to account for this mortality.
- Subject to the geographic constraints above, hunting units available to the permittee would allow for considerable choice (but not include areas within, or near, the CYE or BE).
- Season dates would be designed to limit female mortality by targeting periods when most females are denning and primarily males are out of dens.
- Taking of any bear in a group would be prohibited.

- Taking of a bear in a den would be prohibited.

Projected benefits:

- The primary anticipated benefit would be the generation of revenue from the sale of a single, high-priced permit; these revenues would be ear-marked for supporting regionally placed grizzly bear managers.
- A secondary anticipated benefit would be providing a very small amount of hunting opportunity for those interested in legally taking a grizzly bear and willing to spend a great deal of money for this rare opportunity.

Projected challenges:

- FWP workload associated with administering the auction (or managing the contract of an outside organization if outsourced).
- FWP workload associated with staff checking harvested bears, and publicizing hunting season closures (if needed) rapidly.

Projected downsides:

- Many people object to a hunt that is available only to the highest bidder, a person typically with financial means to bid well above what most can afford. This type of hunt is likely to be considered by most of the public as a "trophy hunt," which are held in lower regard by many members of the public than hunts available to those of lesser financial means.

• **Approach 4: Population growth reduction hunt.**

Description:

- Either in conjunction with hunts described above or as a stand-alone program, a limited number of tags would be available via random lottery for licenses to take a single grizzly bear during short spring- and fall-seasons in specified areas where the geographic distribution of bears has expanded into areas that are outside of DMAs, and/or that provide no connectivity with other population cores. Permits would be limited numerically to produce, at maximum, a slow and modest reduction in the underlying rate of growth but would not be constrained by the maximum allowable mortality limits codified in any multi-agency conservation plans.

Characteristics:

- These hunts would occur where reducing the number of bears, short-term, and the growth-rate longer-term of the bear population, are considered social benefits.
- Hunt permits would be valid only on private land and require advance permission of the landowner.
- Hunting would not occur where connectivity between population cores can occur.

Projected benefits:

- The primary anticipated benefit would be an enhanced sense of involvement and engagement among landowners living near the bears subject to this kind of hunt. FWP anticipates that an enhanced sense of landowner engagement that would accompany this type of hunting would help foster communication and cooperation with FWP bear managers and NGO staff working to minimize human/bear conflicts. FWP anticipates that increased communication and cooperation, in turn, would benefit grizzly bear conservation in areas where connectivity and population growth is an articulated objective.

- A secondary anticipated benefit would be enhanced acceptance among local residents of remaining bears because of the removal of some bears from these landscapes (i.e., areas where bears are not expected to contribute measurably to connectivity or to establish new populations). Bear-human conflicts would be anticipated to decline slightly simply from fewer bears being on the landscape.
- A tertiary anticipated benefit would be providing a modest amount of hunting opportunity for those interested in legally taking a grizzly bear.
- An additional anticipated benefit would be the generation of revenue from the sale of a limited number of licenses and potentially from non-refundable application fees; these revenues would be ear-marked for supporting regionally placed grizzly bear managers.
- Finally, while not identified as an objective, it is possible that because of the geographic restrictions of this hunt, animals harvested would be those likely to become involved in conflict situations, thus further reducing bear-human conflict.

Projected challenges:

- Delineation of hunting areas that meet the criteria.

Projected downsides:

- The potential that the social benefits anticipated above (i.e., fostering a sense of involvement and cooperation among local residents who feel burdened by co-existing with grizzly bears) would not be realized, in part because of the modest number of bears removed (i.e., bears would remain on the landscape, and bear-human conflicts would likely continue, albeit perhaps both at lower levels than were this type of hunt not implemented).

Part IV: Supplementary Information

Summary of science used in this document

This section covers references on science used by FWP to develop this document, organized by relevant topic with brief notes about the main takeaway.

Grizzly bear biology

FWP generally has depended on the following sources for basic biological information on grizzly bear biology in North America: Pasitschniak-Arts (1993), Schwartz et al. (2003) and Garshelis (2009). With specific reference to denning, FWP has consulted Haroldson et al. (2002), Graham and Stenhouse (2014), Krofel et al. (2016), Pigeon et al. (2016b), and Johnson et al. (2017).

Augmentation

Servheen et al. (1987) provided an early discussion paper of how augmentation into the Cabinet-Yaak area might occur. Maguire and Servheen (1992) discussed the decision analysis used to decide on the age/sex class of bears to use in the pilot augmentation project and estimated the probabilities that augmented bears would remain in the target area, as well as that they would be involved in subsequent human–bear conflicts. Servheen et al. (1995) reported on early efforts to augment four bears into the CYE during 1990-92. They used the word "transplant," but we prefer "augmentation." Kasworm et al. (1998) updated this report. Proctor et al. (2004) used simulations to show that augmenting the CYE population was more effective than other alternatives in reducing extinction probability in the short-term. Kasworm et al. (2007) used genetic evidence to show that three of the four grizzly bears augmented in the early 1990s had remained resident for at least a year and that at least one had successfully reproduced. Kendall et al. (2015) concluded, based on a large-scale mark-recapture experiment depending on genetic signatures for the marks, that augmentation had succeeded in preventing the CYE population from becoming functionally extirpated.

Density dependence

Our general understanding of population regulation in grizzly bears was informed by Brockman et al. (2020), Keay et al. (2018), McLellan (1994, 2015), Miller et al. (2003), and Schwartz et al. (2006a) (Gardner et al, 2014).

Genetics, minimum population size, conservation biology

For background on conservation genetics as it relates to grizzly bear conservation and management generally, FWP has referred to Wright (1931), Franklin (1980), Frankham et al. (2013), Jameison and Allendorf (2012, 2013), Mills and Allendorf (1996), and Wang (2004). On the genetics effects of small and isolated populations for grizzly bears specifically in the Northern Rockies, FWP has referred to Harris and Allendorf (1989), Miller and Waits (2003), Haroldson et al. (2010), Kamath et al. (2015), Kendall et al. (2009), Kasworm et al., 2007, Laikre et al. (1996), Kendall et al. (2015), Proctor et al. (2004), and Proctor et al. (2012).

Infanticide

It has long been known that grizzly bears sometimes kill each other, and that cubs are the most frequent victims of such intraspecific killing (Craighead et al. 1976, Mattson et al. 1992, Olson 1993, Mörner et al. 2005). Adult males are the most frequent perpetrators, but other sex/age classes of bears, including adult females, are known to occasionally kill cubs (Hessing and Aumiller 1994, McLellan 1994.)

Based on observations of spatial distributions of females and males in two disparate study areas, Wielgus and Bunnell (1994) suggested that adult females avoided adult males (in one but not the other study area) in order to reduce the probability that their cubs would be subjected to intraspecific predation. Because grizzly bear females are induced ovulators, Wielgus and Bunnell (1995) suggested that sexually selected infanticide (SSI)—in which a male enhances his reproductive success by killing cubs and mating with the mother who shortly after comes into estrus—might operate in bears and that the avoidance documented was a counterstrategy by females.

Swenson et al. (1997b) found evidence consistent with the hypothesis that hunting had affected the social structure of bears in Sweden in a way that exacerbated SSI and lowered the population's rate of increase from what it would have been without infanticide. Following on this, Wielgus and Bunnell (2000) added this element to their earlier interpretation of their data. A number of subsequent studies from Europe supported some, albeit not all, of the original implications of Swenson et al.'s (1997b) work (Swenson et al. 2001a,b Dahle and Swenson 2003; Bellemain et al. 2006a,b; Zedrosser et al. 2009; Steyaert et al. 2013; Gosselin et al. 2015).

FWP finds the most well researched, thorough, and geographically applicable reviews of SSI to be that of Miller et al. (2003) and McLellan (2005). In a review of four cub survival and litter size data Alaskan populations, Miller et al. (2003) found no evidence consistent with the expectations had SSI been common. Instead, he found that litter sizes and cub survival were lower in national parks, where densities were probably close to carrying capacity, than in nearby, similar hunted areas where densities had been lowered by hunting. In his study area, where one might expect to find the kind of hunting-related effects of SSI postulated by Wielgus and Bunnell (1995) and Swenson et al (1997b), McClellan (2005) found no evidence consistent with expectations of the hypothesis. Additional data and analyses in the same study area later led to a similar conclusion (McLellan 2015).

McLellan (2005) also provided a useful simulation model that further explored expectations under explicitly articulated versions of the SSI hypothesis for bears, finding that it should typically be rare, and when present, the most likely perpetrators would be older rather than younger males. Finally, McLellan (2005) pointed out some particularities of the study area in which Wielgus and Bunnell (1995) claimed to have found their counterstrategy, but also pointed out some design and analysis flaws from their study that left it open to alternative explanations.

Grizzly bears and people

In addition to the sources cited elsewhere, FWP has referenced the following:

- For grizzly-bear livestock conflicts, Anderson et al. 2002.
- For details on compensation programs (particularly for lost livestock), Morehouse et al. 2018, Harris 2020.
- For conflicts in domestic settings (and reasons grizzly bears might be attracted to such settings), Elfström et al. 2013, 2014a,b; Fernández-Gill et al. 2016; Gunther et al. 2004, Howe et al. 2010, and Morehouse 2016a,b.

Relocation

Brannon (1987) provided an early report on success of relocations of GYE grizzly bears involved in conflict (the author used the term translocation, but we replace it with relocation for consistency). He found that between 1968 and 1984, 57% of individual moved were not later involved in human–bear conflicts and that 41% did not return to their capture site (77% of those moved more than 75 km). Riley et al. (1994) defined success of relocations of Northwestern Montana bears slightly differently: no resumption of conflict activities within 2 years, and mortality only from legal hunting or natural causes. Under this definition, success rate for bears over 1.5 years old was 44% for 1st-time relocations and 15% for bears moved more than once. Females were twice as likely than males to be successfully relocated, although no statistical difference between sexes was observed for animals originating east of the mountains where livestock depredation predominated as the conflict cause. Campbell (1999) reported that 6 of 13 grizzly bears relocated from the Cooper River Delta in Alaska whose movements could be adequately monitored returned to their original home range compared with 3 that did not.

Linnell et al. (1997) reviewed relocations of large carnivores worldwide, concluding that relocated animals typically roam widely after release and are prone to the same types of conflict that justified the initial capture and relocation. Finally, Milligan et al. (2018) evaluated 110 relocations of grizzly bears in Alberta, characterizing 33 of these as "successes" (defined as the bear surviving at least one year with no evidence of homing and not requiring additional management action). Increasing success in relocation was associated with implementation earlier during the non-denning season than later, and the release location having a low mortality risk (fewer roads, more water bodies). Bears released further from their release site were less likely to exhibit homing behavior than those released closer, but also had home ranges over three times as large for the first year following release.

Population status and potential for each population core

Bitterroot area

For insight into the potential for the Bitterroot area to support grizzly bears long-term, FWP used Boyce and Waller (2003) as well as the more general assessment of Mowat et al. (2013). For additional insight into attitudes toward grizzly bears and their possible recovery in the Bitterroot area, we referenced the qualitative study conducted by Velado (2005). Boyce et al. (2002) modeled metapopulation dynamics with and without the addition of a population in the Bitterroots. For more recent status of grizzly bears in the Bitterroot area, we used USFWS (2020).

That the BE retains appropriate habitat for grizzly bears is supported by the work of Merrill et al. (1999); Boyce and Waller (2003) used habitat and population size information from earlier studies of grizzly bears in the Swan Mountains and Yellowstone to estimate that the BE might ultimately support approximately 321 grizzly bears.

Cabinet-Yaak area

For context and background on grizzly bear conservation efforts in the Cabinet-Yaak area, we used Kasworm et al. (1998). For more recent information on status, trends, and prospects, we relied on Kasworm et al. (2019, 2020), Kendall et al. 2015), Proctor et al. (2018), and USFWS (2020). On augmenting bears to the area's population, we used Maguire and

Servheen (1992), Servheen et al. (1987, 1995), and Kasworm et al. (2007). For recent management efforts, we used Annis (2017, 2018), Annis and Trimbo (2019).

Northern Continental Divide area

Principle references informing FWP's understanding of the status of grizzly bears in the Northern Continental Divide area comes from Kendall et al. (2009, 2019), Mace et al. (2012), Costello et al. (2016), Mikle et al. (2016), Costello and Roberts (2019, 2020), and USFWS (2020). We referenced Teisberg et al. (in review) for information on body condition of grizzly bears in this area.

Greater Yellowstone area

FWP has generally depended on annual reports produced by the IGBST for its understanding of the status and trend of grizzly bears in the greater Yellowstone area. Other important sources on which we base our understanding of the status of grizzly bears in the Greater Yellowstone area include Miller and Waits (2003), Schwartz et al. (2006a), Harris et al. (2007), Cherry et al. (2007), Schwartz et al. (2006a,b, 2008, 2010, 2012), Haroldson et al. (2010), Fortin et al. (2013), Van Manen et al. (2014, 2016, 2020, 2021), Costello et al. (2014), Bjornlie et al. (2014a,b), Kamath et al. (2015), Wells et al. (2019), and IGBST (2006, 2012, 2013, 2021). The USFWS species status review (USFWS 2020) provides a useful summary.

Critiques of science used

FWP is aware of, and has thoroughly considered, critiques of science produced by the IGBST that have been published online or in various non–peer-reviewed venues. Here, we briefly explain our rationale for accepting the quantitative analyses conducted by IGBST and thus IGBST's interpretations.

- **Overview: Areas of concurrence and differences of interpretation re: Yellowstone grizzly bears.**

Issue 1. Critics and IGBST agree that from the 1980s until about 2001, grizzly bear abundance in the Yellowstone area increased at a modest pace and more slowly since then. They disagree about the magnitude of the increase.

Issue 2. Critics and IGBST disagree about how many bears most likely have been present in the past decade or so.

Issue 3. IGBST has concluded that mortalities of grizzly bears (including all documented and estimates mortalities never detected) have remained at levels consistent with a stable population; critics have claimed that mortalities have increased, possibly to the point of causing a population decline.

Issue 4. Critics and IGBST concur that all available approaches to estimating abundance and trend of grizzly bears are imperfect. They disagree regarding the most likely consequences of these imperfections.

Issue 5. Critics and IGBST concur that grizzly bear spatial distribution has increased considerably and has continued to do so at least through 2018. They disagree about the causes and implications of the increase.

Issue 6. Critics and IGBST concur that important dietary items for grizzly bears (notably whitebark pine and cut-throat trout) have declined in abundance, as well as that these declines have made life more challenging for grizzly bears. They disagree about evidence for population level consequences of these declines.

Issue 7. Critics and IGBST concur that increasing human population and development poses challenges for continued grizzly bear conservation, and that reducing human–bear conflicts as much as possible is the highest priority.

- **Detailed explanations.**

Issue 1: Trend.

The IGBST has used data from four independent sources to estimate the trend of GYE grizzly bears since 1983 (IGBST 2006, 2012, 2021): 1) asymptotic growth rates (i.e., λ), estimated from multi-year estimates of survival and fecundity rates (Harris et al. 2006, Harris 2007), 2) tallies of unique females with cubs observed within the GYE, filtered to reduce to inconsequential the probability of incorrectly considering as separate animals multiple observations of the same one (Knight et al. 1995) and expanded to estimate the number of undetected females with cubs (via Chao et al., IGBST 2021), 3) mark-resight estimates using data from fixed-wing aerial surveys of marked and unmarked females with cubs (starting in 1998), and 4) a partial reconstruction minimum number of bears known alive at various years in the past (which is unavoidably characterized by a long time-lag as many animals are only enumerated and added to estimates of presence in years past when they die and their carcasses become available for inspection).

FWP is aware of only a single criticism of the first method. Doak and Cutler (2014) argued that Harris et al. (2007) over-estimated asymptotic population trajectories by ignoring reproductive senescence among older-aged females. However, Harris et al. (2006) had earlier showed that incorporating reproductive senescence as estimated by Schwartz et al. (2003) had negligible influence on estimated trends using this approach.

More common have been criticisms that numbers of unique females with cubs generated by the Knight et al. rule set are sensitive to the observer effort and because observer effort has generally increased through time, that apparent increases are spurious. However, while it's true that very low levels of effort would return a lower number of females-with-cubs than were actually present, it is not necessarily the case that observation effort past a certain level would continue to return even more females-with-cubs, both because the Knight et al. rule precludes increases without limit, and because the Chao estimator explicitly handles the condition under which all animals are observed multiple times. Figure 4 in Van Manen et al. (2014) shows that grizzly bear seen/hour during flights went up and hours flown actually declined somewhat from 1997 to 2012 – so at best, the relationship between effort and total number of sightings is complex, not necessarily (certainly not entirely) controlled by effort. Van Manen et al. (2014) also presented evidence that although the number of bears captured increased during 1998-2012, the proportion representing bears previously captured did not change during the same period, a pattern consistent with an increasing population during this time period. More recently, improvements to the original Knight et al. (1995) ruleset have resulted in estimates of population trend largely similar to those in use in recent years (IGBST 2021).

Issue 2: Abundance.

Acknowledging that even the best conceivable approach to estimating the abundance of grizzly bears in the GYE would be subject to some uncertainty, we find the estimates produced by IGBST (2021) to be well grounded in empirical data and reasonable models, thoroughly considered and vetted, and in any case, the best available. IGBST (2021) estimated that in 2019, total abundance within the DMA was over 1,000 bears. Using the improved approach outlined in IGBST (2021), the study team reported an abundance estimate in 2021 of 1,069 bears (95% confidence interval 953 – 1,184).

Issue 3: Trends in mortalities.

IGBST has reported that documented and estimated mortalities (including, but not limited to, radio-marked bears) has been lower than estimated 'limits' for all years since monitoring began. Critics contend that mortalities have increased markedly in recent years and infer that the population could be in decline as a result. FWP is unable to confirm some of the numbers used in reports that take issue with the IGBST results. FWP's analysis shows that the number of "TRU" (total reported and unreported, i.e., an estimate of mortalities taking into account those never documented) deaths of male grizzly bears during the 19-year period 2002-2020 increased (at a rate of approximately 1.13 male bears/year, $z = 5.18$, $P < 0.01$), as did the number of mortalities as a proportion of estimates of adult male abundance (at a rate of approximately 0.004 mortality rate/year; $z = 3.76$, $P < 0.01$). However, FWP's analysis shows that the number of "TRU" mortalities of females has shown no significant change during the 2002-2020 period ($z = 0.77$, $P = 0.44$). Thus, it is not logically inconsistent for mortalities aggregated among both genders to have increased, while density of females has either not changed or increased. It is also consistent with IGBST's conclusion that male bears have increasingly occupied areas with greater risk while population trajectory (controlled by the female segment of the population) has increased slowly or remained approximately stable.

Issue 4: Uncertainty in trends and abundance estimates.

FWP understands, as IGBST has acknowledged, that the Knight-Chao estimator is imperfect. In particular, because of the limitations of the original Knight et al. (1995) rule set to differentiate individual females (Schwartz et al. 2008), it becomes increasingly conservative as the number of true females increases. Past some density of females, this index would be expected to remain flat even if true density continued to increase. However, most of these issues were recently resolved by IGBST (2021). Likewise, the IGBST has provided additional analyses leading to its conclusion that the preponderance of evidence supports the conclusion that Yellowstone area bears increased relatively rapidly during 1983-2002, more slowly during 2002-2014 and very slowly if at all since 2014. There is no evidence of a population decline since 1983.

Issue 5: Increase in minimum area occupied.

There appears to be consensus among IGBST and some critics that the minimum area of grizzly bear occupancy in the GYE area has increased considerably since 1980. The method IGBST has used to quantify this was reported by Bjornlie et al. (2014a) and interprets this expansion as resulting from bears being near, or at carrying capacity within the inner portion of the area of occupancy (not necessarily in all portions of it), noting that males are disproportionately represented among the pioneering bears. Critics make two points about this to counter this assessment: a) the rate of occupancy expansion has exceeded estimates that IGBST has made of the rate of increase in abundance, and b) that density overall must have declined, not increased, because relatively constant trend indices over the period of geographic expansion suggests the same number of bears occupied an increasing area.

a) Implicit in the first theme of criticism is that the rates of increase in abundance and occupied area should bear an approximately 1:1 relationship to one another. FWP knows of no accepted biological theory dictating that rates of increase in abundance and areal extent of a free-ranging wildlife population must be similar. That said, if one had to choose a simple mathematical expectation for the relationship of abundance (λ) to expansion (A), it would more likely be A = λ2 than to be A = λ. This is because if appropriate habitat surrounds the core of an expanding population, animal home ranges would gradually build on each other in two dimensions (longitude and latitude) rather than the single dimension available to an increase in numbers. FWP would not contend that a simplistic quadratic relationship between abundance and area is necessarily correct or empirically supported for GYE grizzly bears but offers it as context within which to interpret the discrepancy in the two rates of increase.

Additionally, there are biological reasons to expect grizzly bears of both sexes to begin exploring new habitats (and, by such exploration, increase estimates of the area occupied by grizzly bears), particularly when situated at the frontier of the existing geographic distribution (e.g., Swenson et al. 1997a, Kojola and Laitala (2000), Jerina and Adamiĉ (2008). Animals who can find good habitat not already occupied by conspecifics can enjoy a fitness advantage (i.e., better survival and reproduction) over those who stay put.

b) Van Manen et al. (2016) considered the grizzly bear density had approached or reached its capacity within the central portions of the study area (with its outer-most boundary approximated by the DMA) but did not necessarily imply that density was similarly high along the expanding front of grizzly bear distribution.

Issue 6: Food declines vs. density.

FWP is unaware of disagreement in the scientific literature that important dietary items for grizzly bears (notably whitebark pine and cut-throat trout) have declined in abundance. A reasonable hypothesis to examine (and one that some critics have favored) is that these declines have contributed to the reduction in reproductive rate and juvenile survival that resulted in reduction of population growth from the roughly 4–7% estimated during 1983–2001 (Harris et al. 2006, Harris 2007), to the roughly 0–2% estimated during 2002–2012 (Van Manen et al. 2016). Another reasonable hypothesis is that these declines in reproductive rates and juvenile survival resulted from increased resource competition (and consequences thereof) that in turn was associated with higher grizzly bear density. These two plausible events (reduced food availability vs. more bears competing for those foods) occurred at about the same time, and both would be expected to reduce or halt population growth. How do we know which one was more important?

In situations such as this, it is generally seen as weak science to simply document a correlation between one plausible explanation and the observed consequences and, from this, conclude causation. Instead, scientists attempt to elucidate specific responses that would logically flow from one, but not the other plausible cause. Then, quantitative empirical data is gathered and used to examine which of the two hypotheses is most consistent with the empirical evidence. This is the approach taken by IGBST:

a) Bjornlie et al. (2014b) wondered if trends in home range sizes of males and female grizzly bears in the Yellowstone area could provide some insight into the relative roles played by the whitebark pine (WBP) decline and the increase in grizzly bear density. They found that female home ranges were smaller during 2007-2012 than during 1989-1999, whereas those of males did not change significantly between the two time periods. They hypothesized, based on previous published research on bears, that home range size of female bears would increase if declines in WPB required bears to search further for foraging, but would decrease if intra-specific competition resulted from increased density. To test the competing hypotheses, Bjornlie et al. (2014b) developed indices of grizzly bear density in the Yellowstone area from a long history of marked animals and also used fine-scaled maps of WBP to quantify the proportion of grizzly bear home ranges affected by its decline. They then used model selection procedures to assess the strength of the evidence for the two competing hypotheses. Bjornlie et al. (2014b) found that data supported an association between density and female home range size (smaller home ranges associated with higher density) but did not support an association with availability of WBP. Signals were slightly more nuanced for male home range sizes: the associations with both WBP and density were similar when home ranges were quantified using one method; associations were somewhat stronger with density than WBP when home ranges were quantified using an alternative method. However, only the density relationship using the alternative home range metric was significant. These analyses provided justification for Bjornlie et al. (2014b) to conclude that the smaller home range sizes of females seen during the latter period were more likely a result of high density than reductions of WBP.

b) Van Manen et al. (2016) used a similar competing-hypotheses design to examine influences directly on the vital rates that drive population growth (survival and cub production), with particular focus on the time period 2001-2011 when WBP mortality increased markedly. They used the same index to grizzly bear density developed by Bjornlie et al. (2014b) and developed a spatially- and temporally explicit index of WBP mortality using remote-sensing databases. These spatial covariates were applied to each individual grizzly bear sampled. Van Manen et al. (2016) found no evidence that independent (i.e., no longer under mothers' care) female survival had changed during 2002-2011 compared with 1983-2001, and modest evidence that independent male survival had increased. However, there was no evidence that either independent female or male survival was associated with either density or WBP. In contrast, Van Manen et al. (2016) found support for models that included density as associated with both cub and yearling survival, but not for models that included WBP. Similarly, cub production (quantified by the transition rate from not having cubs in one year to having a litter the next year) was found to be associated with density but not WBP mortality.

Those two studies provided empirical evidence to support the relative importance of grizzly bear density (as opposed to declining WBP) in explaining differences observed since the earlier study period. FWP is unaware of any similarly rigorous analyses, published or unpublished, that would question or refute either of those studies.

Issue 7: Increasing human population and development.

In recent decades, although still sparsely populated by national standards, Montana has seen great increases in its human population and, in turn, of areas where humans live, work, and play. The results for grizzly bears include more fragmented habitat, more exposure to humans, and more potential for conflict. Additionally, recreationists have largely unhindered access to millions of acres of undeveloped land which, based on documentation of current and expected trends, either is or will be occupied by grizzly bears. As bear numbers and distribution increase and the number of outdoor enthusiasts grow, contact and interaction with people engaged in outdoor activities is likely to increase.

Biological effects of hunting

FWP is aware of, and has thoroughly considered, written critiques suggesting that hunting grizzly bears in Montana would almost certainly result in more strongly negative biological consequences than indicated in this document's section on hunting (e.g., Gosselin et al. 2015, Bischof et al. 2018, Mattson 2020). Below is a brief review of those writings.

1) Mattson (2020) uses an overly simplistic dichotomy of whether hunting mortality would be compensatory or additive. It ignores the literature showing density-dependent responses, not in adult survival where theory and empirical evidence in most large-mammal studies suggests it should not occur, but in juvenile survival and recruitment where one would expect to find it. See the section on density dependence. Mattson (2020) ignores the data on grizzly bears in Alaska (Miller et al. 2003, Keay et al. 2018, Brockman et al. 2020,) and misinterprets McLellan (2005).

2) Critics contend that sexually selected infanticide (SSI) would occur in Montana bear populations subject to a recreational hunt, reducing cub and possibly yearling) survival (or litter sizes prior to mortality, if females increase counterstrategies to avoid infanticide and in so doing sacrifice foraging opportunities at the expense of their own reproductive output). A number of studies are cited, primarily from European bear populations, supporting these arguments.

FWP does not dispute or take issue with the potential for infanticide or SSI among bears in Montana, nor with research showing the importance of SSI in many populations of bears in Europe. However, as articulated earlier in the section on infanticide in bears, FWP finds the most cogent, well researched, and applicable works relating to SSI among North American bears to be those of Miller et al. (2003) and McLellan (2005) and is unaware of newer or more applicable research that would cast doubt on the value of those studies.

Conclusions from both Miller et al. (2003) and McLellan (2005) are persuasive that litter size and juvenile survival among bear population subjected to low offtake via recreational hunts would increase if hunting reduced density of populations near carrying capacity and would be unchanged if hunting had no effect on—or reduced density of—a population below carrying capacity. Neither study supported the hypothesis that hunting (and particularly, reducing the abundance of adult males) would reduce litter size or juvenile survival.

Also relevant is Swenson (2003), which states that the presence of SSI among Scandinavian bear populations "does not mean that SSI is important in every population… North American and Scandinavian brown bears have very different histories. Humans tried to exterminate bears in Scandinavia with all available technology for hundreds of years and almost succeeded.... This long history of persecution may have been an important selective force in shaping life history strategies…lowered aggressiveness and increased productivity… may make European brown bear females less able than North American females to defend their cubs from infanticidal males.... In contrast to Europe, brown bears in North America were exterminated rapidly after European immigrants arrived; they survived only in inaccessible areas."

3) A number of publications have implicated hunting as having deleterious effects on grizzly bear social dynamics, foraging tactics, life-history strategies, or other biological attributes (Zedrosser et al. 2013; Frank et al. 2017, 2018, 2021; Bischof et al. 2018), and thus that biological effects of hunting would extend beyond the loss of hunting individuals. These studies have focused on the hunting population of brown bears in Sweden, where harvest rates have been high, regulations are lax, and most hunting occurs with the help of dogs. Such research is helpful for context, but FWP's view is that extrapolating effects to such a different system would not constitute good science.

4) FWP's understanding of the likely effects of hunting on human–bear conflicts is summarized in the above section on hunting.

Human dimensions

For attitudes and concerns regarding the presence, management, and conservation of grizzly bears, FWP relied on Frost (1985), Velado (2005), Sage (2019, 2022), and Nesbitt et al. (2020).

Relationship of this plan to federal laws and regulations

U.S. Endangered Species Act

As of this writing, all grizzly bears in the lower 48 states are classified by the U.S. Fish and Wildlife Service (USFWS) as threatened under the Endangered Species Act. All actions FWP takes must be consistent with protocols and procedures outlined by the USFWS under the ESA and its implementing regulations. As a threatened species, ultimate management authority is with the USFWS. That said, day-to-day management occurs in a cooperative setting, whereby land management agencies act according to plans that have been developed in consultation with and approved by the USFWS, and in which states and tribes conduct conflict prevention and response activities (in conjunction with USDA WS when livestock depredation in involved). The USFWS must approve of actions that affect individual grizzly bears, i.e., relocation, translocation, euthanasia. The USFWS does not typically require notification or involvement with day-to-day- conflict prevention, conflict response (except when capture of individual grizzly bears is contemplated), education and information efforts on the part of states and tribes.

USFWS "4d" rule

Under the protection of the ESA, "taking" of grizzly bears is prohibited. To "take" is defined by the ESA as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." However, Section (4)(d) of the ESA "Protective Regulations" provides the authority for the Secretary of the Interior to issue regulations for a threatened species that modify the strict interpretation of "take" for states that have entered into a cooperative agreement with the USFWS. Montana has entered into such an agreement. Federal Regulation 50 CFR 17.40(b) lays out four exceptions to strict federal prohibition on "take" that are applicable to grizzly bears in Montana (see Appendix A for the full text of 50 CFR 17.40(b)). These have become known colloquially as the "4d rule."

First, the rule allows grizzly bears to be taken "in self-defense or in defense of others," subject to the requirement that the individual taking the bear must report the event to the USFWS within five days and cannot transport, sell, or retain any parts of a grizzly bear killed in such a situation. Second, it allows authorized federal, state, or tribal authorities to remove (i.e., euthanize) a grizzly bear "constituting a demonstrable but non immediate threat to human safety or committing significant depredations to lawfully present livestock, crops, or beehives" if such taking is done humanely and in accordance with inter-agency guidelines (for more on the Inter-agency Guidelines, see below) and only when "it has not been reasonably possible to eliminate such threat or depredation by live-capturing and releasing unharmed in a remote area the grizzly bear involved." Third, federal, state, and tribal authorities may engage in taking other than killing or permanently injuring a grizzly bear (e.g., harassing, trapping) for scientific or research purposes, again with the requirement of appropriate reporting to the USFWS. Fourth, in national parks, grizzly bear taking is governed by NPS, rather than USFWS regulations.

Relationship of this plan to state laws, regulations, and resolutions

MEPA, Montana Code Annotated (MCA), and Administrative Rules of Montana (ARM)

This plan is written to be consistent and in compliance with the:

- Montana Environmental Policy Act (MCA , Title 75), following guidelines produced by Stockwell (2013).
- Elements of the Montana Code that refer to big game, predators, and grizzly bears specifically (MCA 1-1-508; MCA 87-1-201; 87-1-217; 87-1-304; 87-2-101; 87-2-701; 87-2-702; 87-3-131; 87-5-103; 87-5-301; 87-5-302; 87-5-725; 87-6-202; 87-6-205; 87-6-206; 87-7-413; 87-6-907.
- Elements of the Administrative Rules of Montana (ARM) with relevance to grizzly bears, specifically ARM 12.3.404; 12.8.806; 12.9.1401; 12.9.1403.

Legislative resolutions

In 2021, the 67th Montana legislature passed Senate Joint Resolution 18. The full text appears below.

A JOINT RESOLUTION OF THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA REQUESTING THAT MONTANA'S CONGRESSIONAL DELEGATION WORK TO RETURN MANAGEMENT OF MONTANA'S RECOVERED GRIZZLY BEAR POPULATIONS TO THE STATE OF MONTANA AND INITIATE FURTHER REVIEW OF MONTANA'S GRIZZLY BEAR POPULATIONS.

WHEREAS, the United States Congress authorized the Endangered Species Act of 1973; and

WHEREAS, the Endangered Species Act defined "endangered species" to mean "any species which is in danger of extinction throughout all or a significant portion of its range"; and

WHEREAS, the Endangered Species Act defined "threatened species" to mean "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range"; and

WHEREAS, the grizzly bear was designated as a "threatened species" in the conterminous United States under the Endangered Species Act on July 28, 1975; and

WHEREAS, the Endangered Species Act was amended by the United States Congress in 1978 so that the new definition of "species" included a "distinct population segment" that interbreeds; and

WHEREAS, in Senate Report 151 of the 96th United States Congress, the Congress instructed that the authority to designate distinct population segments be exercised "sparingly and only when the biological evidence indicates that such action is warranted"; and

WHEREAS, in 1993, the United States Fish and Wildlife Service revised the Grizzly Bear Recovery Plan, establishing six grizzly bear recovery zones, including the Greater Yellowstone Grizzly Bear Recovery Zone, the Northern Continental Divide Grizzly Bear Recovery Zone, the Cabinet-Yaak Grizzly Bear Recovery Zone, the Selkirk Grizzly Bear Recovery Zone, the Bitterroot (Mountains of Idaho and Montana) Recovery Zone, and the North Cascades (Mountains of Washington) Recovery Zone; and 67th Legislature SJ 18

WHEREAS, in 1996, the United States Fish and Wildlife Service and the National Marine Fisheries Service developed a policy to clarify the meaning of "distinct population segment," and the clarification required a distinct population segment to exhibit "discreteness" relative to the remainder of the species and "significance" to the species to which it belongs; and

WHEREAS, for the purpose of the discrete population segment policy, the United States Fish and Wildlife Service and the National Marine Fisheries Service define "discreteness" as being separated from other populations of the same species by physical, physiological, ecological, or behavioral factors, or as being delimited by international governmental boundaries with significant differences in habitat management, conservation regulations, exploitation control, or regulatory mechanisms; and

WHEREAS, because of the genetic interchange between the Northern Continental Divide, Cabinet-Yaak, and Selkirk grizzly bear recovery zones, and because of the genetic interchange that occurs between grizzly bears crossing the border between the United States and Canada, these three recovery zones should be considered one large interbreeding distinct population segment; and

WHEREAS, delisting efforts for the Greater Yellowstone Grizzly Bear Recovery Zone have been ongoing for 13 years, and the grizzly bear population in the Northern Continental Divide Grizzly Bear Recovery Zone has reached recovery goals and should also be in an ongoing delisting process; and

WHEREAS, delays in the United States Fish and Wildlife Service delisting process create a significant loss of social tolerance among Montanans who are adversely impacted by the continued expansion of grizzly bears.

NOW, THEREFORE, BE IT RESOLVED BY THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA:

That the Legislature supports the delisting of Montana's grizzly bear populations from the Endangered Species Act and the return of Montana grizzly bears to state management.

BE IT FURTHER RESOLVED, that the Legislature call on the United States Fish and Wildlife Service to revise the 1993 Grizzly Bear Recovery Plan and reevaluate the Grizzly Bear Recovery Zone efficacy across all ranges.

BE IT FURTHER RESOLVED, that the Legislature requests that the United States Fish and Wildlife Service create a statewide distinct population segment that includes all of Montana's grizzly bear recovery zones for the purpose of delisting the bear and returning its management to state control.

BE IT FURTHER RESOLVED, that the United States Fish and Wildlife Service develop a new management plan pursuant to section 4(d) of the Endangered Species Act that would aim to resolve conflicts between bears and humans within the Northern Continental Divide Grizzly Bear Recovery Zone and other grizzly bear recovery zones.

BE IT FURTHER RESOLVED, that the Legislature call on Montana's Congressional Delegation, as part of its efforts to return management of Montana's grizzly bears to the state, to exempt the delisting of grizzly bear populations from judicial review.

BE IT FURTHER RESOLVED, that the Secretary of State send a copy of this resolution to the Secretary of the United States Department of the Interior, the Governor of the State of Montana, the Department of Fish, Wildlife, and Parks, the Secretaries of State for the States of Washington, Wyoming, and Idaho, and to each member of the Montana Congressional Delegation.

Relationship of this plan to inter-agency cooperative plans

Below is a summary of other inter-agency cooperative plans in relationship to this current plan.

1993 Recovery Plan

Grizzly bear populations listed under the ESA are broadly managed under the auspices of the Grizzly Bear Recovery Plan, initially published on January 29, 1982, and revised and approved by the USFWS on September 10, 1993. The 1993 Recovery Plan identified 5 “Ecosystems” in which grizzly bears were present but in need or recovery: the Yellowstone Ecosystem (termed the YGBE in the 1993 Recovery Plan, but subsequently referred to at the Greater Yellowstone Ecosystem, GYE); the Northern Continental Divide Ecosystem (NCDE), the Cabinet-Yaak Ecosystem (CYE), and the Selkirk Ecosystem (SE). Additionally, the 1993 Recovery Plan identified two “evaluation areas” where grizzly bears were not known to exist in 1993, but for which further planning would be conducted. These were the Bitterroot Ecosystem (BE), and the North Cascades Ecosystem (NCE). In March 2000, the USFWS published a final EIS detailing its plan to recovery grizzly bears in the Bitterroot Ecosystem, at which point, the BE “evaluation area” became recognized as a 6th recovery zone. The SE and NCE are located entirely outside of Montana, and thus enter consideration in this plan only tangentially. The other 4 “Ecosystems” are located entirely (in the case of the NCDE), primarily (CYE), or partly (GYE, BE) within Montana.

The 1993 Recovery Plan outlines general approaches the USFWS identified as fulfilling the ESA's requirement that delisting only occur once the conditions that necessitated listing were resolved. However, detailed strategies and tactics for each Ecosystem have evolved over time, and been superseded by various subsequent documents and agreements that have updated our understanding of the species' status, monitoring protocols, and specific actions needed to achieve recovery. Thus, while the 1993 Recovery Plan remains the foundational document from which most others flow, its importance for day-to-day management has receded as newer, more relevant documents have been produced by federal, state, and tribal authorities.

Inter-agency Grizzly Bear Committee (IGBC)

In 1983 the Secretaries of the Interior and Agriculture and the Governors of Idaho, Montana, Wyoming, and Washington signed a Memorandum of Agreement to establish the Inter-agency Grizzly Bear Committee (IGBC). Their purpose for creating the IGBC was to "coordinate [federal and state] management and research actions to the greatest extent possible to insure the best utilization of available resources and prevent duplication of effort." The mission of the IGBC is "…to achieve recovery and delisting, and to support ongoing conservation of grizzly bear populations and their habitats after delisting in areas of the western United States through inter-agency coordination of policy, planning, management, research and communication: (IGBC 2019). Sub-committees for each of the six identified grizzly bear Ecosystems were subsequently created. The IGBC consists of "…representatives from the U.S. Forest Service, the National Park Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, the U.S. Geological Survey and representatives of the state wildlife agencies of Idaho, Montana, Washington and Wyoming. In the interest of international coordination and cooperation, the Canadian Wildlife Service is also represented. At the Ecosystem level, Native American tribes possessing grizzly habitat within the recovery areas have also been involved" (http://igbconline.org/story-of-the-igbc/). FWP has been a full member of both the IGBC Executive Committee and of the GYE, NCDE, and CYE sub-committees from the outset.

The IGBC is not a governing body or legal entity (IGBC member agencies retain their individual authority and autonomy); rather it exists to provide and coordinate policy-level oversight and direction among its various members. Various documents produced or sanctioned by the IGBC have relevance to this plan and are referenced as appropriate. The intention is that the plan be fully consistent with, and build upon, documents produced by the IGBC.

IGBC Guidelines

An early, important, and still-used document is called the Inter-agency Grizzly Bear Guidelines (1986). In its Section III, this document put forth general goals of NPS and USFS lands.

GYE Conservation Strategy (CS)

FWP is a signatory to the inter-agency Memorandum of Understanding (MOU) regarding the GYE CS (GYE Subcommittee 2019), which serves as an inter-agency management plan for the GYE and surrounding lands. The GYE CS is not a regulatory document, but rather a summary of commitments and regulatory mechanisms made by each government entity. The GYE CS would formally take effect upon delisting of bears within the GYE RZ. If delisting occurs, the ESA requires the USFWS, in cooperation with the state of Montana, to monitor the species for at least five years afterwards to assure that recovery is sustainable (a separate monitoring strategy would be developed by the USFWS). The CS, however, is not considered to be time-limited, but rather to be in effect indefinitely and (although reviewed by participants at 5-year intervals).

The GYE CS summarizes strategies and actions that federal, state, and tribal authorities have pledged to undertake within the Demographic Monitoring Areas (DMA) that includes and surrounds the GYE Recovery Zone (which would be renamed the Primary Conservation Area after delisting). The CS categorizes these commitments as Demographic Monitoring and Management (i.e., population management), Habitat Management and Monitoring, and Conflict Prevention and Response. FWP is primarily involved with the first and third of these, and tangentially involved with the second.

NCDE Conservation Strategy (CS) document

FWP is a signatory to the inter-agency MOU implanting the NCDE CS (NCDE Subcommittee 2019), which serves as an inter-agency management plan for the NCDE and surrounding lands. The NCDE CS (NCDE Subcommittee 2019) is not a regulatory or statutory document, but rather a summary of commitments and regulatory mechanisms made by each government entity. The NCDE CS would take formal effect upon delisting of bears within the NCDE Recovery Zone. If delisting occurs, the ESA requires the USFWS, in cooperation with the state of Montana, to monitor the species for at least five years afterwards to assure that recovery is sustainable (a separate monitoring strategy would be developed by the USFWS). The CS, however, is not considered to be time-limited, but rather to in effect indefinitely and (although reviewed by participants at 5-year intervals).

The NCDE CS summarizes strategies and actions that federal, state, and tribal authorities have pledged to undertake within the Demographic Monitoring Areas (DMA) that includes and surrounds the NCDE Recovery Zones (which would be renamed the Primary Conservation Area after delisting). The CS categorizes these commitments as Demographic Monitoring and Management (i.e., population management), Habitat Management and Monitoring, and Conflict Prevention and Response. FWP is primarily involved with the 1st and 3rd of these, tangentially involved with the 2nd. Commitments made by FWP related to Demographic Monitoring and Management were formalized by a public process and written into regulation by the Commission in ARM 12.9.1403.

Tri-State Memorandum of Agreement (MOA)

In December 2021, the Commission entered into a Memorandum of Agreement with the wildlife commissions of Wyoming and Idaho regarding the management, genetic health, and allocation of discretionary mortality of grizzly bears in the Greater Yellowstone Ecosystem (see Appendix H). The purpose of the MOA was to define a process to coordinate management of grizzly bears across state lines, largely anticipating a possible future delisting of these animals. This plan and the accompanying EIS are fully consistent with that MOA.

FWP-USDA-WS Memorandum of Understanding (MOU)

In February 2020, FWP renewed a Memorandum of Understanding (MOU) with U.S.D.A. Wildlife Services (WS) outlining a cooperative program for management of wildlife damage from grizzly bears, wolves, black bears, and mountain lions in Montana. For grizzly bears, the importance of this MOU is largely to clarify that investigations of possible livestock depredations will be the responsibility of WS (in cooperation with FWP when possible).

U.S. Forest Service Plans

Decisions made by the U.S. Forest Service, which manages the largest single land-ownership category in Western Montana, have great influence on grizzly bear management and conservation. Forests with lands in the NCDE and GYE areas are incorporated by reference in the two respective Conservation Strategies.

Relationship of this plan to existing plans

Western Montana Plan (2006) and Southwest Montana Plan (2013)

This plan, when formally adopted, would supplant both of the following grizzly bear management plans:

- the Western Montana plan (Dood et al. 2006); and
- the Southwestern Montana plan (FWP 2013).

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APPENDICES

Appendix A.
Full text, 4d rule (CFR, 10-1-07 edition) governing take of grizzly bears

Congressional Record § 17.40 CFR Ch. 1 (10-1-07 Edition)

Special rules – mammals.

a) [Reserved]

(b) Grizzly bear (*Ursus arctos*)—(1) *Prohibitions.* The following prohibitions apply to the grizzly bear:

(i) *Taking.* (A) Except as provided in paragraphs (b)(1)(i)(B) through (F) of this section, no person shall take any grizzly bear in the 48 conterminous states of the United States.

(B) Grizzly bears may be taken in self-defense or in defense of others, but such taking shall be reported, within 5 days of occurrence, to the Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, P.O. Box 25486, Denver Federal Center, Denver, Colorado 80225 (303/236–7540 or FTS 776–7540), if occurring in Montana or Wyoming, or to the Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, Lloyd 500 Building, Suite 1490, 500 Northeast Multnomah Street, Portland, Oregon 97232 (503/231–6125 or FTS 429–6125), if occurring in Idaho or Washington, and to appropriate State and Indian Reservation Tribal authorities. Grizzly bears or their parts taken in self-defense or in defense of others shall not be possessed, delivered, carried, transported, shipped, exported, received, or sold, except by federal, state, or tribal authorities.

(C) *Removal of nuisance bears.* A grizzly bear constituting [sic] a demonstrable but non immediate threat to human safety or committing significant depredations to lawfully present livestock, crops, or beehives may be taken, but only if:

(*1*) It has not been reasonably possible to eliminate such threat or depredation by live-capturing and releasing unharmed in a remote area the grizzly bear involved; and

(*2*) The taking is done in a humane manner by authorized federal, state or tribal authorities, and in accordance with current inter-agency guidelines covering the taking of such nuisance bears; and

(*3*) The taking is reported within 5 days of occurrence to the appropriate Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, as indicated in paragraph (b)(1)(i)(B) of this section, and to appropriate State and Tribal authorities.

(D) *Federal, state, or tribal scientific or research activities.* Federal, state, or tribal authorities may take grizzly bears for scientific or research purposes, but only if such taking does not result in death or permanent injury to the bears involved. Such taking must be reported within 5 days of occurrence to the appropriate Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, as indicated in paragraph (b)(1)(i)(B) of this section, and to appropriate State and Tribal authorities.

(E) [Reserved]

(F) *National Parks.* The regulations of the National Park Service shall govern all taking of grizzly bears in National Parks.

(ii) *Unlawfully taken grizzly bears.* (A) Except as provided in paragraphs (b)(1)(ii)(B) and (iv) of this section, no person shall possess, deliver, carry, transport, ship, export, receive, or sell any unlawfully taken grizzly bear. Any unlawful taking of a grizzly bear shall be reported within 5 days of occurrence to the appropriate Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, as indicated in paragraph (b)(1)(i)(B) of this section, and to appropriate State and Tribal authorities.

(B) Authorized federal, state, or tribal employees, when acting in the course of their official duties, may, for scientific or research purposes, possess, deliver, carry, transport, ship, export, or receive unlawfully taken grizzly bears.

(iii) *Import or export.* Except as provided in paragraphs (b)(1)(iii) (A) and (B) and (iv) of this section, no person shall import any grizzly bear into the United States.

(A) *Federal, state, or tribal scientific or research activities.* Federal, state, or tribal authorities may import grizzly bears into the United States for scientific or research purposes.

(B) *Public zoological institution.* Public zoological institutions (see 50 CFR 10.12) may import grizzly bears into the United States.

(iv) *Commercial transactions.* (A) Except as provided in paragraph (b)(1)(iv)(B) of this section, no person shall, in the course of commercial activity, deliver, receive, carry, transport, or ship in interstate or foreign commerce any grizzly bear.

(B) A public zoological institution (see 50 CFR 10.12) dealing with other public zoological institutions may sell grizzly bears or offer them for sale in interstate or foreign commerce, and may, in the course of commercial activity, deliver, receive, carry, transport, or ship grizzly bears in interstate or foreign commerce.

(v) *Other violations.* No person shall attempt to commit, cause to be committed, or solicit another to commit any act prohibited by paragraph (b)(1) of this section.

(2) *Definitions.* As used in paragraph (b) of this section:

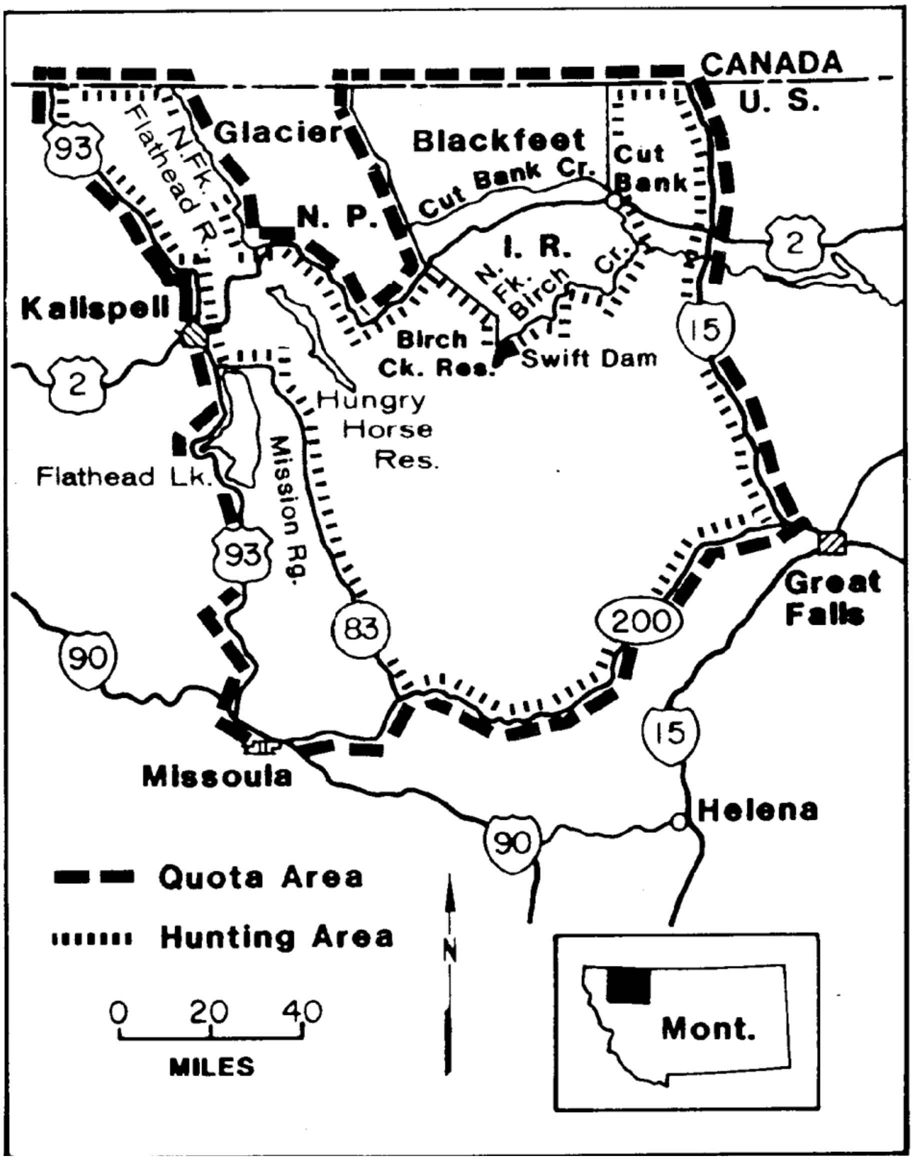
Grizzly bear means any member of the species *Ursus arctos* of the 48 conterminous States of the United States, including any part, offspring, dead body, part of a dead body, or product of such species.

Grizzly bear accompanied by young means any grizzly bear having offspring, including one or more cubs, yearlings, or 2-year-olds, in its immediate vicinity.

Identified means permanently marked or documented so as to be identifiable by law enforcement officials at a subsequent date.

State, Federal or Tribal authority means an employee of State, Federal, or Indian Tribal government who, as part of his/her official duties, normally handles grizzly bears.

Young grizzly bear means a cub, yearling, or 2-year-old grizzly bear.



Appendix B.
Summary, USFWS conflict response protocol and hazing guidance

U.S. Fish & Wildlife Service, Grizzly Bear Recovery Program

Grizzly Bear Conflict Response Protocol

Grizzly Bear conflict response is primarily conducted by state wildlife agencies, tribes, and Wildlife Services. These agencies work under the authority of the US Fish & Wildlife Service (FWS) to manage and recover grizzly bears.

1) Grizzly Bear Conflict Reported.
For assistance with grizzly bear conflicts, call the nearest agency office or local conflict specialist:

	Livestock Conflicts		Non-Livestock Conflicts
Idaho	Wildlife Services Idaho Idaho Dept. of Fish & Game Tribe	(208) 373-1630 (208) 334-3700	Idaho Dept. of Fish & Game Tribe
Montana	Wildlife Services Montana Montana Fish, Wildlife & Parks Tribe	(406) 657-6464 (406) 444-2535	Montana Fish, Wildlife & Parks Tribe
Washington	Washington Dept. of Fish & Wildlife Tribe	(360) 902-2200	Washington Dept. Fish & Wildlife Tribe
Wyoming	Wyoming Game & Fish Dept. Tribe	(307) 777-4600	Wyoming Game & Fish Dept. Tribe

2) Conflict Investigation.
Investigation to confirm grizzly bear conflict and determination of next steps (e.g., trapping, hazing, no action). The decision to trap depends on human safety risk, probability of catching the bear, number of bears in the area, and other site conditions. Investigator notifies US Fish and Wildlife Service (FWS) of planned action.

3) Decision on Grizzly Bear Control Action.
When a grizzly bear is caught, the responding agency (or agencies) or Tribe recommends management action (euthanize, relocate, release bear on site) to FWS via phone. FWS makes final decision. Decisions are made on a case-by case basis in consideration of the conflict history of the bear and area, availability of relocation sites, mortality threshold of the ecosystem, health and demeanor of the bear, type of offense, and sex and age class of the bear. The Interagency Grizzly Bear Guidelines (Table 1) provide guidance to the decision, but decisions may vary due to factors not considered in the Table.

FWS Grizzly Bear Recovery Program Contact:

Hilary Cooley, Grizzly Bear Recovery Coordinator
hilary_cooley@fws.gov; 406-243-4903

August 2020

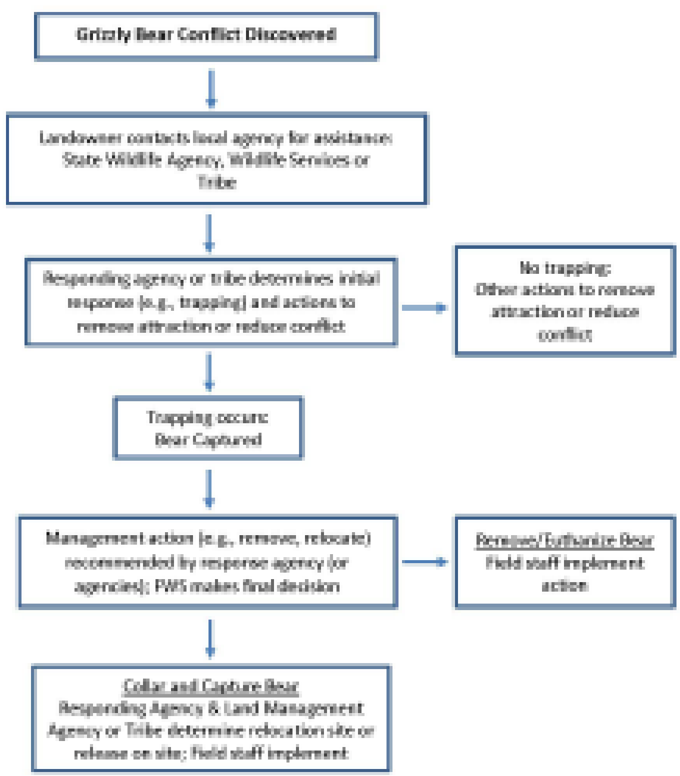
U.S. Fish & Wildlife Service, Grizzly Bear Recovery Program

Table 1. Guidelines for Grizzly Bear Control Action (from Interagency Grizzly Bear Guidelines (1986).

Conflict Type		Livestock Depredation or Use of Unnatural/Human Foods			Human Safety Threat		Human Injury/Death
History (no. of "strikes")		1	2	3	1	2	1
Female	Sub-Adult	REL	REL	REM	REL	REM	REM
Female	Adult	REL	REL	REM	REL	REM	REM
Female	Ad w/ Young	REL	REL	REM	REL	REM	REM
Female	Old Adult	REL	REM	N/A	REM	N/A	REM
Male	Sub-Adult	REL	REM	N/A	REM	N/A	REM
Male	Adult	REL	REM	N/A	REM	N/A	REM
Male	Old Adult	REM	REM	N/A	REM	N/A	REM
Male / Female	Orphaned Cub	RLS/REL	RLS/REL	RLS/REL	RLS/REL	RLS/REL	REM

REL = Relocate; REM = Removal (Euthanasia); RLS = Release on site

Figure 1. Conflict Response Protocol



August 2020

U.S. Fish & Wildlife Service

Grizzly Bear Hazing Guidelines

Guidance for Livestock Owners, Homeowners and the General Public

Grizzly bears are listed as Threatened under the Endangered Species Act (ESA). As such, harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting grizzly bears is not permitted except for self-defense or in defense of others, as authorized by the grizzly bear 4(d) rule. *Harass* in the definition of "take" in the ESA means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Grizzly bears can pose a threat to human safety and should be discouraged from using areas near homes and other human-occupied areas. Hazing discourages undesirable behavior in wildlife, and when properly conducted, does not create a likelihood of injury to grizzly bears to such an extent as to significantly disrupt normal behavioral patterns.

Individuals may use the methods listed below to deter grizzly bears away from the immediate vicinity (200 yards) of a human-occupied residence or potential conflict area, such as a barn, livestock corral, chicken coop, grain bin, or schoolyard . Once bears have moved beyond the immediate vicinity (200 yards), hazing is unlikely to be effective and should stop. All measures must be taken to ensure proper use of methods and that the bear is not injured or killed. If there is immediate danger of attack, individuals may legally take a grizzly bear in self-defense or in defense of others. This includes lethal removal of such grizzly bears. Any such taking must be reported to the US Fish & Wildlife Service within five days.

Any person who uses the techniques described in these guidelines must use discretion and act safely and responsibly in confronting nuisance grizzly bears. All actions taken must comply with applicable laws and regulations, including local, state and tribal laws.

Acceptable Hazing Techniques:

Non-Projectile Auditory Deterrents: Yelling, clapping, banging pots or other objects, air horns, vehicle horns, vehicle sirens, and P.A. systems (vehicle-based or hand-held) are often sufficient to move bears short distances, and should be employed before other methods are tried.

Visual Stimuli/Deterrents: Sometimes simple visual stimuli, such as spotlights or flashing lights can frighten a bear away. Use in combination with yelling so the bear associates the stimuli with human presence.

Vehicle Threat Pressure: Vehicles can be an effective hazing tool. By driving vehicles slowly towards bears (without hitting them), it can apply enough threat pressure to get bears to leave the immediate vicinity (200 yards). The effectiveness of vehicle pressure can be enhanced by using it in combination with auditory deterrents such as sirens or horns. Caution must be taken that no contact is made between the vehicle and the bear. As soon as the bear is clear of the immediate vicinity, pressure and noise should be discontinued.

Dogs: Dogs, such as Karelian Bear Dogs or trained guard dogs used on a leash can be an effective deterrence tool.

Water: The use of water in a large steady stream has proven effective at temporarily displacing some bears from human use areas. Hoses with a nozzle that gives a high pressure, long-range stream, such as a fire hose, can be an effective deterrence tool. As with all deterrence techniques, use of water for hazing should be accompanied by yelling so the bear associates the experience with human presence.

March 2020

Stones or marbles: Can be either thrown or sent out of a slingshot. Wooden balls are also available for use with a sling shot. They should NOT be aimed at the face due to the danger of hitting an eye, but rather aimed at the rump of a bear. The maximum size of projectile should be the size of a golf ball. Range: 15-200+ ft.

Paintballs: Paintballs can also be used as a deterrent, avoiding injuring to the bear (when shot away from the face). An alternative to paintballs are rubber balls. Rubber balls are extremely cost effective and can be used repeatedly. Range: 30-150 ft. Note: Bears are attracted to paintball residue, therefore the area must be cleaned up after the use of paintballs.

Noise-making Projectiles: This category includes projectiles fired from a weapon that explode, creating a sudden loud noise, such as bangers and 12-gauge crackers. Range: 75-90 ft. (bangers); 180-250 ft. (cracker shells). The explosive noise of cracker shell or banger must occur between the shooter and the bear.

Guidelines for Use of Noise-Making Projectiles
The improper use of noise deterrents can cause injury to the individuals, bystanders, the bear, or nearby property. The following guidelines MUST be followed to prevent injuries:

- Always fire projectiles from a secure location (inside a hard-sided vehicle or from building).
- Always be aware of the line of fire and the backdrop. Ensure bear has an escape route away from people.
- Ensure the deterrent explodes between the operator and the bear – a noise deterrent that explodes behind the bear may drive him toward you or bystanders.
- All shooters must know the optimal range of their rounds as they can cause death at close distances.
- Noise deterrents should be fired into the air at a 45 degree angle above the ground.
- NEVER fire noise deterrents directly at or under a bear as penetration may occur sometimes resulting in internal explosion (particularly with 12 gauge crackers used at a close distance).
- Be aware of the potential for a ricochet.
- 12 gauge rounds should be used in un-choked barrels only - check the barrel of the gun after each shot to ensure there is no blockage that could result in a misfire.
- NEVER load 12 gauge crackers and lethal rounds into the same firearm. Deaths have resulted from confusion with regard to which round is chambered.
- Bear bangers discharged from a hand-held pen should be avoided as they are inaccurate and have been known to explode in people's hands.
- Cracker shells can start fires. Be aware of any fire related hazards when using explosive devices.

Unacceptable Deterrence Methods

- Screamers and Whistlers. Erratic flight pattern; higher fire risk in dry conditions.
- Rubber bullets and rubber batons. Higher risk of injury to the bear.
- Bean Bag and Aero Sock Rounds. Short range creates a human-safety threat.

Preventative Methods:

Livestock owners and homeowners should take measures to prevent or minimize losses from predation through good husbandry and strategic use of pro-active deterrent methods such as electric fence, guard animals, and human presence. More information is provided in the Loss Prevention Toolkit on the Montana Livestock Loss Board website: www.llb.mt.gov .

For more information on grizzly bear deterrence, please contact:

- USFWS Grizzly Bear Recovery Program at 406-243-4903
- USFWS Office of Law Enforcement at 406-247-7355

March 2020

Appendix C.
Full text, FWP / USFW Memorandum of Agreement (MOA) re. MT SB 337

Montana Fish, Wildlife & Parks

Memorandum of Agreement
between
Montana Fish, Wildlife & Parks
and
U.S. Fish & Wildlife Service
regarding
Grizzly Bear Management in Relation to Montana Senate Bill 337

Senate Bill 337, Section 1. (3)(b) *The department may respond to a grizzly bear listed under the federal Endangered Species Act (ESA), 25 16 U.S.C. 1531, et seq., that is causing conflict outside of a federal recovery zone. If the bear is to be relocated, the department may not relocate the bear.*

Purpose. The purpose of this Memorandum of Agreement (MOA) is to document the agency response process for Montana Fish, Wildlife & Parks (MTFWP), the U.S. Fish & Wildlife Service (FWS) and Wildlife Services (WS), including agency roles and coordination, for grizzly bears causing conflict outside of a federal recovery zone in light of Senate Bill 337 which will become effective date on March 1, 2022.

For purposes of this MOA, grizzly bear conflicts are defined as: incidents in which bears either do or attempt to: injure or kill people; damage property; kill or injure lawfully present livestock or poultry; damage beehives; obtain reasonably secured anthropogenic foods and other attractants; or damage agricultural crops.

This MOA relies on the collaborative relationship that already exists between MTFWP, FWS and WS. All efforts to manage grizzly bear conflicts will be conducted in collaboration with the FWS Grizzly Bear Recovery Program (GBRP) Coordinator and will be consistent with the conditions of the agency's 4(d) authorization letter (under 50 CFR § 1740) to MTFWP.

MTFWP and FWS agree that when managing grizzly bears in conflict:

1) For grizzly bears causing conflicts inside a federal recovery zone:
   a) MTFWP and WS will handle all aspects of the response, including trapping, processing, and carrying out the agreed upon management action, including removal and relocation to Montana Fish and Wildlife Commission-approved release sites. WS will respond to livestock conflicts according to the Memorandum of Understanding between MTFWP and WS.

2) For grizzly bears causing conflicts outside a federal recovery zone:
   a) MTFWP and/or WS (livestock) will respond to conflicts. MTFWP and WS will recommend management approach to FWS. If FWS approves trapping, MTFWP or WS will set traps. Traps will not be set until and unless approved by FWS.
   b) When a bear is trapped, MTFWP and/or WS (livestock) will process (tranquilize, mark, collar, collect biological data) bear. Processing the bear is needed to confirm sex, conflict history, and whether bear is the target bear. This information will inform a management decision.
   c) If the bear is determined to be in conflict:
      i) If, after consultation with USFWS, a decision is made to remove the bear, MTFWP or WS will carry out the removal.

ii) If, after consultation with FWS, a decision is made to relocate the bear, MTFWP or WS will place bear in trap for transport and hold the bear in a secure location as close to the capture site as possible. FWS will take possession of the bear within 6 hours and will relocate, unless otherwise explicitly agreed upon by agencies (bears are often held overnight to allow full recovery prior to relocating). MTFWP and WS agrees to ensure health and safety of bear until USFWS can take possession, including moving bear to protected area if/when needed due to exposure. FWS will notify MTFWP of the location where they relocated a bear within 12 hours of release.

d) If the bear is determined to NOT be in conflict (incidental catch), MTFWP will maintain possession of bear and will relocate bear to an agreed upon Fish and Wildlife Commission-approved site or release on site.

<u>Potential Scenarios</u>
-conducted in collaboration with the FWS GBRP Coordinator and consistent with the conditions of the agency's 4(d) authorization letter (under 50 CFR § 1740) to MTFWP.

1) Livestock depredation near Augusta (outside recovery zone)
   WS responds and sets traps. Grizzly bear is trapped. WS and/or MTFWP processes bear.
   a. If there is no information to confirm this bear is the target bear (or if it is known that this is not the target bear) and decision is made to relocate bear, MTFWP will relocate bear.
   b. If bear is target bear and decision is made to remove bear, MTFWP or WS will remove bear.
   c. If bear is target bear and decision is made to relocate bear, FWS will relocate bear.

2) Chicken conflict near Whitefish (outside recovery zone).
   MTFWP responds and sets traps. Grizzly bear is trapped. MTFWP processes bear.
   a. If bear is non-target bear and decision is made to relocate bear, MTFWP will relocate bear.
   b. If bear is target bear and decision is made to remove bear due to conflict history, MTFWP will remove bear.
   c. If bear is target bear and decision is made to relocate bear, FWS will relocate bear.

3) Site conflict outside Condon (inside recovery zone).
   MTFWP responds and sets traps. Grizzly bear is trapped. MTFWP processes bear.
   a. If bear is non-target bear and decision is made to relocate bear, MTFWP will relocate bear.
   b. If bear is target bear and decision is made to remove bear due to conflict history, MTFWP will remove bear.
   c. If bear is target bear and decision is made to relocate bear, MTFWP will relocate bear.

4) Dead cow being fed on by grizzly bears is reported (outside recovery zone). Upon investigation, four bears are identified. It is unknown, which, if any, were involved in a depredation. Feeding on dead livestock is not a conflict, however WS sets traps because of recent depredations in the area.
   a. If bear(s) are captured and there is no information to determine whether these bears were involved in previous depredations, MTFWP may relocate.
   b. If bear(s) are captured and there is information to suggest the bears were not involved in a depredation, MTFWP may relocate.
   c. If bear(s) are captured and there is information to suggest the bears were involved in killing this cow or in recent depredations in the area, and the decision is made to relocate bear, FWS will relocate.

Effective Dates: This MOA is effective upon signature by both parties through October 31, 2023 and may be renewed annually.

Signatures

12/3/21

Hank Worsech, Director
Montana Fish, Wildlife and Parks
Date

12/13/21

Hilary Cooley, Grizzly Bear Recovery Coordinator
U.S. Fish and Wildlife Service
Date

Attachment: SB 337

Appendix D.
Full text, Governor's Executive Order
creating citizens' grizzly bear advisory council (GBAC)

STATE OF MONTANA
OFFICE OF THE GOVERNOR
EXECUTIVE ORDER No. 9-2019

EXECUTIVE ORDER CREATING THE GRIZZLY BEAR CONSERVATION AND MANAGEMENT ADVISORY COUNCIL

WHEREAS, grizzly bears are valued by people and cultures across Montana and around the world;

WHEREAS, grizzly bears are also feared and can affect people's livelihoods and safety;

WHEREAS, grizzly bear numbers in Montana continue to increase, and have expanded into areas where they have not
been for decades, including places key to connecting their populations;

WHEREAS, despite this success, long-term coexistence of people and grizzly bears across the landscape will remain a challenge;

WHEREAS, existing management plans did not fully anticipate grizzly bear distribution across the landscape and as Montana's human population continues to grow, we can expect conflicts between bears and people to increase in frequency and complexity;

WHEREAS, the U.S. Fish and Wildlife Service, in cooperation with the Montana Department of Fish, Wildlife and Parks (FWP), the U.S. Forest Service, the National Parks Service, the Bureau of Land Management, the Blackfeet Tribe, and the Confederated Salish and Kootenai Tribes, currently manage grizzly bears in Montana as "threatened" under authority of the Endangered Species Act;

WHEREAS, four of the six recovery areas identified by the U.S. Fish and Wildlife Service in the Grizzly Bear Recovery Plan occur in whole or in part within Montana;

WHEREAS, recent litigation has created uncertainty about delisting of grizzly bears from the Endangered Species Act;

WHEREAS, it is timely that Montanans work together to determine how the state and its partners will collectively manage and conserve grizzly bears;

WHEREAS, it is important to recognize existing grizzly bear management objectives and existing intra-agency and inter-agency commitments already in place, including conservation strategies, monitoring protocols, recovery plan criteria, and forest plans;

WHEREAS, the future of grizzly bear management in Montana must maintain scientific integrity, and balance diverse interests and values;

WHEREAS, Montana remains committed to maintaining the long-term viability of grizzly bears and balancing their needs with those of people;

WHEREAS, it is important for the public to have ownership and confidence in grizzly bear management in Montana;

WHEREAS, to ensure its citizens have a voice in the future of grizzly bears, Montana must provide meaningful opportunities for people to engage in a public discussion around grizzly bear management, recovery and conservation; and

WHEREAS , it is in the best interests of all Montanans to bring stakeholders and experts together to recommend statewide strategies for conserving and managing grizzly bears for today and the future;

NOW, THEREFORE, I, STEVE BULLOCK, Governor of the State of Montana, pursuant to the authority vested in me under the Constitution and the laws of the State of Montana, Title 2, Chapter 15, MCA, do hereby create the Governor's Grizzly Bear Conservation and Management Advisory Council (Council).

PURPOSE

The purpose of the Council is to develop recommendations for fundamental guidance and direction on key issues and
challenges related to the conservation and management of grizzly bears in Montana, particularly those issues on which there is significant social disagreement.

DUTIES

1. The Council shall produce a Final Report with discrete, actionable recommendations that provides clear and meaningful guidance to the Governor's Office, FWP, the Fish and Wildlife Commission, and other entities with responsibility for grizzly bear management and conservation in Montana.

2. The Council shall recognize grizzly bear management objectives and existing intra-agency and inter-agency commitments already in place, including conservation strategies, monitoring protocols, commission policies, recovery plan criteria, and forest plans.

3. The Council shall utilize a transparent process that maximizes engagement among people with diverse values and interests. The Council shall consider public input on its recommendations.

4. The Council's recommendations shall identify strategies that achieve the following broad, strategic objectives:

- a) Maintain and enhance human safety;
- b) Ensure a healthy and sustainable grizzly bear population;
- c) Improve timely and effective response to conflicts involving grizzly bears;
- d) Engage all partners in grizzly-related outreach and conflict prevention; and
- e) Improve intergovernmental, inter-agency, and tribal coordination.

5. The Council shall have the discretion to examine grizzly bear-related issues that it deems to be important, including at a minimum the following topics critical to its objectives:

- a) Grizzly bear distribution within Montana (including outside of established recovery zones);
- b) Connectivity between ecosystems;
- c) Conflict prevention;
- d) Response protocols to grizzly conflict in different parts of the state;
- e) Transplant protocols;
- f) Role of hunting; and
- g) Resources for long-term sustainability of grizzly bear conservation.

COMPOSITION AND ORGANIZATION

1. The Council members shall be solicited through an application process and appointed by and serve at the pleasure of the Governor.
2. The Council members shall be a cross-section of Montanans representative of different geographic areas and interest categories involved in or affected by grizzly bear conservation and management, including livestock producers, wildlife enthusiasts, conservation groups, hunters, community leaders, tribal members, and outdoor industry professionals.
3. The Governor shall appoint a council member as chairperson.

4. Council members shall serve in an individual capacity.
5. The Office of the Governor, with support from FWP, will engage to further the objectives of this Council. The Council will be attached to FWP for administrative purposes.
6. FWP shall convene an interdisciplinary, inter-agency technical advisory committee to serve the Council and provide biological, legal, and policy information.
7. The Council may establish procedural bylaws to aid in the performance of its duties.
8. The Council may establish subcommittees comprised of members of the Council to aid in the performance of its duties.

FWP ROLES AND RESPONSIBILITIES

1. FWP shall provide staff to assist the Council in completing its work.
2. FWP shall make available experts who can support the Council with technical, scientific, social, policy, and legal matters.
3. As the Council begins its work, specific decisions for implementation of management strategies will continue to be the responsibility of FWP.

OTHER

1. The Council may request consultation, information, and technical expertise from directors or their designees of state and federal agencies, the university system, the public, and other entities related to grizzly bear management and conservation.
2. The Council is not a regulatory body; its recommendations are advisory only.

COMPENSATION

All Council members shall be reimbursed for travel, meals, and lodging related to Council duties pursuant to Section 2-15-122, MCA.

DURATION

The Council shall complete its Final Report and provide its recommendations to the Governor by August 31, 2020. The Council shall then disband unless continued by subsequent executive order.

This Order is effective immediately.

GIVEN under my hand and the GREAT SEAL of the State of

Montana this 24th day of July 2019.

____

STEVE BULLOCK, Governor

ATTEST :

____

COREY STAPLETON , Secretary of State

Appendix E.
Full text, 2020 final report from GBAC

FINAL REPORT
Recommendations and Input on the Future of Grizzly Bear Management and Conservation in Montana

Preamble

Montana's heritage is intimately connected to grizzly bears, and many indigenous peoples have lived with grizzly bears from time immemorial. The Blackfeet Tribe and Confederated Salish and Kootenai s (CSKT) continue to play essential roles in grizzly bear management and conservation in cooperation with the U.S. Fish and Wildlife Service (US FWS), Montana Fish, Wildlife and Parks (FWP), the U.S. Forest Service (US FS), the Bureau of Land Management (BLM), USDA Wildlife Services, and the National Park Service (NPS). The Governor's Grizzly Bear Advisory Council (GBAC or the Council) respects and honors this long-standing relationship, as well as the traditional knowledge that continues to inform management and provide habitat for grizzly bears in Montana.

As grizzly bear populations have been reduced or extirpated throughout much of their historic range over the past century, the populations that continue to reside and expand in Montana are perceived by many from our state and around the world to hold both intrinsic and spiritual value, alongside a recognized ecological importance. The grizzly bears residing in Montana's four recovery Ecosystems are considered essential to the continued recovery of the species nationally. Significant progress toward the recovery of this species has occurred since grizzly bears were listed as protected by the Endangered Species Act in 1975.

Continued conservation and management efforts remain necessary. Montana is unique in the continental United States for its maintenance of grizzly bear populations and their core habitats that support connectivity and recovery in landscapes extending beyond primary conservation areas and state lines. The Council recognizes that alongside the wilderness, parks, and protected lands that have provided refuge for grizzly bears over the past century, there is an essential role for local communities and working lands, both public and private, in helping to maintain a landscape capable of supporting both people and grizzly bears. Grizzly bear expansion across the state has and will continue to bring challenges to traditional and emerging livelihoods as the human population of Montana increases simultaneously with the population of grizzly bears. The conservation of this species from past and ongoing management and cooperation, as well as future conservation and management, could offer the opportunity to make the goal of grizzly bear recovery a reality.

The GBAC was charged with developing citizen recommendations for fundamental guidance and direction on key issues and challenges related to the conservation and management of grizzly bears in Montana, particularly those issues on which there is significant social disagreement. The 18 Montanans that make up the Council acknowledge the important task with which we were charged, and worked to bring our diversity of livelihoods, backgrounds, community concerns, and connections to Montana's landscapes into our discussions when crafting our recommendations. We also acknowledge that our recommendations are just that, and stand beside many other agency, tribal, and public contributions. The Council worked to use all information provided by support staff, as well as public comment, to provide meaningful guidance and feedback that will inform, but not constrain, the management and conservation of grizzly bears into the future.

Vision

We envision fully recovered grizzly bear populations in the four identified recovery areas in Montana and landscapes in-between that accommodate grizzly bear presence and connectivity while maintaining the safety and quality of life of those that live, work, and play in Montana.

Guiding Principles

The following principles provide the underlying foundational understandings that inform all the Council's recommendations. These considerations should be accounted for in any decision or process related to grizzly bear management in the state of Montana and are representative of the communal voice existing among the diverse individual members of the Council.

1. All those living in or visiting Montana should expect the potential presence of grizzly bears on the landscape, and should have access to education, assistance, and resources involved with coexisting with grizzly bears.

2. The identification of areas between established recovery zones that best contribute to genetic and demographic connectivity is necessary to prioritize resource allocation, focus outreach and education efforts, build social tolerance, and proactively engage local communities and landowners.

3. As expansion occurs outside the four recovery Ecosystems and the landscapes in-between them in Montana, FWP and relevant agencies will have to balance this expansion with the need to prioritize resources that support both public and private lands. This would include resources, personnel, and conflict prevention/ mitigation strategies well ahead of grizzly bear expansion into unprepared areas.

4. The best available science should inform decisions in all aspects of grizzly bear management and conservation.

5. Strategies and tools aimed at proactively preventing or reducing conflicts are often effective and can be less expensive than compensating for conflict after the fact.

6. Strict enforcement of poaching is necessary for the long term conservation of grizzly bears.

7. Grizzly bear management requires communication, coordination, and timely consultation among governmental agencies, tribal entities, private landowners, and the public.

8. Montana's diverse landscapes and complex circumstances require flexibility in grizzly bear management decisions.

9. Cooperation with and consideration of working landscapes is essential to the successful expansion and connectivity of grizzly bears. These communities are an important part of the decision-making process.

10. Social tolerance is not uniform; it is a complex topic that is dynamic and variable across space and time. FWP and relevant agencies should strive to cultivate social tolerance through sound management decisions and conflict prevention measures.

11. Addressing the challenges to working landscapes, recreationists, and local communities on both public and private lands will require an inclusive and proactive effort.

12. Voluntary, incentive-based conservation efforts on lands should be encouraged and supported.

13. Both genetic and demographic connectivity are important to the long-term sustainability, persistence, and resiliency of grizzly bears. Connectivity areas will exist in diverse social and environmental settings. Not all

these settings are conducive to permanent habitation but should be managed to promote genetic and demographic connectivity in biologically suitable habitat, being mindful that biologically suitable does not always mean acceptable.

14. Increasing recreational use on public lands is an emerging challenge to grizzly bear recovery and management and could negatively affect grizzly bear recovery.

15. The Council recognizes the importance of large tracts of remote secure habitat. Sustaining and improving habitat security, managing road densities, and identifying and protecting natural food resources and other needs will contribute to long-term survival and resiliency of grizzly bears.

16. The effects of climate change should be considered when making decisions about grizzly bears.

17. In order to implement our recommendations, relevant agencies will need new funding from diverse entities and sources. Resources are key to the success of all our recommendations. As resources are developed and utilized, both public and private lands needs must be considered.

18. Grizzly bear conservation is a shared responsibility.

SECTION I.
Council Recommendations
Education and Outreach

The following recommendations were crafted with careful consideration and consensus from the 18 Council members. Education and outreach should engage all Montanans and visitors in the shared responsibility of grizzly bear conservation. In order to support, develop, and improve the range of grizzly bear education and outreach between FWP and the public, the Council offers the following recommendations:

1. In recognition of the grizzly bear being Montana's state animal and the strides made since the species was listed as protected under the Endangered Species Act in 1975, the Grizzly Bear Advisory Council recommends the Governor establish a date to annually celebrate and create awareness around the grizzly bear and the landscapes, communities, and continued collaborative efforts in Montana that have contributed to grizzly bear conservation.

2. FWP should provide easy access to education about hunting safely in grizzly bear country for resident and non-resident hunters in Montana.

3. All relevant agencies should provide residents and landowners with accurate information on the effective use of non-lethal methods to haze grizzly bears.

4. Relevant agencies should provide consistent messaging when communicating with the public about the differences among the terminology around relocation, reintroduction, and augmentation, and when each might be necessary or utilized.

5. Relevant agencies should create open and accessible communication channels between bear managers and the public to encourage communal efforts around bear awareness and conflict prevention.

a. Support bear managers as they create reliable and easy reports of bear sightings and conflicts near human settlements, towns, and cities.

b. Grizzly bear management on working lands will not be a static process. Communication is key to mutual understanding, innovative solutions, and trust. The council recommends regular engagement with working lands managers to inform grizzly bear management and policy.

6. FWP, in coordination with relevant agencies, should create consistency and timeliness around public access to grizzly bear mortality data across recovery Ecosystems.

7. FWP, together with partners, should explore ways to inform, promote, and incentivize Bear Aware programs in communities.

8. Relevant agencies should support educational efforts to build a common understanding of perspectives between agricultural producers and urban communities.

9. Relevant agencies should create and use consistent messaging around the use and effectiveness of bear spray.
   - a. FWP should encourage bear spray distribution and training programs across the state, including but not limited to the following:
     - i. Work with Inter-agency Grizzly Bear Committee (IGBC) and professionals in the outdoor industries to provide bear spray and training and to explore best management practices for businesses around bear safety for employees and clients;
     - ii. Partner with outdoor recreation companies and retailers to offer grizzly bear safety training;

iii. Coordinate messaging on the efficacy and use of bear spray with the Montana Office of Outdoor Recreation and the Montana Office of Tourism; and

iv. Provide a bear identification and safety video including proper use of bear spray and couple it with the bear identification test online.

10. The Governor's office and FWP should work to fund and create a full time and permanent Grizzly Bear Information, Education, and Outreach Coordinator to support and contribute to the broader efforts of FWP's Wildlife Stewardship Outreach Specialist. The following considerations were identified by the Council for this position but should be pursued by the appropriate FWP staff regardless of this position being in place.

a. Develop and maintain a statewide Bear Aware program.

i. Together with partners, work to establish a statewide program and a way to certify Bear Aware businesses and communities.

b. Create a centralized location within FWP that includes available resources and a catalog of educational materials.

c. Coordinate with stakeholders to provide bear safety information and outreach.

i. Identify gaps where additional bear safety information and outreach is needed

d. Work with agency partners to address outreach and education needs on public lands.

e. Continue the FWP Grizzly Bear Education and Outreach Summit to:

i. Address conflict prevention, resource concerns, and ongoing challenges; and

ii. Create, report, and share consistent messaging and effective strategies.

f. Work with the Montana Office of Public Instruction, local teachers, agencies, and tribal partners to create and implement a K-12 grizzly bear curriculum.

Conflict Prevention and Reduction

Preventing conflicts with grizzly bears is essential to the development of social acceptance and the continued conservation of grizzly bears. Proactive, inclusive efforts to mitigate conflict can engage communities, protect private property, maintain human safety, and be an efficient use of limited resources, while minimizing associated bear mortality. The following recommendations are actionable items that can strengthen or support existing efforts.

11. Human/Grizzly Conflicts in and around Developed Areas

a. In areas where grizzly bears are or may be present:

i. FWP, along with local state, federal, and tribal entities, should: provide guidance for land use planning to prevent human/grizzly conflicts;

ii. Proactively recommend actions to governing bodies on how to minimize grizzly bear conflicts;

iii. Help local communities identify and use available local grants for conflict prevention; and

iv. Review and update all FWP subdivision recommendations (2012).[4]

b. FWP and IGBC should make the research, development, and funding of new and innovative tools and techniques for conflict prevention and aversive conditioning a high priority.

c. The Governor's office and FWP should work with partners to increase access to federal dollars for grizzly bear conservation and management that includes conflict prevention actions.

12. Agriculture

a. We strongly recommend the Governor's Office and the 2021 Montana Legislature fully fund the Livestock Loss Board (LL B) to provide dedicated conflict prevention dollars in order for the LL B to allocate funding for conflict reduction tools and practices.

b. All relevant state and federal agricultural and wildlife agencies should research and make recommendations on best management practices that help reduce depredations on livestock and non-livestock commercial losses.

c. Relevant agencies should integrate technology to allow for timely reporting of agricultural conflicts to neighboring farms and ranches.

d. FWP should increase and diversify partnerships, funding, and support for community-based groups and other organizations to:

i. Support conflict mitigation efforts and monitoring;

ii. Expand outreach efforts;

iii. Provide salary cost shares with local groups; and

iv. Provide proper resources for livestock producers to implement appropriate conflict prevention

13. Public and State Land

a. In areas where grizzly bears are or may be present:

i. Relevant agencies should create and enforce consistent food storage requirements across state and federal lands;

ii. Relevant agencies should work with partners to make bear resistant infrastructure available at all federal, state, and local campgrounds and other public recreation areas;

iii. FWP and relevant agencies should continue to work with partners to research and closely monitor impacts to grizzly bears from road densities and other human activity on public and state lands; and

iv. FWP should coordinate with public land managers to develop plans to address the general and seasonal impacts to wildlife from recreational use and to prevent conflicts between grizzly bears and people on the landscape, including but not limited to the following:

1. Encourage reduced maximum group sizes for public and special event use in recovery Ecosystems;

2. Encourage temporary trail closures and limit special use permits in areas with critical habitat conditions during appropriate times of year;

3. Consider future areas of connectivity in land management decisions;

4. Require that commercial or special use permit applications include specific plans to meet food storage order regulations, manage and reduce conflicts, contain attractants, and minimize impacts to grizzly bear habitat and food resources;

5. Consider identifying areas of Montana with minimal impacts to grizzly bear habitat and minimal risk of conflict to proactively prepare for participation in recreation planning processes; and

6. Ensure appropriate and timely analysis for new and proposed recreation activities n designated core grizzly habitat and connectivity areas on public lands, and move or reroute activities as determined by the analysis.

14. Waste Management/Sanitation

a. In areas where grizzly bears are or may be present:

i. FWP and relevant agencies should support the development of consistent local sanitation ordinances that require attractants to be stored in a bear-resistant manner and includes entities for enforcement.

ii. Counties and local governments are encouraged to work with local sanitation companies to explore the use of bear-resistant sanitation storage options. Sanitation efforts should be coupled with outreach, monitoring, and maintenance of infrastructure.

b. Outside of areas where grizzly bears are or may be present:

i. Communities and planning boards should proactively explore local sanitation practices.

Conflict Response and Protocols

Timely and consistent conflict response is necessary to build and maintain relationships between FWP and the communities where grizzly bears exist. Building these relationships prior to conflict will help to promote open communication and sharing of information if the need for response should occur. These recommendations are intended to increase FWP and other relevant agencies' abilities to facilitate positive engagement with those living with grizzly bears.

15. The State Legislature and FWP should make bear management specialists Full Time Equivalent (FTE) positions included in permanent base funding, provide each specialist with a year-round technician, and create more of these fully funded positions as needed. This would:

a. Allow for transfer of expertise from bear managers to bear managers-in-training;

b. Improve response time;

c. Allow bear managers to be proactive and mitigate conflicts; and

d. Allow time for relationship building, outreach, and communication with landowners, agriculture producers, and local communities.

16. Conflicts should be monitored and reported in a consistent manner across relevant agencies to effectively identify new and/or emerging areas of concern.

17. US FWS and relevant agencies should clarify management protocols for conflict bears and continue to share them with landowners, livestock producers, and communities to maximize transparency.

18. Relevant agencies should periodically review inter-agency Memorandums of Understanding (MOU s) for opportunities to improve efficiency and capacity for conflict response.

Grizzly Bear Distribution, Relocation, and Connectivity

Genetic and demographic connectivity among Montana's four recovery zones is important to the long-term viability of grizzly bear populations in the continental United States. These recommendations intend to balance the continued importance of public lands with the need for the involvement of private lands to support our vision for an interconnected metapopulation of grizzly bears in Montana.

19. FWP should continue to allow natural movement to new areas between all four identified recovery zones in Montana.

20. FWP and all relevant agencies should clearly define the "landscapes in-between" the four recovery zones in Montana that are important for genetic and demographic connectivity and the long-term sustainability of the grizzly bear.

21. FWP, in coordination with relevant agencies and through a public process, should evaluate and identify those landscapes that can reasonably be considered important for grizzly bear recovery and connectivity from those that cannot, and clearly distinguish these in its management plan. Such a distinction is necessary for determining appropriate relocation sites between the four recovery zones, as well as for prioritizing resources for outreach and education, transportation upgrades, and conflict prevention, reduction, and response efforts. These decisions should be in accordance with current Conservation Strategies.

22. In areas where grizzly bears are or may be present, FWP and relevant agencies should increase and promote research on habitat conditions that could support grizzly bear occupancy in order to better understand and track distribution trends.

23. Relevant agencies should expedite work with landowners, agricultural producers, and communities to prioritize the creation of new suitable relocation areas inside and between recovery Ecosystems which further the conservation, connection, and recovery of grizzly bears in Montana while ensuring existing land uses are supported.

24. Any new and existing agreements regarding population augmentation should be evaluated on a regular basis.

25. All transportation entities should coordinate with the Montana Wildlife and Transportation Steering Committee's efforts and the Federal Railroad Administration to reduce transportation mortalities, facilitate movement, and enhance public safety, including but not limited to the following:

a. Work with partners to develop a wildlife transportation safety campaign;

b. Work with appropriate entities to explore ways to minimize train/bear collisions due to grain spills and carcasses near train tracks;

c. Identify and model potentially important grizzly bear crossing points on major highways and seek funding to incorporate wildlife connectivity into the transportation system as infrastructure upgrades are made; and

d. Encourage voluntary incentive-based conservation practices in areas identified as important to wildlife passage and support allocating state and federal funding for such efforts.

Resources

The Council recognizes that current grizzly bear management and conservation resources are inadequate. Moreover, the Council sees the issue of resources as the greatest limitation, and therefore the greatest challenge, in working toward its vision of a landscape that supports both grizzly bears and people. Addressing these resource challenges will require a multipronged and long-lasting approach and needs to include public, private, and philanthropic efforts. The Council kept the issue of resources in mind throughout the process of drafting recommendations, and specific resource-related recommendations are included in the relevant sections of this document.

In an effort to start meeting the broader challenge of providing adequate resources, the Council would like to call attention to several of the most critical needs and suggest several ideas that can be used to inform future conversations. Recognizing that there are numerous, creative ways to meet resource needs, the Council focused much of its discussion on identifying existing gaps and systemic needs. By focusing on broad needs rather than on discrete opportunities, the Council hopes multiple funding pathways will be pursued. The Council feels that by fostering and supporting multiple, coordinated efforts, the state stands the best chance of meeting the resource needs it faces.

Needs:

1. A greater diversity of funding sources as well as greater stability in the resources generated;

2. Increased FWP staff capacity to meet the scope and scale of conservation and management needs and opportunities;

3. Improved access to and an overall increase in resources and tools necessary for the implementation and long term maintenance of education, outreach, and conflict prevention;

4. Full funding for the Montana Livestock Loss Board compensation program to compensate ranchers for the losses of livestock to grizzly bears;

5. Full funding of the Montana Livestock Loss Board's Livestock Loss Reduction and Conflict Mitigation Trust Fund;

6. Increased funding and support for voluntary, incentive-based conservation efforts undertaken by communities and individuals to improve habitat and/or reduce conflicts;

7. Increased funding and coordination for landscape level wildlife-friendly transportation projects;

8. Funding and support for community-wide bear-resistant sanitation programs to include ongoing monitoring, outreach, and maintenance;

9. Additional public relations efforts around grizzly bear conservation and management; and

10. Funding and support for grizzly bear research and the development of new and innovative tools and techniques for conflict prevention and aversive conditioning.

In addition to identifying these broad needs, the Council developed an initial list of possible sources and ideas to explore to meet these needs. We recognize there are many entities working on this issue in different ways. It would be beneficial for FWP to facilitate further analysis, coordination, and communication between partners around the challenge of resources. Ideas discussed by the Council that merited further research, analysis, and discussion included the following:

1. FWP should continue to explore ways to diversify agency funding. This is important to consider as Montana looks at potential income like the Recovering America's Wildlife and Wildlife Corridors Acts and the match that would be necessary to take advantage of these potential new funding opportunities.

2. Grizzly bears are part of the allure of Montana, bringing millions of tourists to the state each year. Analysis on

ways to access tourism related dollars is needed. Other states are also exploring this idea, and could be a resource in this process.

a. Work with Montana Office of Outdoor Recreation to explore ideas for funding wildlife conservation through the rapidly growing outdoor recreation community.

3. Establishing diverse, alternative, and sustainable economic streams would benefit both grizzly bears and people.

4. Natural Resources Conservation Service (NRCS) conservation practices do not currently cover grizzly bear conflict prevention actions. We encourage the NRCS to modify or add new "Conservation Practices:" e.g., carcass pickup and composting, electric fencing, livestock guard dogs, range riding, and other conflict prevention tools.

5. FWP should initiate improved coordination and collaboration to link and leverage existing efforts, tools, and resources and to ensure better prioritization of need.

6. Wildlife friendly transportation infrastructure is important to landscape connectivity and requires significant funding. We encourage FWP and the Montana Department of Transportation (MDT) to continue to work with partners to explore and expand ways to meet connectivity and transportation-related goals.

7. Work with state and national partners to explore, create, and implement a dedicated federally-appropriated grizzly bear conservation fund.

8. In an effort to provide a long-term and stable funding source, the Council considered whether a portion of existing tax revenue could be targeted toward grizzly bear conservation. We encourage broad and inclusive partnerships to continue the exploration of this idea.

9. Voluntary and/or opt-in fundraiser ideas at both the state and federal level should be explored as mechanisms to increase funding for grizzly bear conservation and management.

10. Explore the use of social media to garner funds for education and outreach programs.

11. The Council recommends the continuation of the $1.38 million federal appropriation Congress allocated in FY20 to pay for nonlethal conflict-prevention specialists employed by Wildlife Services in Montana and other states.

12. The federal government, state legislature, and public stakeholders should encourage an excise tax on outdoor recreation gear and equipment like the Pittman-Robertson and Dingell-Johnson Acts have done with hunting and fishing gear.

13. Expand the US FWS Wolf Livestock Demonstration Grant Project to include grizzly bears and increase the annual amount of program funding available.

14. To save agency time and effort, the Council recommends the establishment of a voluntary, inclusive citizens' working group to research funding possibilities and create pathways to obtain them.

SECTION II.
Council Input

Section II contains input from the Council for items that received substantial consideration but did not lead to full consensus among the members of the Council.

Council Discussion around the Role of Hunting

Substantial deliberation was given to the role of hunting; however, because of the diversity of interpretations of available science, backgrounds, values, and opinions individually held by Council members, we cannot reach consensus that hunting has a role in grizzly bear management. The Council received a large number of public comments regarding hunting. The comments also represented a large disparity of views and were acknowledged in our conversations. Our process is presented as such and includes opposing views and discussion for context and consideration. The conversation on the role of hunting focused on two threads: (1) consideration of the role of hunting; and (2) beyond the question of whether there should be a hunt, what guidance would the Council like to provide, without consensus, in the event that the Montana Fish and Wildlife Commission moves forward with hunting regulations.

Considerations around the Role of Hunting

Considerations supporting the role of hunting	**Considerations opposing the role of hunting**
A grizzly bear hunt would not take place until ESA protections have been removed and grizzly bears are put under state management. At that time, a conservative, scientifically-sound hunt of grizzly bears could take place like other predator species. While hunting can be a useful tool in managing grizzly bear populations, it will not replace the need for conflict prevention. If a hunting season is under consideration, cooperating agencies should focus on sharing expertise, best available science, knowledge of geographic areas, and the status of connectivity. Although specifics regarding the hunting of a recovered grizzly bear population will be unique to the ecosystem and legal jurisdictions involved, we support hunting regulations that reflect the best available science, are adaptable to changing factors, are established in a public process, and are consistent with standards in the ecosystem specific Conservation Strategies. Regulated hunting can provide a tool to manage grizzly bears. Council members participated in the FWP social science survey concerning grizzly bears, and 14 of 18 members answered in support of an eventual grizzly bear hunt in Montana. Montana has a history of hunters being at the forefront of wildlife restoration and conservation by providing funding, management, and habitat protection that have helped us achieve the wildlife abundance we enjoy today. Offering regulated hunting of grizzly bears could solicit, build, and retain support for continued grizzly bear management from the sportsmen groups who have historically funded the wildlife management programs. Citations: https://drive.google.com/file/d/1LJYub0Xd6hh__daq3UhfaftC-Abfs8q6/view	Public comments made to the GBAC show that hunting of grizzly bears is a highly divisive issue. A grizzly bear hunt could be socially divisive at a time when Montanans need to work together in support of conservation, management, and those challenged with living with grizzly bears. A grizzly bear hunt will not remedy the financial needs of FWP for grizzly bear management and could jeopardize public support for alternative funding mechanisms. Concern over the implementation of an immediate grizzly bear hunt has contributed to public opposition to removal of ESA protections for grizzly bears in the Northern Rockies. Hunting grizzly bears might not increase their acceptance, but scientific evidence does show that increased conflict prevention measures and education increase social acceptance of grizzly bears. Scientific evidence shows that low hunter-harvest rates, as would be proposed by FWP, do not reduce human–bear conflicts or increase the safety of people around grizzly bears. Hunting could be an impediment to movement and population linkage and could threaten the distribution, abundance, and social structure of grizzly bear subpopulations. Scientific evidence shows that heavy hunter harvest can reduce bear numbers and distribution, but the low harvest rates focused on males proposed by FWP would likely play a minor role in managing grizzly populations. Hunting does not target problem grizzly bears. Citations: https://drive.google.com/file/d/1VfJIOkNaDEBhZ5QsN8_2mObYYG98dsUL/view

Considerations for a Proposed Grizzly Bear Hunt

The Governor's Executive Order requested the Council address the role of a grizzly bear hunt, if a hunt were to occur. The following guidelines were provided by a significant number of Council members.* We acknowledge that hunting is not likely to be an effective tool for conflict prevention or reduction.

• We encourage the take of bears where the desired outcome is a lower bear density, recognizing that it will not mean no bears in those areas, but where the management challenges are significant.

• Female grizzly bears with dependent young, as well as dependent young, should be protected from hunter harvest.
• Hunting season(s) may also be timed to reduce exposure of females to harvest. Early spring and late fall hunts tend to focus hunting pressure on males.

• Regulations should include dynamic season closure prior to tag delivery based on static population levels.

• Hunting should be limited and follow the North American Model of Wildlife Conservation. Grizzly bear license fees should be modeled on moose, bighorn sheep, and mountain goats, with the non-refundable drawing fee going to grizzly bear management and conservation.

° Tags could include a governor's tag to sell and a SuperTag for everyday people for a chance to draw;

° Tags should be once-in-a-lifetime tags;

° Out-of-state hunters must have a licensed guide;

° No baiting or any use of anthropogenic attractants can be used;

° Hunters should be strongly encouraged to carry bear spray;

° People that draw a grizzly bear license should be required to participate in training on grizzly bear ecology, identification, and safety; and

° Grizzly bear harvests should be reported immediately.

* 14 of the 18 council members contributed to these guidelines.]

Appendix F.
FWP policies and protocols re. grizzly bear orphan cubs

Purpose of Policy and Protocols

This document is intended to serve two purposes: 1) as a proposed section of the Statewide Grizzly Bear Plan, currently just underway but not expected to be completed until sometime in 2022, and 2) as stand-alone statement of policy that will provide clarity and standardization prior to formal adoption of the larger statewide plan.

These policies and procedures are intended to complement and support the FWP "Montana Wildlife Rehabilitation Center Intake Policy" (Intake Policy 2020, hereafter), which was approved on December 31, 2020 and should be consulted in conjunction with this document.

This document has two intended audiences:

a) Internally, for FWP staff, to clarify roles and responsibilities, and to reduce uncertainty during what is typically a stressful situation; and

b) Externally, to the general public, to clarify the process and to explain the rationale for decisions that may at first seem poorly considered or counter intuitive.

Background and Need Statement

FWP has a long history of temporarily caring for, and subsequently releasing into the wild orphaned black bear (Ursus americanus) cubs. It has also, on occasion, come into possession of grizzly bear (U. arctos) cubs, and faced decisions about how to best proceed. To date, however, FWP planning has not standardized or formalized protocols for making these decisions.

This policy will provide guidance for field practitioners (typically 'bear managers', but potentially wardens or other biologists), regional wildlife program managers, regional directors, Montana Wildlife Rehabilitation Center (MWRC) staff, and other Helena-based staff. While grizzly bears are listed under the ESA, it will also provide a useful reference for USFWS staff who may be required to consult or approve FWP actions. Finally, it can serve an informational role to the public who may have legitimate questions about the basis for decisions FWP makes on these difficult issues.

Nomenclature and Definitions

In this document, the following nomenclature and definitions are used:

- "Cub" means a bear not having reached its first birthday. By convention, grizzly bears are considered to be born on ~ 1 February. "Cub" in this document is identical in meaning to "Grizzly bears (< 12 months of age)" as used in the Intake Policy (2020).
- "COY" is often used elsewhere to mean "cub-of-the-year." This document does not use that terminology, and instead defines "cub" specifically.
- "DMA" means demographic monitoring area, as mapped in NCDE and GYE conservation strategies.
- "FWP" means Montana Fish, Wildlife and Parks staff
- "MWRC" means the Montana Wildlife Rehabilitation and Education Center, a part of the Montana Wild facility, owned and operated by FWP.

- "Offspring" in this document refers generally to either cubs or yearlings.
- "Orphan" means a juvenile bear whose mother has died while still caring for that year's offspring.
- "Rear" (or "captive reared") refers to the temporary care and feeding of bear offspring, typically with the intention, if possible, of releasing the animal back into the wild at some appropriate time.
- "Rehabilitate" is defined by Beecham (2006) as "treatment and temporary care of injured, diseased, and/or displaced indigenous animals, and the subsequent release of healthy animals to appropriate habitats in the wild", and is thus very similar to the term "rear" as used in this document. Despite its common use, we avoid the term "rehabilitate" as part of policies and procedures for grizzly bears because it implies that the animal has done something wrong and because releasing orphans back to the wild after captive rearing is NOT currently approved by FWP.
- "Rewild" in common usage refers to releasing back into the wild an animal that has been held in captivity temporarily. Despite its common use, we avoid the term "rewild" here because of its use in other contexts.
- "Yearling" means bears older than cub, but not yet having reached its 2nd birthday. By convention, grizzly bears are considered to be born on ~ 1 February.

Options for Orphaned Grizzly Bear Cubs

As articulated by Beecham (2006), and frequently incorporated into other jurisdictions' policies and procedures on orphaned black bears, there are four alternative courses of action facing a management agency responsible for responding to orphan bear offspring: 1) releasing in the wild, either onsite or nearby, 2) capturing and placing permanently in a captive facility, 3) capturing and rearing temporarily in a suitable facility with the objective of future release into the wild, and 4) euthanasia. Advantages, drawbacks and issues surrounding each are summarized here:

1) Releasing orphaned offspring (or simply declining to attempt a capture) at or near their capture site should always be considered and in **most situations is FWP's preferred approach.** Although grizzly bear cubs captured in their first spring are unlikely to survive their first winter, cubs older than 6 months of age have non-negligible survival probability, with that probability with increasing proximity to the time they would normally have followed their mothers to winter hibernation dens. Recent work has indicated that orphaned black bear cubs released this young have survival rates similar to non-orphaned offspring. Anecdotal evidence from Montana also indicates that grizzly bear cubs orphaned late in summer or fall have survived at least through their first winter and possibly longer (W. Kasworm, unpublished, 2020; a cub orphaned in fall was documented to survive to adulthood by J. Jonkel in Yellowstone; an orphaned cub was documented as surviving on its own near Freezeout Lake by M. Madel). Draft guidance on dealing with orphaned grizzly bear cubs in British Columbia uses 1 August as a cut-off; after this date, priority for orphaned cubs is to allow them a chance to survive in the wild. Some members of the public may object to releasing animals near their capture site, particularly if their mother had been involved in human-bear conflicts, or was considered to be a nuisance[9]. Other members of the

[9] Although data are sparse, there is currently no evidence that young cubs of a nuisance bear are more likely to become nuisance bears themselves than any other bear. All available evidence suggests that nuisance behavior is learned rather than inherited. Thus, if a cub is orphaned at a young enough age to have had no opportunity to learn the behavior that led to bear–human conflict, it can be considered innocent of any misdeeds of its mother.

public may object to releasing to the wild an animal with a high probability of dying shortly afterward. However, retaining the option for these animals to survive in the wild in their native habitat is consistent with FWP's fundamental approach of managing populations rather than individual animals, and to the degree possible, keeping wild animals wild.

2) As per Intake Policy (2020), FWP is authorized to accept, and has in the past accepted orphaned grizzly bear cubs (but not yearlings) for permanent captive placement[10]. However, MWRC is **not designed, equipped, or able** to care for grizzly bears permanently, and its capability to handle such animals temporarily is also severely limited (currently a maximum of 4 grizzly bear cubs). In recent years, FWP has found it increasingly difficult to find placement for grizzly bears at suitable long-term captive facilities. Few facilities that include grizzly bears in their collection need them, in part because they generally want only a few, and captive bears live many years; we anticipate this situation will continue. Some people object to keeping grizzly bears in captivity, but even when viewed as an acceptable outcome it should not be assumed to be possible. Caring for such bears, even for a short time, and arranging for a long-term captive solution is time and resource intensive, require staff to spend many hours finding placement and coordinating transfer of cubs if placement is found, and thus necessarily reduces time and resources available for other MWRC activities. For these reasons, Intake Policy (2020) stipulates that MWRC will not accept cubs that are unlikely to be placed permanently in an approved captive setting.

3) Orphan bears can be cared for in special captive situations for a limited time, during which stringent measure are taken to minimize the chance of habituation to people, and subsequently released into the wild. Current policy is that grizzly bears may not be transferred to a facility (MWRC or other) and later released to the wild except for an accepted, approved recovery project in which augmentation or reintroduction is a clearly articulated method for achieving conservation/management objectives in the specified area. There is much less experience doing this with grizzly bears than with black bears in North America. Documentation is scanty, and success has been < 50%. Captive rearing and subsequent release of grizzly bears is best considered an experimental approach as of this writing, thus choosing this route should be considered, at least in large part, to be a research project. If possible, some members of the public are likely to object to a program in which a bear that has been captively-reared is released near them, fearing problem behaviors or bears generally. Other members of the public are likely to support this option because they see it has a humane and caring solution. This option (rearing and subsequently releasing to the wild orphaned cubs) is not currently available because no facilities in North America have both the capacity and necessary permitting to provide this service; we do not expect this situation to change in the near future.

4) Euthanizing orphan bears is always an option, particularly when the above three options are foreclosed. It is not technically difficult to do, and educational uses for hides and skulls can generally be found without great

[10] An FWP approved facility is a facility accredited by the American Zoological Association and/or facility approved by the FWP Wildlife and Enforcement Divisions to possibly include Zoological Association of America facilities. Other certifications may be considered on a case by case basis and facility by facility basis when the care of the subject animal can be assured to meet AZA or ZAA level of care for the species involved.

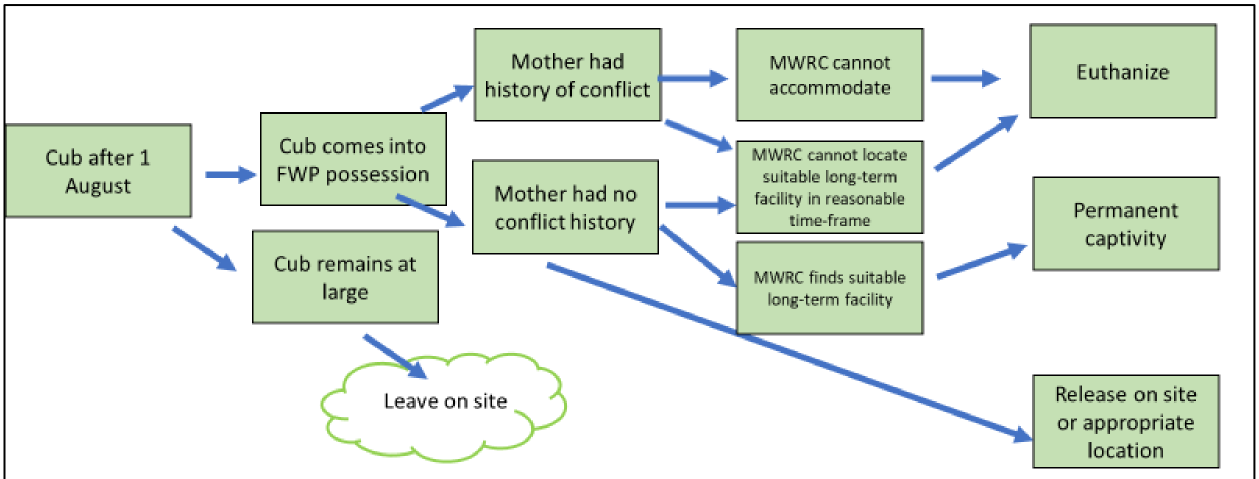
difficulty. Some members of the public who oppose having wild animals in captivity find euthanasia the least objectionable option, and argue that it can be more humane than other options. Other members of the public find euthanizing young animals with no history of conflict repugnant.

A possible fifth option, cross-fostering with either grizzly bear or black bear females, has been tried with limited success in black bears, but is considered too untested and resource-intensive to be considered further in this document).

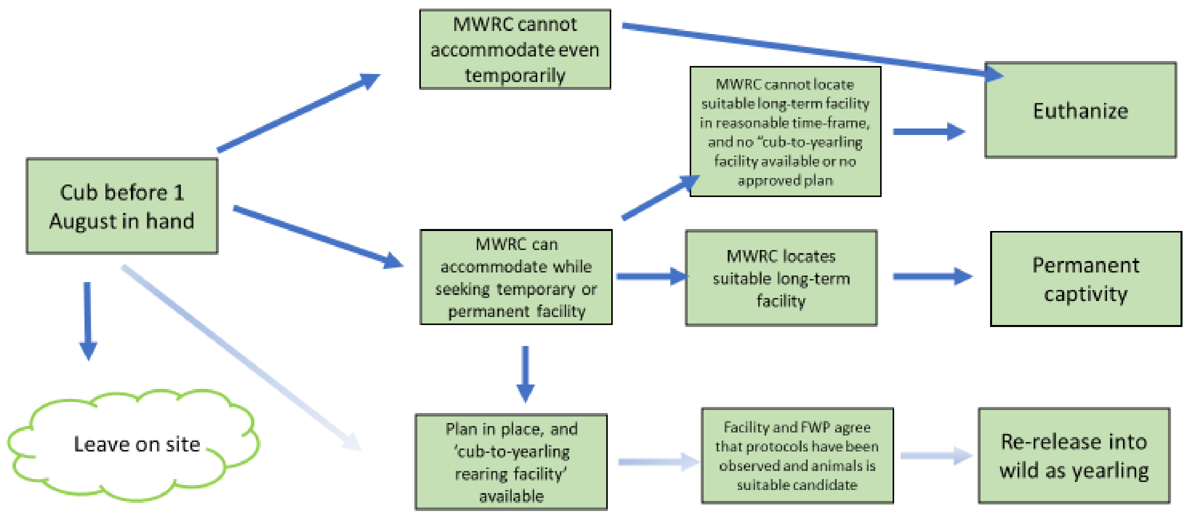
Responsibly caring for grizzly bear cubs in captivity is considerably more specialized, intensive, and difficult than doing so for black bear cubs. The difficulties increase if the intention of rearing cubs is ultimately release into the wild (e.g., having holding enclosures located at a site that are far removed from the public and staff/volunteers, and having only a single individual to perform all care and feeding, ensuring bears do not become habituated). (It is much more difficult to prevent habituation in grizzly bear cubs than in black bear cubs). MWRC has limited capacity to care for grizzly bear cubs temporarily while transport to an approved permanent captive facility is arranged (see Intake Policy 2020) and is not designed for, or capable of, rearing grizzly bear cubs for release back into the wild. Some limited capacity for provisional holding pending permanent captive placement may also exist at the Grizzly and Wolf Discovery Center in West Yellowstone. MWRC is also initiating a process of regular communication with AZA representatives to facilitate information flow regarding the zoo community's capacity to accept grizzly bears for permanent placement. Although there exist numerous facilities capable of handling black bear cubs, FWP is aware of only a single facility in North America doing so for grizzly bears (see below), and it is not currently permitted to accept Montana grizzly bears.

Process flow-chart

Step-down plans are provided here for field and agency decisions on grizzly bear orphans in hand. Two flow-charts, depending on age of orphan under consideration (from older to younger). Under listed status, approval from USFWS is required. Deviations from this step-down plan will occur only with approval from both Regional Supervisor and Wildlife Division.



Offspring from a nuisance mother may have learned behaviors that would make it a poor risk for release; thus transfer to MWRC may be an option. Consult Intake Policy (2020) before proceeding.
When mother had no conflict history and cub is unsuitable, options are to release or transfer to MWRC. Consult Intake Policy (2020) before proceeding. Recognize that an orphan grizzly bear cub in the wild may not survive (cubs with their mothers typically have 40-60% survival).



These are the youngest, least independent cubs. If capture not necessary, strongly consider leaving onsite. If capture occurs (or bears already in hand), consult Intake Policy (2020) before proceeding.
Bottom option (temporary rearing at a FWP approved facility over winter, releasing back into the wild as a yearling the following summer) is not currently available because no facilities yet have FWP approval and the necessary permitting from their respective authorizing agency.

Public Information Plans

FWP recognizes and respects the high level of public attention that often attends incidents involving bear cubs. One purpose of this policy is to provide transparency and clarity to the interested public. That said, each situation will have its unique characteristics; thus, information flow from Regional staff on the ground to Helena-based communication managers will be essential. At the same time, staff on the ground should not have to carry the entire burden of messaging actions that may engender public unhappiness. Thus, the CommEd Division in Helena will work closely with Regional staff to understand each situation in detail, and will serve as a clearinghouse for information requests from the public.

Deviations from these Policies and Protocols

Any deviation from this policy requires prior written authorization by the FWP Director in consultation with the Wildlife Administrator, Enforcement Administrator, and Communication & Education Administrator and the appropriate FWP Region. It is the responsibility of the FWP Region to initiate an exception due to an extenuating circumstance. Extenuating circumstances must be clearly articulated through written documentation.

Appendix 1:
Brief summary of relevant research and experience with grizzly bear orphan cubs

In North America, considerable experience has been gained in reintroducing orphaned black bear cubs into the wild starting as early as the 1970s (Alt and Beecham 1984). Clark et al. (2002) reported high survival of orphaned black bear juveniles released in the Smoky Mountains of Tennessee and North Carolina as late-year cubs or mid-summer yearlings. Smith et al. (2016) reported that orphaned black bear cubs released in New Hampshire during the months of May and June survived at acceptable rates and stayed out of conflict situations in a year in which natural foods were abundant, but not in a year when natural foods were scarce. Blair et al. (2019) documented 100% annual survival among yearlings and 64% annual among black bear cubs (released just prior to winter denning) during their first-year post-release in Tennessee and North Carolina. Three of the 42 bears were later involved in conflict situations, all of which had mothers with a history of such conflict prior to being orphaned.

Jonkel et al. (1980) reported on an early experiment with a grizzly bear cub in Montana. A female cub obtained after its mother was killed on July 31, 1975 was transferred first to the precursor facility to MWRC in Helena, and later to the University of Montana in Missoula, where it was fed and cared for. It was radio-collared and placed in an artificially constructed den on November 11, at a weight of approximately 51 kg (112 lbs.). The cub stayed in the vicinity of the artificial den for a few days, dropped the collar, but then moved away and evidently denned elsewhere. The animal was observed a few times the following spring, and appeared to be in good condition. Palomero et al. (1997) reported normal denning and survival at least through May of the following year of 3 unmarked brown bear cub orphans in Spain (one cub was documented to have survived at least until November). Swenson et al. (1998) reported survival of and normal development of 5 orphaned brown bear cubs in Sweden. Extrapolation of these results to North American grizzlies should be made with caution however, because in some ways the life-history characteristics of U. arctos in Europe more closely resembles that of American black bears, who typically leave disperse from their mothers a year earlier than North American grizzlies (Zedrosser et al. 2011, Steyaert et al. 2012).

A recent and authoritative review of releasing yearling bears that had been orphaned as cubs back into wild habitat after having spent time in captive facilities is was provided by Beecham et al. (2015). Most information on orphaned U. arctos cubs reared in captivity from some months and released as yearlings came from Romania. Survival was similar to best estimates of non-orphaned yearlings, and conflicts were reported as rare. Breck et al. (2008) provided analyses indicating that food conditioning in black bears is neither inherited nor learned from their mothers. Morehouse et al. (2016) provided evidence that conflict behavior in brown bears is learned from their mothers rather than inherited. These authors did not address the implications of their findings for orphaned cubs, but it seems reasonable to conclude that the amount of time a cub spends with its mother before being orphaned would thus influence it probability of adopting conflict behavior.

Appendix 2 [currently not available]: Details on option 3 – temporary rearing followed by release

Additional detail and policies are provided on Option 3 because it is controversial (many people having strong opinions favoring or opposing it), it is experimental in North America, and experience with it in Montana in rare.

As of this writing, no facility has both the capability to rear grizzly bear cubs for subsequent release into the wild and a permit to accept cubs from Montana. The Northern Lights Rescue facility in Smithers, British Columbia, has expressed interest in obtaining provincial permitting to begin such work, but is not currently permitted to accept and rear cubs obtained from outside British Columbia. Additionally, current FWP policy is that grizzly bears may not be transferred to a facility (MWRC or other) and later released to the wild except for an accepted, approved recovery project in which augmentation or reintroduction is a clearly articulated method for achieving conservation/management objectives in the specified area.

Summary of Northern Lights Wildlife Shelter, Smithers, British Columbia, as a potential rearing location for orphaned Montana grizzly bear cubs

From 2007 through June 2020, Northern Lights Wildlife Shelter (NLWS) has accepted 26 grizzly bear cubs, all the results of orphaning events within British Columbia. Two of those died shortly after intake. All of the remaining 24 have been reared at NLWS. Five additional cubs were accepted in 2020 for release in 2021. The NLWS protocol has focused on getting cubs as large as possible before their planned release in mid-summer of the year following intake in order to minimize their vulnerability to intraspecific predation. To this end, cubs are fed throughout the winter which obviates their physiological need to hibernate. To minimize the opportunity for habituation to humans, NLWS policy has been to limit caretakers to 1; however, this has not always been strictly enforced. NLWS is a fenced facility, however, at least a couple of escapes have been documented.

All 24 living cubs have been released as yearlings. However, little is known regarding the survival and conflict history post-release of these 22 bears. Ten (42%) experienced collar failure or lost their collar prior to their first winter (quite possibly because they lost, rather than gained weight post-release as a result of their atypical winter feeding); 3 (15%) additional bears dropped their collars while in hibernation or shortly after emergence. Seven of the 24 were known to have died within a year: 1 by a hunter, 1 killed illegally, 1 evidently killed by another bear, 1 hit by vehicle, and 3 (15%) were removed due to human–bear conflicts. Two other animals were released without tracking collars.

The need for better understanding successes and failures of this program is now being addressed through a cooperative study headed by Dr. Lana Ciarniello, and funded largely by the (Canadian-based) Grizzly Bear Foundation. Intensive efforts will be made to follow released yearlings, including re-capture attempts for animals losing their collars but surviving through their first post-release winter.

Under B.C. policy, all releases must occur within 50 km of the site of initial capture. NLWS is not currently permitted to accept bears from outside the Province; this could change in future. For the immediate present, however, B.C. policy is to prioritize B.C. bears, and to support the captive-rearing and release efforts in a research context.

Should NLWS be permitted **at some future time** to accept and rear Montana-born grizzly bear cubs and B.C. government permit the movement of these bears across the international border, the following considerations would apply:

1) Current policy is that grizzly bears may not be transferred to a facility (MWRC or other) and later released to the wild except for an accepted, approved recovery project in which augmentation or reintroduction is a clearly articulated method for achieving conservation/management objectives in the specified area. Grizzly cubs would only be considered for release if it was for an approved recovery need, such as reestablishing bears in new areas or augmenting a low population such as in the Cabinet-Yaak.
2) As is currently the case, FWP would view all releases as experiments, and prioritize learning from each. As is currently the case in B.C., FWP would coordinate closely with Dr. Ciarniello to assure that data collection protocols were similar to those in B.C., and that these animals would contribute to long-term understanding of captive rearing and release.
3) Unlike the current NLWS protocol, Montana bears would not be fed over-winter, but instead, would be allowed to enter their normal hibernation state. NLWS is currently prioritizing the size of released yearlings, in an attempt to maximize survival. However, cubs fed during the winter of their 1st birthday grow to > 300 lbs., and thereafter are destined to larger-than-average body size, necessitating high caloric intake to avoid hunger for the remainder of their life. Their higher than average foraging requirements, in turn, make these animals more vulnerable to the temptations offered by anthropogenic sources of food, and thus conflicts with people. In short, there is a trade-off between minimizing intraspecific predation and minimizing the probability of conflict behavior. Optimizing the former argues for getting bears as large as possible prior to release; optimizing the latter argues for a more typical winter-hibernation period, even if that means release at a smaller (and more vulnerable) size. B.C. has opted to maximize survival at the risk of conflict. In Montana, this calculus differs, because if experimentally captive-reared yearlings become conflict

bears, the negativity of that would redound to all grizzlies, not just to those yearlings. Thus, Montana bears housed by NLWS would be allowed to hibernate, even if that means they face higher risk of intraspecific predation after release.

4) Unlike in B.C., Montana would not require bears to be released within a specified radius of their capture or orphaning site. As stated above, they would only be released in areas where there is an approved recovery need such as to augment a low population, where they have the best chance to contribute to population growth (which will also reduce their likelihood of encountering infanticidal conspecifics)

The following guidelines would apply, should permitting by Northern Lights or a similar facility approved by FWP occur in future.

1) An articulated and approved recovery need must be in place describing the role of cubs in the recovery effort. The release site must be approved by the Fish and Wildlife Commission, and if a new site, the proposal must also undergo MEPA review.
2) A written, post-rearing release plan must be approved by the regional supervisor in the region which release is planned, as well as by the FWP Director or authorized representative. The plan must include:
   a. A first, second, and third option indicating the precise location (in latitude/longitude coordinates) where the bear(s) would be released;
   b. A public version of that location, providing the general location but not the specific latitude/longitude;
   c. Evidence that the bear(s) in question are not habituated to people;
   d. The date, plus or minus 10 days, of the planned release;
   e. Written documentation of plans for complying with MCA 87-5-725 requiring public notice on the FWP website and, where practical, by personal contact, of the general area where the animal will be released, as well as how that information can be accessed; and written documentation of landowners permission, if release is to occur on private property;
   f. Written documentation of at least 1 public meeting in the county or neighboring county of the planned release having been completed, including a summary of public reaction to the concept of releasing a yearling captively raised from orphaning as a cub. This would typically be done as part of required MEPA process.
   g. A clear plan for monitoring the movements, survival, and potential conflict behavior of the released animals. All animals will be ear-tagged and permanently tattooed. In addition, a minimum tracking requirement for yearlings released after captive rearing is VHF telemetry equipment that is expected to be retained by the animal and transmit for at least 3 months.
3) General policies on geographic placement of orphaned cubs and reared in a FWP-approved facility:
   a. Animals obtained as cubs from within the DMA surrounding the GYE will not be released within the GYE DMA.
   b. Animals obtained as cubs from within the DMA surrounding the NCDE will not be released within the NCDE DMA, but may be released within the GYE DMA (i.e., with the intent of potentially adding to allelic diversity in the latter).
4) Other considerations
   i. Hard release only, no soft release

ii. Funding

1. The captive facility would be responsible for the costs of rearing the orphan.
2. FWP would be responsible for transportation costs.
3. We anticipate that, because of public sentiment, finding funds for rearing orphan cubs from private sources will not be difficult. FWP policy is that, because a higher priority remains preventing human–bear conflict, resources spent soliciting financial support will prioritize bear management operations.
4. Cross-border permits and CITES permits would be a collaborative effort.

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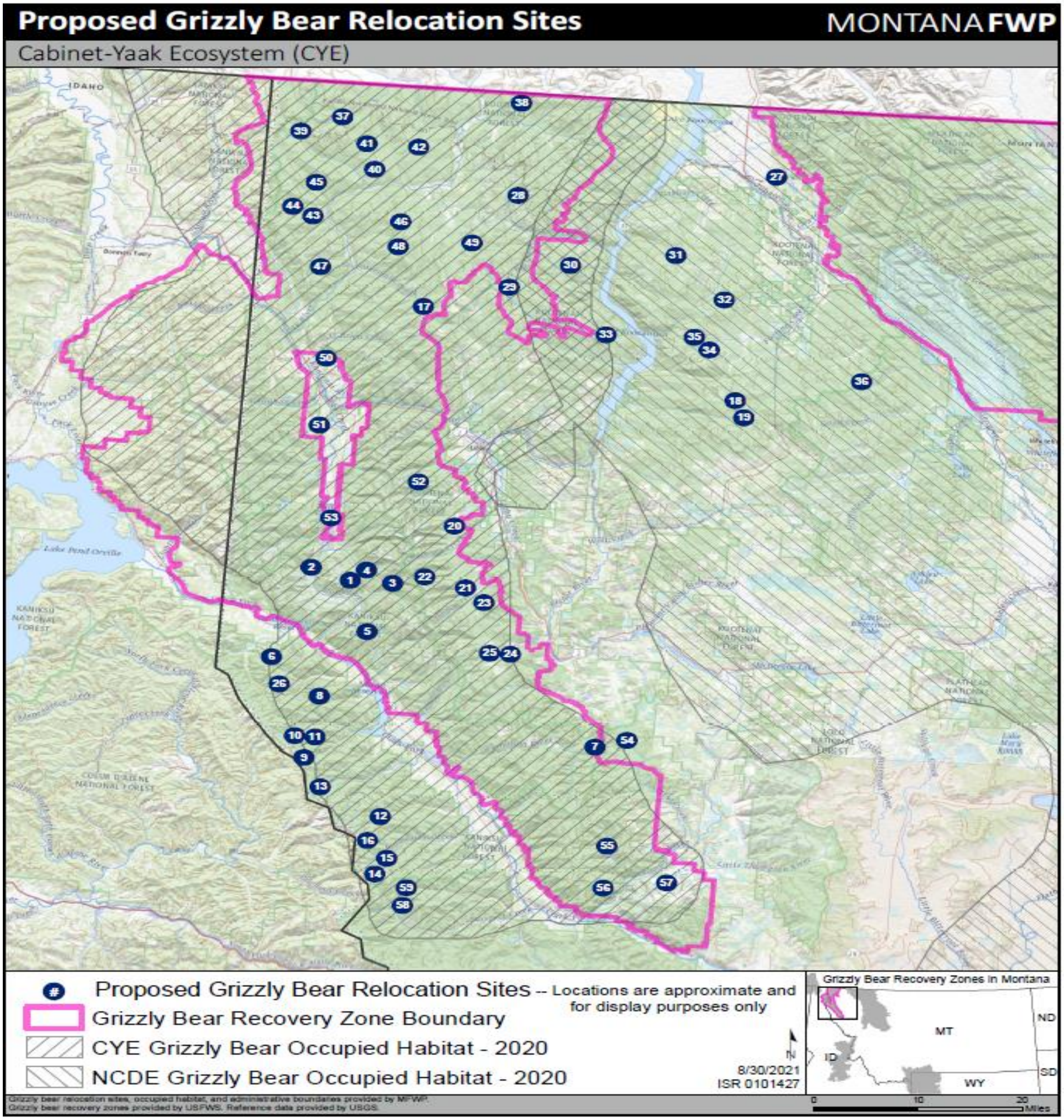
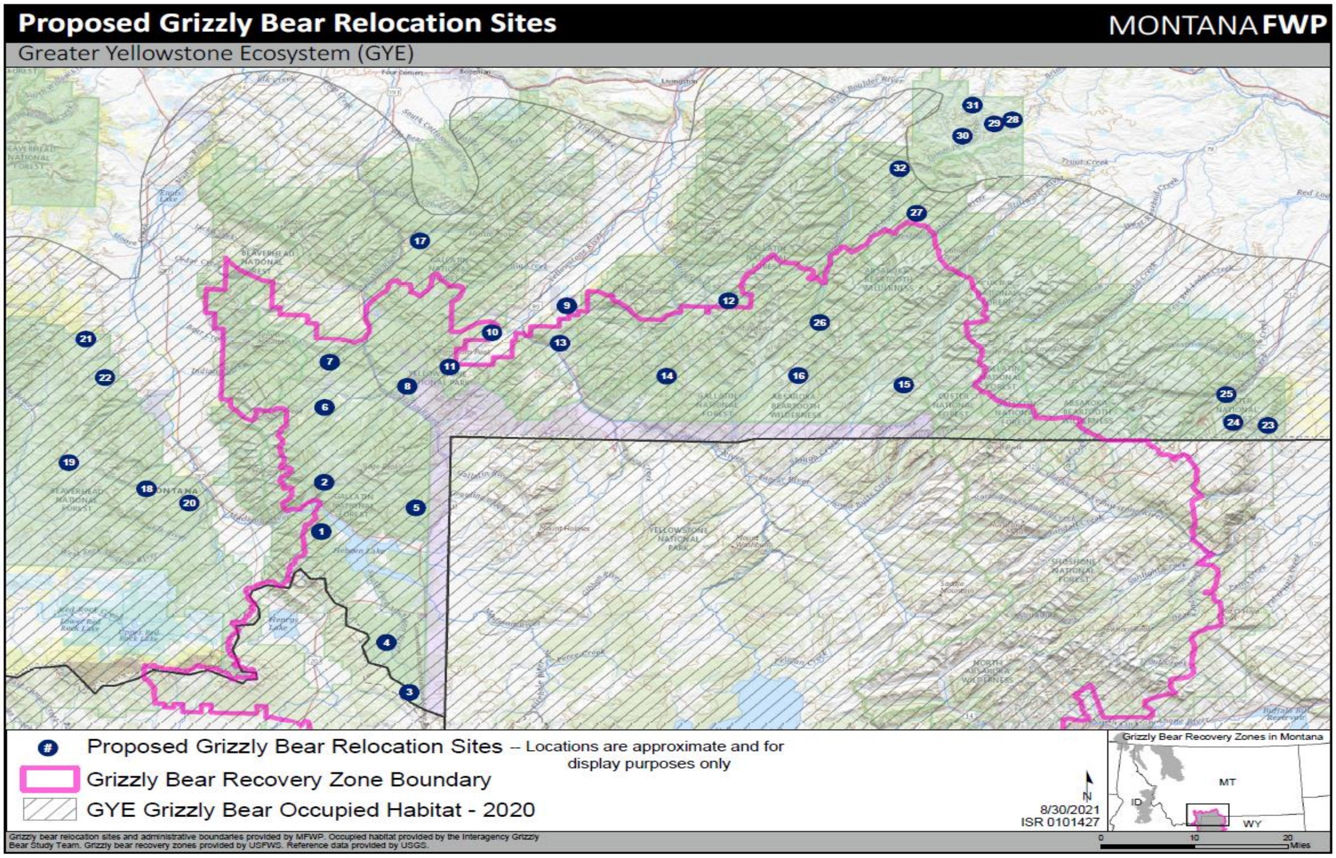
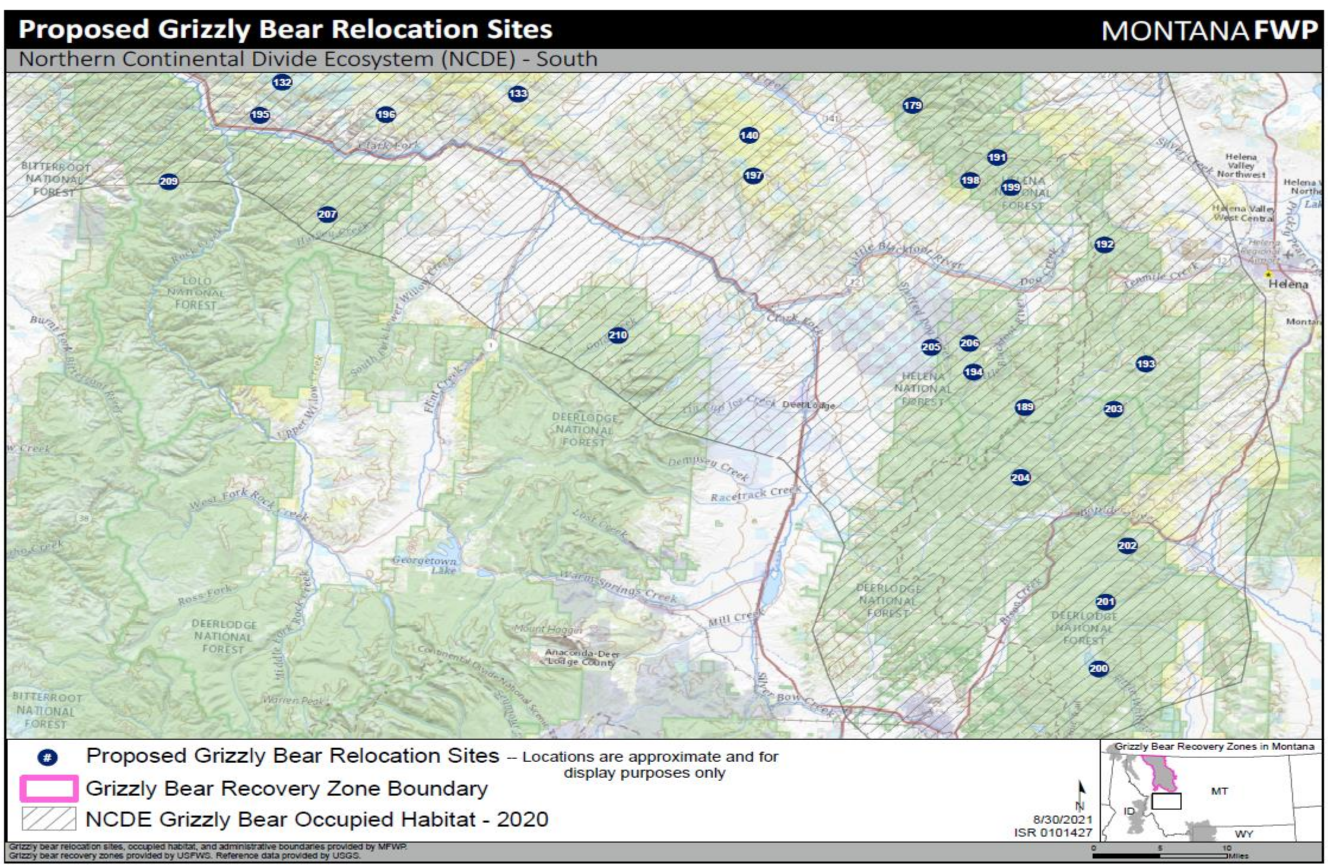
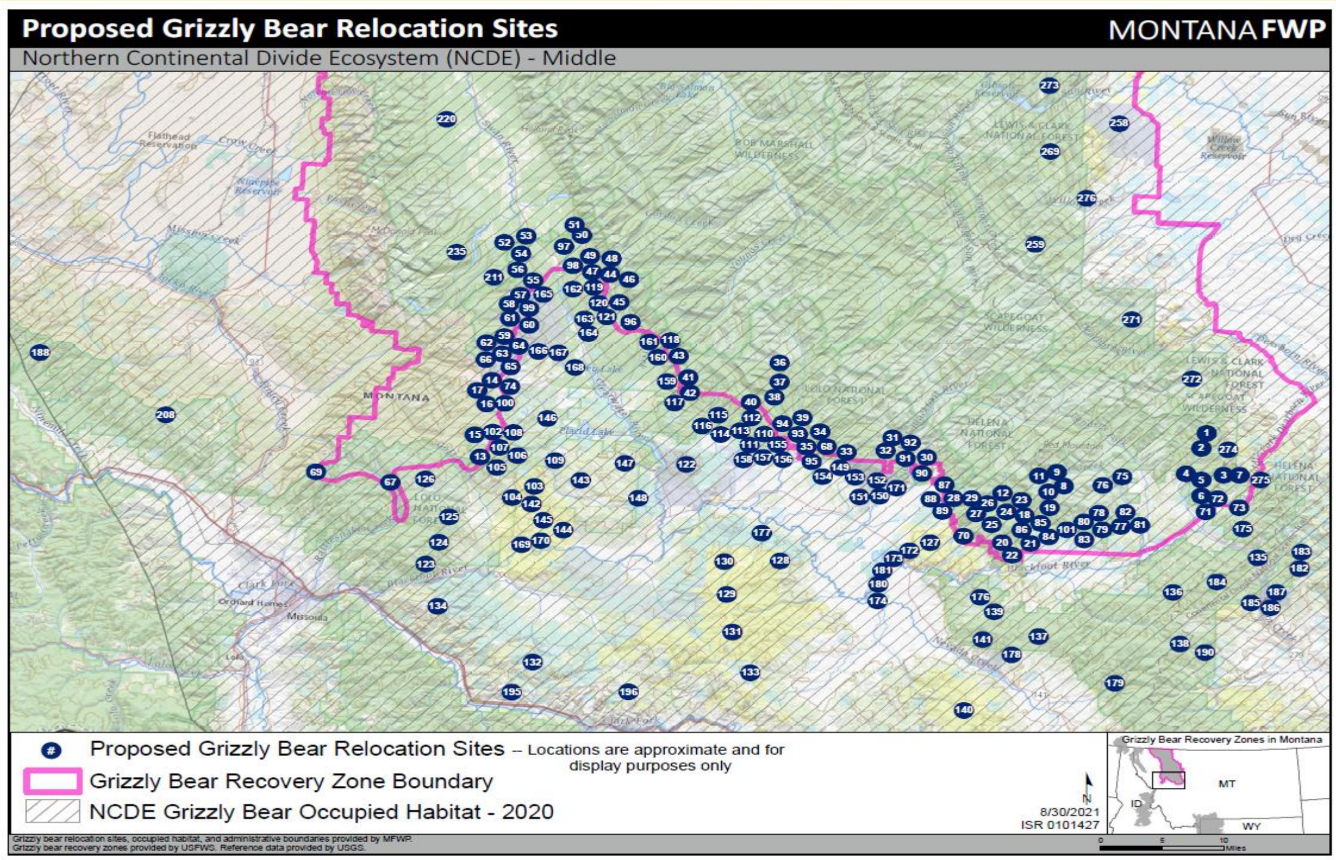
Appendix G.
Maps of Commission-approved sites for release of grizzly bears

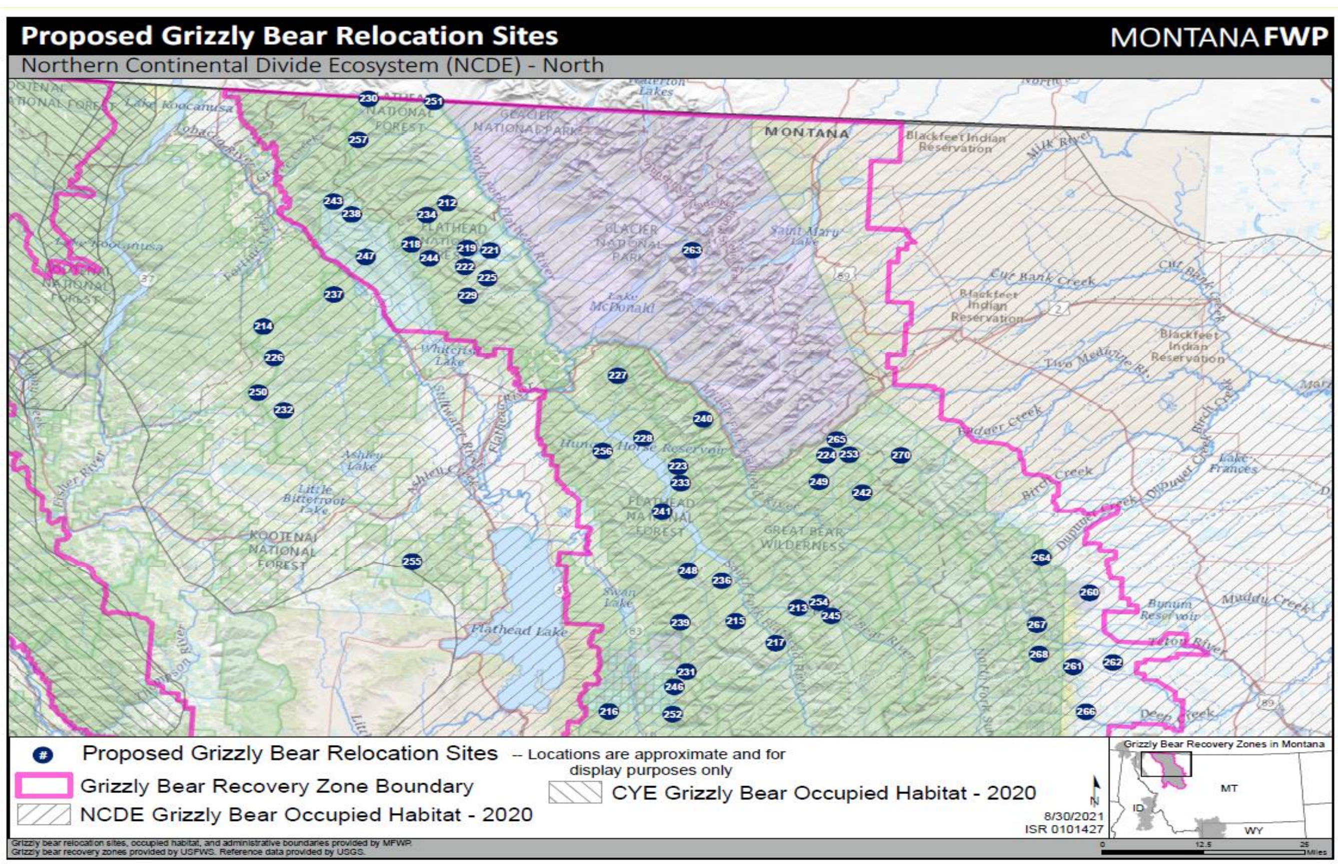
The below series of maps show proposed, Commission-approved sites for release of grizzly bears.




Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Greater Yellowstone Ecosystem (GYE)
Proposed Grizzly Bear Relocation Sites – Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
GYE Grizzly Bear Occupied Habitat - 2020
8/30/2021
ISR 0101427
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
0 10 20 Miles
Grizzly bear relocation sites and administrative boundaries provided by MFWP. Occupied habitat provided by the Interagency Grizzly Bear Study Team. Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.


Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Northern Continental Divide Ecosystem (NCDE) - South
Proposed Grizzly Bear Relocation Sites – Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
NCDE Grizzly Bear Occupied Habitat - 2020
8/30/2021
ISR 0101427
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
0 5 10 Miles
Grizzly bear relocation sites, occupied habitat, and administrative boundaries provided by MFWP. Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.


Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Northern Continental Divide Ecosystem (NCDE) - Middle
Proposed Grizzly Bear Relocation Sites -- Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
NCDE Grizzly Bear Occupied Habitat - 2020
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
8/30/2021
ISR 0101427
Grizzly bear relocation sites, occupied habitat, and administrative boundaries provided by MFWP.
Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.


Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Northern Continental Divide Ecosystem (NCDE) - North
Proposed Grizzly Bear Relocation Sites -- Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
NCDE Grizzly Bear Occupied Habitat - 2020
CYE Grizzly Bear Occupied Habitat - 2020
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
8/30/2021
ISR 0101427
Grizzly bear relocation sites, occupied habitat, and administrative boundaries provided by MFWP.
Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.

Appendix H.
Tri-State (WY, MT, ID) Memorandum of Agreement (MOA) re. GYE

Tri-State Memorandum of Agreement Regarding the Management, Genetic Health, and Allocation of Discretionary Mortality of Grizzly Bears in the Greater Yellowstone Ecosystem

Among

Wyoming Game and Fish Commission, Wyoming Game and Fish Department, Montana Fish and Wildlife Commission, Montana Fish, Wildlife and Parks, Idaho Fish and Game Commission, and Idaho Department of Fish and Game

This Memorandum of Agreement (MOA) is made and entered into by and among the Wyoming Game and Fish Commission and the Wyoming Game and Fish Department (collectively WGFD), the Montana Fish and Wildlife Commission and Montana Fish, Wildlife and Parks (collectively MFWP), and the Idaho Fish and Game Commission and the Idaho Department of Fish and Game (collectively IDFG), collectively referred to as the Parties.

I. Purpose

The purpose of this MOA is to define the process by which the Parties will coordinate the management and allocation of discretionary mortality of grizzly bears in the Greater Yellowstone Ecosystem (GYE) to ensure the long-term genetic health, viability, and sustainability of the GYE grizzly bear population (GYE population). The Parties enter into this MOA in support of the designation of the Distinct Population Segment (DPS) of GYE grizzly bears and removal of the DPS from the federal list of endangered and threatened wildlife under the Endangered Species Act. The Parties intend this MOA to be consistent with the *Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem* (Strategy) and individual state management plans, as these documents may be revised in conjunction with the delisting process.

The Parties amend the 2016 version of their MOA to resolve items identified in the July 2020 Ninth Circuit Court decision warranting vacatur and remand of the U.S. Fish and Wildlife Service (USFWS) 2017 final rule designating and delisting the GYE DPS of grizzly bears: (1) to ensure long-term genetic diversity of the GYE population, Parties commit to mechanisms for genetic augmentation through translocation; and (2) should a new population estimation method be incorporated to estimate abundance and evaluate survival/mortality of the GYE population, the Parties commit to recalibrate GYE population metrics and mortality limits.

II. Background

The GYE Inter-agency Conservation Strategy Team, with the participation of the Parties and various federal agencies, developed the Strategy to implement regulatory mechanisms, inter-agency cooperation, population and habitat management and monitoring, and other actions to ensure continued recovery and sustainable management of the GYE population post-delisting. The Strategy was subject to public comment and scientific peer review. The Strategy's key mechanisms for maintaining a recovered GYE population are its population and habitat standards, which are based on USFWS recovery criteria for the GYE population. The Strategy incorporated the Parties' individual state management plans that have different, but compatible, management objectives.

For purposes of this MOA, the Parties adopt the Demographic Monitoring Area (DMA) identified in the USFWS 2017 Supplement to the Grizzly Bear Recovery Plan (Supplement) as the geographic area used to monitor continued achievement of population and distribution objectives for the GYE population. The Inter-agency Grizzly Bear Study Team (IGBST) and the Yellowstone Ecosystem Subcommittee (YES) of the Inter-agency Grizzly Bear Committee (IGBC) have recommended the use of the DMA for monitoring GYE population demographics.

The demographics and vital rates of the GYE population have changed over time, and the IGBST has periodically reviewed and adjusted mortality limits to ensure a total GYE population of at least 500 bears and to meet the occupancy criterion for female bears. The GYE population has far surpassed the minimum requirement for genetic diversity represented by 500 bears.

For purposes of this MOA, the Parties identified tiered limits (based on population size) for human-caused mortality to support managing the GYE population within the DMA at levels around 932 grizzly bears (the tri-state management objective for the DMA, based on the refined Chao2 average population estimate for 2002-2019; 95% Confidence Intervals = 831 to 1,033 grizzly bears) (see Paragraph IV below). Tiered mortality rates enable the Parties to address higher grizzly bear densities and human–bear conflict levels that may occur when the GYE population is above 932 grizzly bears in the DMA, which is well above the recovery criterion of a minimum population size of 500 animals in the GYE.

The IGBST uses the Chao2 estimator and a model averaging process to calculate GYE population size on an annual basis. As the GYE population has grown, the model-averaged Chao2 estimates have become increasingly conservative (*i.e.*, prone to underestimation). IGBST has recently conducted an in-depth analysis that revises ruleset parameters and averaging techniques based on current empirical data to derive a more accurate estimate of the GYE population while still using approved Chao2 methodologies. For purposes of this MOA, the Parties assume that USFWS will, as a matter of best available science, rely on the refined Chao2[11] population estimates. The Parties commit to implementing appropriate revisions to methods for GYE population estimation as new methods are scientifically vetted and accepted.

III. Definitions

1. "Discretionary mortality" is the amount of human-caused grizzly bear mortality over which agencies have discretionary authority, such as management removals and regulated harvest.

2. "Non-Discretionary mortality" is documented loss over which agencies do not have discretionary authority, such as naturally occurring mortality or human-caused mortality such as illegal shootings, defense-of-human-life shootings, and vehicle collisions.

3. "Greater Yellowstone Ecosystem" (GYE) is defined as that portion of Idaho that is east

of Interstate Highway 15 and north of U.S. Highway 30; that portion of Montana that is east of Interstate Highway 15 and south of Interstate Highway 90; that portion of Wyoming south of Interstate Highway 90, west of Interstate Highway 25, Wyoming State Highway 220, and U.S. Highway 287 south of Three Forks (at the 220 and 287 intersection), and north of Interstate Highway 80 and U.S. Highway 30. This is the same GYE definition that USFWS used in its 2007 and 2017 rules to designate and delist a DPS of grizzly bears under the Endangered Species Act, both of which rules USFWS vacated in response to court decisions based on grounds other than the DPS designation. The Parties assume USFWS will re-designate a grizzly bear DPS for the GYE geographic area as defined herein.

4. The "Primary Conservation Area" (PCA) is the area whose boundaries are approximately depicted on the map attached hereto as Attachment A; the PCA is divided into 18 Bear Management Units.

5. The "Demographic Monitoring Area" (DMA) is the area that includes the PCA and an additional area surrounding the PCA. The DMA is approximately 19,279 square miles in area, whose boundaries are

[11] In 2021, the IGBST refined the Chao2 population estimator based on information from the report entitled *A reassessment of Chao2 estimates for population monitoring of grizzly bears in the Greater Yellowstone Ecosystem*. For the sake of this MOA, the 2002-2019 timeframe was chosen to reflect the period when population trajectory decreased and to reflect the data provided in the report.

depicted on the map attached hereto as Attachment A. The DMA is based on suitable habitat. The DMA is the area within which the GYE population is annually surveyed and estimated and within which the total mortality limits will apply.

6. "Chao2" is the population estimation technique currently used for the GYE population. IGBST recently conducted an in-depth analysis that revises ruleset parameters and averaging techniques based on current empirical data to derive a more accurate "refined Chao2" estimate of the GYE population while still using approved Chao2 methodologies.

IV. Responsibilities

1. **Science-based Adaptive Management.** The Parties will use best available science and adaptive management approaches to manage the GYE population collectively and cooperatively.

2. **Tri-State Population Management Objectives.** The Parties agree to monitor and manage the GYE population to ensure achievement of the three USFWS demographic recovery criteria (minimum population size, breeding female occupancy, and mortality limits).

As an additional level of protection, the Parties will manage the GYE population within the DMA to maintain a relatively stable population around 932 grizzly bears. This management objective is consistent with the refined Chao2 average grizzly bear population estimates in the DMA from 2002-2019 (associated 95% confidence intervals from 831 to 1,033 grizzly bears). To achieve this population objective for the DMA, the Parties will apply mortality limits (described in subparagraph 3c below) developed by the IGBST to maintain a relatively stable population around the 2002-2019 average population estimates in the DMA. If the estimated population falls below 932 bears, the mortality limits become more conservative, and should result in a population increase.
If the annual population estimate within the DMA falls below 831 (the lower bounds of the 95% confidence interval), the Parties will request IGBST biology and monitoring review, and the

Parties will close the DMA within their respective jurisdictions to hunting until the population increases. The Parties will consider the results of the IGBST review in determining appropriate changes to the management framework.

3. **Relationship of Tri-State Management Objectives to USFWS Demographic Recovery Criteria.**

a. **USFWS Demographic Recovery Criterion 1 (Minimum Population Size)** is to maintain a minimum population size of at least 500 bears within the DMA (for genetic fitness). The Parties' agreement in Paragraph IV.2 to manage the GYE population within the DMA around 932 grizzly bears, based on the refined Chao2 average GYE population estimates from 2002-2019 (95% CI = 831-1,033), provides an additional level of protection above USFWS Demographic Recovery Criterion 1 and will ensure this criterion is met.

b. **USFWS Demographic Recovery Criterion 2 (Breeding Female Occupancy)** is to ensure that 16 of the 18 Bear Management Units within the PCA are occupied by at least one female with offspring over a six-year period, with no two adjacent Bear Management Units unoccupied over a six-year period. The Parties' agreement in Paragraph IV.2. to monitor and manage for breeding female occupancy will ensure it is met.

c. **USFWS Demographic Recovery Criterion 3 (Mortality Limits)**[12] is to ensure annual total mortality rates are not exceeded within the DMA for independent males, independent females and dependent young. In

[12]The GYE population estimates identified in this subparagraph applies the IGBST's revised population estimates (refined Chao2 estimator) for 2002-2019; the 2017 USFWS Recovery Criterion 3 and Strategy have not yet been revised to incorporate these estimates.

addition to the Parties' agreement in Paragraph IV.2 to manage the GYE population within the DMA around 932 grizzly bears (95% CI = 831 - 1,033), the Parties agree to apply mortality limits as set forth in the following table to ensure achievement of this management objective.

Should the Parties adopt a new population estimation method to estimate abundance and evaluate survival/mortality of the GYE population, the Parties commit to recalibrate population metrics and mortality limits therein.

Total Grizzly Bear Population Estimate in the DMA			
	≤ 932 (note: hunting closure < 831)	932-1033	> 1033
Total mortality rate for independent FEMALES.	<7.6%	9%	10%
Total mortality rate for independent MALES.	<15%	20%	22%
Total mortality rate for dependent young.	<7.6%	9%	10%

4. **Additional Mortality Management.** In addition, the Parties' management will include, but not be limited to, the following:

• At a minimum of every 5 years, the Parties will coordinate with IGBST to review vital rates and demographics for the GYE population and make any appropriate adjustments to mortality rates (as presented in Paragraph IV.3 above).

• The Parties will prohibit hunting of females accompanied by young, and young accompanied by females, and discretionary mortality of such animals will only occur for management removals. • At any population level greater than 831, if total allowable independent male or female mortality is exceeded, the number exceeding the total allowable mortality will be subtracted from the next year's discretionary mortality available for harvest for that sex.

• If a state meets any of its allocated regulated harvest limits at any time of the year (see IV.7 below), the respective state will close that state's portion of the DMA to hunting for the remainder of the year.

• If the population within the DMA is less than 600, which the Parties do not expect to occur based on their commitments under this MOA and other inter-agency commitments such as those described in the Strategy, discretionary mortality under the Parties' respective authorities will not occur, except for management removals to address human safety issues.

5. **Genetic Fitness.** The Parties agree to translocate grizzly bears between the GYE and other grizzly bear populations, when necessary for genetic fitness of a distinct grizzly bear population occurring within the three states, and subject to applicable requirements of federal, state, or tribal law and to consistency with applicable demographic recovery criteria for a population listed or previously listed under the ESA.

a. As a cooperative effort of the IGBST, the Parties will continue to conduct genetic sampling of GYE grizzly bears (*i.e.*, biological samples will be acquired from grizzly bear captures, mortality investigations, or other methods), and will analyze these samples to evaluate genetic diversity and connectivity with other grizzly bear populations.

b. To further ensure genetic viability of the GYE population, the Parties adopt the following mechanisms to provide for genetic augmentation through translocation:
By 2025, the Parties will translocate at least two grizzly bears from outside the GYE into the GYE, unless migration from outside the GYE is detected in the interim. Genetic monitoring of the GYE population will continue, and genetic diversity and effective population size (N_e) will be re-assessed at least every 14 years (*i.e.*, one generation). If effective migration is not detected, the Parties will continue to make additional translocations from outside the GYE.

6. **Monitoring.** The Parties will support the IGBST in the annual monitoring of the GYE population.

7. **Coordination and Allocation of Discretionary Mortality.**

a. The Parties will meet annually (preferably in the month of January) to review population monitoring data supplied by IGBST and collectively establish discretionary mortality limits for maximum regulated harvest for each jurisdiction (MT, ID, WY) in the DMA, so DMA mortality limits not exceeded, based upon the following allocation protocol:

i. Begin with the refined Chao2 total population estimate and estimates for independent males, independent females, and dependent young (demographic classes) in the DMA for the previous calendar year, as reported by the IGBST.

ii. Determine the maximum allowable mortality limit for each demographic class based on the mortality rates identified in the table above (IV.3).

iii. Determine total mortality during the previous calendar year for each demographic class.

iv. Subtract the previous year's total mortality from the maximum allowable mortality limit for each demographic class. If the difference is negative (*i.e.*, a DMA annual mortality limit is exceeded for any of the three classes), the number of mortalities above the limit will be subtracted from the corresponding DMA discretionary mortality limit for that class for the current year.

v. Allocate maximum discretionary mortality available for regulated harvest for independent males and females to each management jurisdiction as provided in the following table.

Management Jurisdiction*	**% of DMA outside NPS lands**
WY inside DMA	58%*
MT inside DMA	34%
ID inside DMA	8%

*Four percent (4%) of the DMA outside of National Park System lands in Wyoming is under the jurisdiction of the tribes governing the Wind River Reservation.
b. The Parties may agree to adjust their respective individual allocation of discretionary mortality based on management objectives and spatial and temporal circumstances. Each party has discretion as to how it applies its allocation of discretionary mortality pursuant to its respective regulatory processes and management plan.

c. If, for any reason, a state opts not to implement some or all of its allocation for regulated harvest, that harvest is not available to another state for additional harvest unless agreed to by the state with unused allocation.

d. The Parties will confer with the National Park Service (NPS) and United States Forest Service (USFS) annually. The Parties will invite representatives of both GYE National Parks, the NPS regional office, GYE USFS Forest Supervisors, and the Wind River Reservation to attend the states' annual meeting.

e. The Parties will monitor mortality throughout the year, and will communicate and coordinate with each other, tribal and federal land management agencies as appropriate to minimize the likelihood of exceeding mortality limits.

f. Each Party will designate one representative as a respective Point of Contact for purposes of achieving the objectives of this MOA.

V. Authorities and Regulatory Mechanisms

The Parties enter into this MOA pursuant to their respective state authorities as set forth in Title 87, Montana Code Annotated; Title 23, Wyoming Statutes Annotated; and Title 36, Idaho Code.

The Parties have the authority, capability and biological data to implement appropriate hunting restrictions, management relocations and removals, and population management. The Parties will use their respective individual authorities to regulate discretionary mortality as allocated to their jurisdictions under this MOA. The Parties' respective regulatory mechanisms to manage, monitor, restrict, and adjust mortality include, but are not limited to, those identified in Attachment B.

This MOA in no way restricts the Parties from participating in similar activities with other states, agencies, tribes, local governments, or private entities.

Each Party has discretion to manage grizzly bears within its jurisdiction of the GYE that are outside the DMA pursuant to its respective regulatory processes and state management plan.

VI. No Obligation of Funds

This MOA is neither a fiscal nor a funds obligation document. Any endeavor or transfer of anything of value involving reimbursement or contribution of funds among the Parties will be handled in accordance with applicable laws, regulations, and procedures and such endeavors will be outlined in separate agreements or contracts made in writing by representatives of the Parties. This MOA does not provide such authority.

VII. Term, Termination and Effective Date

This MOA will become effective upon the date of signature of all Parties. It will remain in effect until it is terminated by the Parties. Any Party may terminate its participation in the MOA by providing one hundred-eighty (180) days' written notice to the other Parties, which notice shall be transmitted by hand or other means of delivery confirmation.

VIII. Amendment

The Parties will meet annually to review implementation of the MOA and to recommend any appropriate modifications to the MOA based on changes to the Strategy, state management plans or other pertinent regulatory documents. Any modification to the MOA will only become effective upon the written consent of all Parties.

IX. No Third-Party Beneficiary

Nothing contained herein shall be construed as granting, vesting, creating or conferring any right of action or any other right or benefit upon any third party.

X. Severability

Should any portion of this MOA be judicially determined to be illegal or unenforceable, the remainder of the MOA will continue in full force and effect.

XI. Sovereign Immunity

The states of Wyoming, Montana, and Idaho do not waive their sovereign immunity by entering into this MOA, and each fully retains all immunities and defenses provided by law with respect to any action based on or occurring as a result of this MOA.

In Witness Thereof, the Parties hereto have executed this MOA as of the last written date below.

______________________________________ ________
President, Wyoming Game and Fish Commission Date

______________________________________ ________
Director, Wyoming Game and Fish Department Date

______________________________________ ________
Chairman, Montana Fish and Wildlife Commission Date

______________________________________ ________
Director, Montana Fish, Wildlife and Parks Date

Appendix I.
Pilot program: Genetic augmentation – GYE

Genetic augmentation of grizzly bears in the Greater Yellowstone Ecosystem:

Pilot Program, December 2022

This working document was coordinated by Rich Harris (MFWP), with considerable input from the editorial team of Cecily Costello (MFWP), Frank van Manen (USFS), and Hillary Cooley (USFWS). Substantive input was received from Mark Haroldson (USGS), Dan Thompson (WDFG), Dan Bjornlie (WDFG), Jeremy Nicholson (IDFG), Jeremiah Smith (MFWP), Tim Manley (MFWP, retired), Wesley Sarmento (MFWP), Chad White (MFWP), Kari Eneas (CSKT), Jennifer Fortin-Noreus (USFWS), Wayne Kasworm (USFWS), Scott Jackson (USFS) and Kerry Gunther (YNP). This or earlier drafts have been reviewed by Kim Annis (MFWP), Jamie Jonkel (MFWP), Lori Roberts (MFWP), Camel Whisper-Means (CKST), Jeff Horn (Blackfeet Tribe Wildlife), Ken McDonald (MFWP), Justin Schwabedissen (GTNP), Rory Trimbo (MFWP), John Waller (GNP), Dan Tyers (USFS) and Kate Wilmot (GTNP).

INTRODUCTION

The Yellowstone Ecosystem Subcommittee of the Interagency Grizzly Bear Committee proposes adopting a process that would assist the long-term genetic health of the grizzly bear population in the Greater Yellowstone Ecosystem (GYE) via the occasional translocation of non-conflict grizzly bears from the Northern Continental Divide Ecosystem (NCDE). This document lays out the processes required to allow this to occur, how we envision field operations to follow from that, and also provides the biological rationale for taking this action. A more detailed step-down providing guidance for field operations is also included. This is consistent with the commitments made by the States of Montana, Wyoming, and Idaho

Briefly, biologists have long recognized the long-term risks that wildlife populations face when they are isolated from other populations. The importance of ultimately providing biological connectivity between bears in the GYE and those further north has been recognized for many years (e.g., Allendorf and Servheen 1986). Because both the GYE and NCDE populations of grizzly bears have expanded in abundance and distribution, they are closer to becoming connected via natural movements of bears than at any time during at least the past 50 years. Natural movements of bears into the GYE have been recognized as desirable by Montana Fish, Wildlife and Parks for many years (Dood et al. 2006, MFWP 2013:41), management zones committed to by federal and state managers are intended to facilitate occasional migration (NCDE Subcommittee 2021), and conflict prevention and reduction activities continue that may ultimately allow these movements to occur.

Similar programs have been considered in the past but not yet implemented. The "Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area" of March 2007 (since superseded by the one signed by participants in December 2016) noted that migration of grizzly bears into the GYE could occur either via natural movements or artificial transplantation. In the proposed delisting rule of 2007, USFWS pledged to "*continue efforts to reestablish natural connectivity, but our partners…* [presumably including MFWP]*… will transplant one to two effective migrants per generation if no movement or genetic exchange is documented by 2020*…". USFWS further stated that "*Augmentation is proposed as a precautionary* *measure based on the recommendations of Miller and Waits (2003, p. 4338) to maintain current levels of genetic diversity, should grizzly bear movement into the GYA not occur over the next 20 years*."

The USFWS (2021:181) also contemplated possible translocation, suggesting confidence that "…*translocation, if necessary, will address the ability of future GYE bears to adapt evolutionarily*". Regarding accountability and monitoring, USFWS (2021:181) stated that "*The IGBST also monitors genetic diversity of the GYE grizzly bear population so that a possible reduction in genetic diversity will be detected and responded to accordingly with translocation of grizzly bears into the GYE originating from another population in the lower-48 States. In addition to possible translocations, measures described in the 2016 GYE Conservation Strategy are and will continue to be used to promote genetic connectivity through natural movements. These measures include habitat protections, population standards, mortality control, outreach efforts, and adaptive management*."

BACKGROUND

Grizzly bears living in the Greater Yellowstone Ecosystem (GYE) have been isolated from other grizzly bear populations for possibly over 100 years, and their continued genetic isolation is a long-term conservation concern. The rate of inbreeding has been very low (0.2% over 25 years), and no inbreeding effects have been detected. Additionally, effective population size has increased well above the level where short-term genetic effects would be expected, and is approaching criteria for long-term population viability. Nonetheless, with lower genetic diversity than other North American grizzly bear populations, it is recognized that infusion of genetic material from other populations would enhance the adaptive capacity and long-term persistence of the GYE population. Although no evidence of immigration has been documented since genetic monitoring began, the potential for natural movement into the population by bears from the Northern Continental Divide Ecosystem (NCDE) is increasing over time. Due to population growth and expansion, distance between the nearest portions of estimated occupied ranges of these two populations to each other had diminished to only 57 km by 2020.

One option for increasing genetic diversity in the GYE is to assist the natural immigration process via occasional human-aided translocation of bears from the Northern Continental Divide Ecosystem. However, translocation of bears, especially between populations separated by human-dominated landscapes, is not without risks. Not all translocated bears survive or settle in the release area. Translocated bears often exhibit unusual movement patterns, likely motivated by their homing instinct or because of spatial competition from resident bears and difficulty in finding a vacant space to settle. Post-translocation movements of grizzly bears can be extensive, often increasing their mortality risk (e.g., vehicle collisions, poor nutrition) or the likelihood of encountering human settlements and engaging in human-bear conflict. If human-aided translocation is implemented, an imperative is to minimize the probability that translocated bears come into conflict with people.

If a translocation option is acceptable to cooperating agencies, careful planning with respect to selection of candidate individuals, timing, and locations will help decrease these risks and increase the likelihood of successfully adding to the genetic diversity of the GYE population.

This working document is intended to guide field practitioners (and to inform wildlife managers, land managers, and the interested public) regarding our collected expertise on 'best practices' likely to result in success. Ultimately, successful implementation would entail translocated bear(s) staying within the GYE and producing or siring cubs that themselves survive long enough to attain survival rates comparable to resident bears. Documenting such success, however, is likely to be a difficult and long-term process, will require statistical procedures such as assignment tests based on DNA samples. More immediate metrics of success, such as documenting an individual's fidelity to the new location, will help inform future translocation procedures (if needed).

We emphasize that the objective of any translocation of grizzly bears into the GYE is for ensuring that genetic diversity is sufficient to provide long-term evolutionary potential. The objective is not to increase population size in the GYE generally.

PROCESS CONSIDERATIONS

Whether or not migrant grizzly bears move into Yellowstone and ultimately contribute genetically, FWP, in cooperation with others, can undertake measures that would, if successful, have a similar biological effect. Process considerations include:

1. FWP would, on an on-going and continuing basis, translocate conflict-free bears from other populations in Montana to pre-selected and pre-approved areas within the GYE. Areas chosen for release would be those judged most likely to allow individuals to meet their biological needs without conflicts with humans, and also most likely to encounter and breed with individuals of the opposite sex.

2. Trapping would be conducted to capture and move bears as resources allow.

3. The sex/age of bears that would be augmentation candidates, exactly where they would be released within the GYE, and whether there are times of year when augmentation would be inadvisable are biological considerations that are crucial to the ultimate success of the initiative. Those considerations are discussed in greater detail below.

4. Bears whose presence is deemed to have greater biological value to the source population than the GYE would not be considered candidates for this program.

5. FWP or USFWS staff in northwestern Montana would coordinate with counterparts in the GYE on the details of transportation and release.

6. The frequency with which such animals would become available would vary annually, and not be predictable. The expectation is that approximately 2 to 4 candidate bears would become available and be moved every 10 years. There would be no additional expectations or requirements for the timing beyond that. For example, if opportunities presented themselves, > 1 bear might be moved in any given year; conversely, a few years might pass with no good opportunities.

7. This magnitude of capturing and moving bears would result in approximately 3 to 6 bears being moved to the GYE per grizzly bear generation (see below). If one-half of the bears moved stayed in the Yellowstone, survived long enough to reproduce, and produced (or sired) a cub that survived to adulthood, approximately 1.5-3 effective migrants per generation would gradually be added to the Yellowstone population. (See below for additional information and justification).

8. If subsequent monitoring (see below) indicated the need for additional bears, additional trapping would be considered. If subsequent monitoring indicated greater fidelity and survival among augmented bears than anticipated, fewer might be moved.

9. All individuals translocated would be fitted with a GPS collar, micro-chipped, and tissues for DNA monitoring would be obtained. The IGBST (or cooperating staff) would track any translocated individuals as part of their routine telemetry

monitoring program. Attempts would be made to continue monitoring females post-denning, to document presence of litters. We anticipate, however, that direct observation of offspring from augmentees will be difficult and incomplete. Thus, the genetic monitoring program that is currently in place would continue to document and quantify any reproductive contribution from translocated animals.

10. Translocated individuals would be considered experimental[13] animals, and either moved or euthanized should they cause conflicts with humans.

11. For any translocated individuals that survive and remain in the GYE Demographic Monitoring Area (DMA) at least 1 year, that year's allowable mortality limit for that gender for the GYE (as per the GYE Conservation Strategy) would be increased by one to account for the unanticipated addition of that individual, reinforcing that the augmentation is for genetic, not demographic purposes.

12. As per the NCDE Conservation Strategy, a bear removed from within the NCDE DMA would count against the NCDE's mortality limit (albeit could be accompanied by an asterisk to clarify that the bear might not have died, thus helping inform a potential programmatic review).

Required Permissions and Suggested Processes/Protocols

The below considerations relate to permissions and approvals.

1. While federally listed, USFWS approves all relocations and translocations of grizzly bears in the contiguous 48 states. With limited exceptions, grizzly bears have not previously been moved from one "ecosystem" to another. To expedite real-time decision making, an omnibus approval of this program from USFWS is part of this process.

2. FWP releases grizzly bears only where the landowner has provided pre-approval. Although there is no particular reason to consider 'northern' grizzly bears differently from those coming from closer by, because this would be a new program, we would anticipate obtaining specific approval from landowners in the GYE (typically USFS) and affected states for releases of these bears.

3. Newly enacted legislation requires that, while federally listed, the Montana Fish and Wildlife Commission pre-approve sites for any grizzly bear releases that would occur within Montana. A list of 32 potential relocation sites in the GYE (anticipating possible relocations of conflict animals) was presented to the Commission for consideration on October 28, 2021 and approved for a five-year period on February 4, 2022.

4. FWP operates its grizzly bear conflict response program under annually renewed memoranda of agreement with the USFWS; thus, no new permits or addenda to these annual agreements would appear to be required.

Biological Considerations

Acknowledging at the outset that 'biological' considerations are not entirely separable from 'social' considerations (and that both are important), we categorize biological issues into four: i) characteristics of a candidate bear; ii) where captured; iii) where released; and iv) when captured/released.

[13] Not to be confused with the legal definition of an "experimental population" in ESA 10(j) sense.

1. Characteristics of bears being considered (sex/age/history)

a) Management history: Bears with a history of involvement in bear-human conflict, even as offspring, will not be considered candidates for translocation. Furthermore, bears captured away from human settlements will be the best candidates to minimize the likelihood of post-release bear-human conflict.

b) Age/sex of bear: Knowledge of bear behavior and information about post-release movements help inform which sex and age categories are most likely to result in success. Younger bears, primarily between the ages of 2 and 5, often undergo natal dispersal whereby they move away from their natal home range to settle in their own permanent home range. In general, male bears are very likely to disperse, tend to disperse large distances, and can be highly transient for more than a year. In contrast, female bears are more likely to remain near their natal range, rarely disperse large distances, and are less transient than males. Nonetheless, occasional long-distance female dispersal does occur. This natural tendency for movement by young bears of both sexes, in the pursuit of finding and establishing their own permanent home range, is associated with less frequent homing and higher fidelity to release areas when they are translocated. Continued transiency and wide-ranging movements following translocation are not uncommon until bears settle in their permanent home range. In the Cabinet Mountain augmentation program, all of the translocated bears known to have successfully bred were translocated when they were within this age group: three females and one male were translocated as 2-year-olds and one male was translocated as a 4-year-old. Overall, both female and male bears in this age class are good candidates for translocation, as long as evidence indicates they have not previously reproduced. It is likely that eventual reproduction by females would be easier to document via direct observations, whereas male reproduction will be detected through genetic analysis. Successful female reproduction is constrained to litters every 3 years, but successful males have the potential, but certainly not the certainty, of breeding every year and fathering offspring with multiple females.

By the time bears reach the age of 6 or 7 years, most have established a permanent home range and have become reproductively active. Consequently, when adult bears are translocated, they frequently return or attempt to return to their home range, even when moved distances >200 km and even when accompanied by offspring. Homing bears generally move in a linear fashion even though it may take them some time to determine the correct direction toward their home range. When translocated long distance, it is not unusual for bears to take more than a year to return home. Overall, reproductively active adult bears are not good candidates for translocation to augment the GYE population.

Cub and yearling bears are usually still dependent on their mother, however survival of orphaned or early-independent bears in these age classes has been observed. When translocated independently of their mother, initial movements of cub and yearling bears are usually more restricted than those of older bears, but they can also become more transient over time, consistent with their natural dispersal behaviors. They likely have a good probability of settling in the release area, however their survival is likely to be lower than older bears. Their survival and ability to settle in a home range is probably most compromised where the resident bear population density is high. Orphaned cub or yearling bears may be good candidates for translocation, as long as their body size and condition suggest good potential for survival on their own. Given that these bears are unlikely to reproduce for at least 4 years, recapture or genetic analyses would likely be required to document any eventual reproduction. There are no sex/age combinations that would automatically disqualify a bear from consideration. However, evidence and experience suggest that some are better choices than others given other considerations, and that each comes with unique sets of attributes:

i) **Sub-adult female (age ~ 2 to 5, as estimated in the field).** These bears are generally the strongest candidates because they are *relatively* likely to remain in the target area without conflict with humans. A 4-year old female would likely be among the easiest to monitor (collar longevity is good) for survival and reproduction. If later bred, her offspring would most likely be hybrids (sired by a GYE male, i.e., she'd be an effective genetic migrant), but even if pregnant when moved, she and any surviving offspring could mate with GYE in future years. Downsides are that it may require 1-3 years before she is mature enough to breed (particularly if younger). If younger (i.e., <4), collar retention could be problematic. However, younger NCDE sub-adults (aged 2-3) that were translocated > 4 times their sex-specific home range radiuses displayed slightly greater fidelity to areas in which they were released than females aged 4 or 5. If it is possible to capture the independent offspring of females known to be free of conflict (e.g., if collared for trend monitoring), such an animal would probably be unfamiliar with human-related attractants, and thus likely to remain conflict-free. Both managers and the public should be aware, however, that even bears in this optimal sex/age group may display homing movements, or wander considerably before settling down.

ii) **Sub-adult male (age ~2 to 5, as estimated in the field).** These bears are generally less suitable candidates than females of similar ages (above), because a) they are more likely than females to get into conflict situations, b) they are more likely than females of similar age to suffer mortality, even without an obvious human-conflict, c) they are more likely than females of similar age to become displaced by larger males, and thus possibly leave the GYE entirely, d) it may require some time before they can establish themselves as breeders if they are not displaced, and e) collar retention is not as good as among females. However, in the unlikely event that a subadult male can safely establish itself, it could breed at a younger age than a subadult female (have less time exposed to risk before it makes a genetic contribution). At least 2 male Cabinet augmentees are known to have later sired subs. Sub-adult males are an option if other considerations are strongly positive.

iii) **Orphaned cub of the year (either sex).** Although there is documentation that some orphaned cubs can survive without their mothers, our assessment is that the additional stress of putting them into a unique environment makes their survival unlikely. Orphaned cubs should not be considered candidates.

iv) **Orphaned yearling (either sex**). The likelihood of orphaned yearlings surviving and finding a new home in the GYE is probably higher than of orphaned cubs. Yearlings of a female that had a history of conflict would not be candidates due to the likelihood that they already learned unacceptable behavior. However, yearlings orphaned as a result of mortalities of non-conflict mothers could be considered candidates. If >1 yearling were captured and moved together, their survival would probably be higher than for a single animal and would also double the potential of ultimately producing an effective genetic migrant. However, yearlings would require more years (probably 4) before they could breed, and would be even more difficult to monitor long-term via telemetry than subadults.

v) **Adult female (age 5+, as estimated in the field).** An adult female unaccompanied by cubs in mid-summer has high likelihood of already being bred; thus, cubs she might produce overwinter in the GYE would not be genetically effective migrants (and would not constitute success). However, those cubs would carry NCDE genes, and thus any that survived to become breeders themselves would increase the pool of potential effective migrants. An adult female in mid-summer who'd lost a litter would be very likely to be bred by a GYE male the following spring, assuming she survives and stays in the target area that long. Adult females would offer the greatest opportunity for monitoring their genetic success, an important criterion because they are most amenable to long-term radio-monitoring, and can sometimes be observed visually (and if accompanied by cubs, reproduction documented). However, adult females generally are the most likely to exhibit homing movements (see above), and thus are poor candidates for this program.

vi) **Adult male (age 5+, as estimated in the field).** Although generally not considered an optimal choice due to concerns about potential human-bear conflicts and competition with resident adult males in the release area, there could occasionally be situations in which an adult male could be considered. An adult male that survived and avoided conflict could conceivably mate during the breeding season immediately following translocation, and if it became established, make a disproportionately large genetic contribution. A downside is that documenting effective migration of males would require long-term genetic data and not be assured; it is also difficult to keep collars on adult males. Consider if a) a translocation site can be found at which potential for conflict is low, and/or b) capture is very late in the season, such that the animal has already built up fat reserves and dens shortly after release. Late-season releases would be contraindicated where big-game hunting is still occurring.

2. Areas for capture

i) Although habitat similarity to the GYE (another consideration) could be greatest for an animal captured at the southeastern extent of the NCDE distribution (and such bears might appear to be "trying" to get to the GYE on their own), such an animal could have a higher likelihood of returning (i.e., not remaining within the target area).

ii) We take it as a given that habitat characteristics of the release site will differ from those at the capture site, and challenges translocated animals will face are factored into the expected probability of success. Although 'matching' habitat of the donor to recipient area would be ideal, it's not a critical consideration given how adaptable bears are. That said, bears living in the relatively mesic, huckleberry-dominated areas in the northwest portion of the NCDE are probably not the best candidates, at least initially. As well, potential candidate bears in this area are high priorities for the Cabinet augmentation program.

iv) A likely constraint for capture areas is the need to use culvert traps (so that bears can easily be moved from the site), and thus road access (unless culverts could be flown into remote locations).

v) A female bear originating in a Bear Management Unit (BMU) or Occupancy Unit (OU) where meeting occupancy standards has been a concern should not be a strong candidate.

vi) As with any grizzly bear capture operation, good communication and close coordination with local land managers is critical.

3. Release areas

At this point in the process, we consider areas at a coarse geographic scale. Specific release sites should be well-vetted, and offer the lowest possible opportunity for released bears to find trouble, while recognizing that bears generally don't stay in the immediate area where they are released. Appropriate sites would be within the GYE DMA, but not otherwise be constrained geographically at this coarse level of consideration. That said, bears released where a large expanse of relatively undeveloped landscape exists between the site and the bear's original home range are less likely to engage in conflict behavior or exhibit homing.

We seek areas with enough bears that translocated animals can find (or be found by) mates, but not such a high density that competition or aggression from resident bears will increase the chance of intraspecific predation or displacement outside the GYE DMA. If possible, local density estimates such as produced by Bjornlie et al. (2014) and IGBST (unpublished data) should be consulted, but qualitative assessments made by locally-based staff will be crucial as well. Expecting that translocated bears may not remain close to the release site, an important consideration is the spatial extent and configuration of habitat surrounding the release site where conflicts with humans are unlikely.

As with any grizzly bear translocation, good communication and close coordination with local land managers is critical.

i) **Yellowstone National Park**. Because livestock are absent and attractants generally well controlled, YNP should be strongly considered at the outset of this program. Challenges would be identifying areas where resident grizzly bears are not too dense (see above, e.g., not Hayden Valley), and where recreationists are not highly concentrated.

ii) **Wyoming, outside of YNP**. There may be areas, particularly in the northern portions of the BTNF, where attractants are rare or well-managed, and where a translocated bear would have a good chance to mate with other bears without coming into conflict. Potential areas include the southeastern portions of Blackrock, Togwotee Pass, and Moccasin Basin, where cattle allotments have been bought out or retired, but there is still gated road access to move a bear far from any developed areas (but not further south where cattle density increases).

iii) **Montana, outside of YNP.** Generally, areas where an augmentee might be released in the Montana portion of the GYE DMA are closer to humans (recreationists, livestock, homesites). Thus, we recommend gaining some experience with the program before considering sites in Montana.

iv) **Idaho, outside of YNP.** Not a candidate translocation recipient at this time.

iv) **Grand Teton National Park**. Not a candidate translocation recipient at this time.

4. Time of year

i) Biologists have typically considered it unwise to transport animals early after den emergence, as bears that time of year are particularly hungry, many plants-based food sources are not yet available, and livestock young are small and vulnerable. Snow typically reduces road access early in the bear-year, which in turn means that capture and release sites are likely closer to people. Spring black bear hunting can also constrain grizzly bear captures.

ii) July and August are typically considered the optimal months to translocate bears, as plant-based food sources are peaking and bears are not yet in hyperphagia. Eighteen of the 22 Cabinet augmentees were moved in July or August to match the peak of huckleberry production. However, the mast peak seen in the Cabinets does not characterize the GYE, so a somewhat earlier time window should be considered.

iii) September through mid-October are generally avoided because i) some bears in hyperphagia descend to low elevations where human attractants are common, and ii) of overlap with big-game hunting. The latter concern would be lower if released centrally within YNP.

iv) Although few data are available to inform it, the possibility that grizzly bears might be successfully translocated very late in the active year, just prior to expected denning, holds promise. Such a bear should have already fattened up, and even in an unfamiliar place we do not expect it to have difficulty finding a place to den. Upon emergence, it may then be more likely to consider its denning area a new home.

In summary, we recommend that for the first few years of this program, managers adopt a conservative approach, moving only bears that are most likely to stay in the GYE, survive, and breed; moved only during the optimum time of year; and released where success is most likely. With time and experience, criteria for acceptable candidate bears, source locations, release locations, and timing of movements can all be revisited if new information becomes available, and this protocol updated and revised if appropriate.

Other considerations

1. FWP and USFWS are cooperating on a long-term project to augment the Cabinet Mountains population; since 2005, all bears have come from FWP Region 1 (Flathead, Swan, Stillwater drainages). The objective is to move 2 subadult bears/year, although fewer have been moved in some years. GYE genetic augmentation would be a concurrent program but could transpire over a more relaxed time schedule. Ideally, appropriate bears can be found for both programs.

2. Bears removed (live) from the NCDE for augmentation are counted as "mortalities" following the NCDE Conservation Strategy when assessing whether thresholds have been exceeded. Typically, capture efforts for augmentation would occur before that year's total mortality has been documented; it's thus possible for mortalities occurring later in the year to put that year's total "over" the threshold. However, the threshold is calculated on a 6-year running average, and because the total reported and unreported estimate would be known for the previous 5 years, the likelihood of reaching the threshold because of live removals can be estimated (albeit with some uncertainty). Because this GYE augmentation is intended to produce 1 or 2 effective migrants per bear generation length (i.e., need not occur rapidly), it would be reasonable to hold off capture efforts in years in which removing more NCDE bears could cause the threshold to be exceeded.

3. Given considerations outlined in this document, we anticipate that trapping efforts for appropriate bears would be planned and deliberate or be associated with ongoing research and monitoring efforts. It is very unlikely that an appropriate bear would be captured in the course of conflict response work. Thus, additional resources will be required from donor agencies.

4. If released in Montana by MFWP (outside YNP) while bears are ESA-listed, the release site would have to be one previously approved by the Montana Fish and Wildlife Commission. This constraint would not apply if released by USFWS.

5. If released in Wyoming (outside a NP), WGFD must notify the county sheriff of the county in which the release takes place within 5 days and issue a press release (W.S. 86 § 1).

6. Released bears will undergo standard data collection and processing, including collection of genetic samples, and must be PIT-tagged, ear-tagged, and outfitted with a GPS telemetry device.

DETAILED BIOLOIGCAL BACKGROUND

Grizzly bears living in the GYE have been isolated from other grizzly bear populations possibly for over 100 years, and thus the genetic effects of small population size raise concerns. No immigrants into the GYE population have been documented to date (Haroldson et al. 2010; M. Haroldson, USGS, pers. comm., 2021), and heterozygosity and allelic diversity are lower than most other North American grizzly bear populations for which data are available. However, these 2 metrics of genetic diversity declined very slowly if at all from 1985 to 2010. The rate of inbreeding has been very low since 1985, and no physiological, behavioral, or demographic effects indicative or associated with inbreeding have been detected. Importantly, estimates are that effective population size (the summary metric best suited to consider genetic effects) has increased over the estimates of 1910-1960, continued to increase during 1985-2007, and is well above the level where the short-term effects of reduced genetic diversity (i.e., inbreeding, genetic drift) would be expected.

Thus, all indications are that Yellowstone grizzly bears are genetically well-adapted to their existing environment and facing no immediate threat related to population genetics. However, the Yellowstone population is sufficiently small from a genetic perspective that isolation from other populations poses risks for its long-term viability (> 100 years). Although no genetic issues currently limit the ability of grizzly bears in Yellowstone to survive and reproduce normally, their ability to respond evolutionarily to unknown future environmental or other challenges may be limited by low allelic diversity combined with isolation. Thus, introduction of genetic material from other grizzly bear populations would reduce the long-term risks associated with loss of allelic diversity in the Yellowstone grizzly bear population.

Best estimates are that any long-term genetic risks can be ameliorated by the effective migration into Yellowstone of as few as 1 to 2 animals per generation (10-15 years) if continued indefinitely into the future. Thus, although connectivity is required over the long-term to alleviate risks, such genetic connectivity can be thought of as a slow and continuous trickle of bears rather than a sudden and dramatic increase of gene flow. Recent geographic expansions of GYE grizzly bears in a northwesterly direction, and of NCDE area grizzly bears in a southeasterly direction have increased the probability of natural genetic connectivity in the future. A major impediment to achieving connectivity is Interstate Highway 90, and in particular the rapidly increasing level of human development associated with the greater Bozeman area.

Why do we think that genetic augmentation is necessary, and why do we think the relatively few animals we suggest here will suffice? Consider the question "How many animals are enough to ensure long-term persistence" by focusing on minimizing the chance that erosion of genetic diversity within a small, isolated population will render it unable to evolve, if needed, to changed conditions in the future. We know that larger populations generally have more genetic diversity — more options available from which to develop adaptations to differing conditions — than smaller ones. But how large is large enough to maintain needed evolutionary potential? We don't have the luxury of observing a variety of wild populations subjected to changing conditions to see which ones successfully coped and which did not. Instead, we need to depend on theory, augmented by well-considered simulation models.

In 1980, geneticist Ian Franklin postulated that an effective population of 500 would be large enough to allow beneficial mutations to balance genetic erosion (in particular, "genetic drift") indefinitely, and was thus a useful rule of thumb for answering the question "How many are enough to retain the evolutionary potential to cope with future change" (Franklin 1980)? Since then, some scientific dispute about the "500 long-term rule" has emerged (Jamieson and Allendorf 2012, 2013; Frankham et al. 2013); FWP agrees with Jamieson and Allendorf (2013) that it retains usefulness in considering long-term needs for population size.

Importantly however, the 500 number refers to the "effective" size, not the number of animals. The effective population size (Ne) is defined as that which will lose genetic variability at the same rate as an "ideal" population[14]. Because in almost all wild populations, Ne is smaller than the actual (census) number of animals (Nc), more than 500 animals would be needed in order to satisfy Franklin's rule-of-thumb. What is the relationship between Ne and Nc in grizzly bears? In reviewing a number of equations relating these 2 quantities at the time, Harris and Allendorf (1989) created simulations of grizzly bear

[14] Defined as one with discrete, non-overlapping generations, that doesn't vary in size annually, and in which the contributions of each member to the succeeding generation are randomly distributed (i.e., described by a Poisson distribution).

populations, and concluded that, based on demographics and breeding structure, Ne was likely to be in the range of 0.24Nc —0.32Nc, depending on assumptions used. This suggested that a grizzly bear population would need to number ~ 1,560 to 2,080 to meet Franklin's criterion. Since then, advances in genetics and theory have allowed better and more data-driven estimates of Ne for the GYE grizzly bear population. Kamath et al. (2015), estimated that the Ne/Nc ratio had, in recent years, been between 0.42 and 0.66 (suggesting between 760 and 1,190 bears needed to satisfy Franklin's rule of thumb). Regardless, the long-term need for occasional genetic interchange between geographically discrete grizzly populations has not seriously been questioned by biologists (and is not questioned by FWP).

A related question follows: if a population is isolated but capable of being reached by occasional migrants from another presumably larger and more genetically diverse population, how many migrants are needed to effectively link the two genetically, and how often must such immigrations occur, in order for the entire assemblage to both be genetically secure while retaining any adaptive divergence? Sewell Wright, one of the founders of modern conservation genetics, had proposed decades ago that, under a number of simplifying assumptions, a single migrant per generation would be sufficient to prevent loss of heterozygosity and allelic diversity within a vulnerable subpopulation while still allowing it to respond adaptively to local conditions (Wright 1931). This noteworthy result derives from fact that a single migrant would provide a relatively large infusion of genetic material to a small population, and although it would provide a proportionally smaller benefit to a larger population, the very fact of large size would reduce the need for the immigration. A number of simulation studies later confirmed that the one-migrant-per-generation (OMPG) rule-of-thumb maintained its validity under a variety of assumption violations typical of real-world populations (Mills and Allendorf 1996, Wang 2004), and thus that OMPG, or perhaps slightly more than one, remained a useful long-term goal. A genetic metric to reflect the balancing between assuring that the target population would maintain its evolutionary potential while still maintaining necessary local adaptations is called FST, which under OMPG would, after a sufficient number of years, equilibrate at 0.2

Of course, a "migrant" in this sense is not merely an animal that travels from one population to another. For it to perform as the OMPG theory predicts, the migrating animal must contribute to the gene pool after arriving, i.e., breed with a resident. Put another way, the 'M' in OMPG must be an "effective migrant". What about the 'G' in OMPG? How long is a generation for grizzly bears? Using similar methods to those used to estimate Ne for Yellowstone grizzly bears, Kamath et al. (2015) estimated it at about 14 years. To date, we have no evidence that any migrants, effective or otherwise, have made it from the NCDE to GYE area populations.

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The importance of natural forest stewardship in adaptation planning in the United States

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Abstract

Forests are critical to the planetary operational system and evolved without human management for millions of years in North America. Actively managing forests to help them adapt to a changing climate and disturbance regime has become a major focus in the United States. Aside from a subset of forests wherein wood production, human safety, and experimental research are primary goals, we argue that expensive management interventions are often unnecessary, have uncertain benefits, or are detrimental to many forest attributes such as resilience, carbon accumulation, structural complexity, and genetic and biological diversity. Natural forests (i.e., those protected and largely free from human management) tend to develop greater complexity, carbon storage, and tree diversity over time than forests that are actively managed; and natural forests often become less susceptible to future insect attacks and fire following these disturbances. Natural forest stewardship is therefore a critical and cost effective strategy in forest climate adaptation.

KEYWORDS

adaptation, biodiversity, carbon, climate change, fire, management, natural forest, protected areas, resilience

Forests, along with oceans, are the most significant ecosystems that regulate the planetary operational system. They determine global temperatures, climate and weather, provide oxygen, and remove carbon dioxide. Forests require a high degree of integrity, complexity and diversity to be at their most functional, and when they lose these attributes they become less resilient and effective in their role in planetary dynamics (Grantham et al., 2020; Millenium Ecosystem Assessment, 2005; Parmesan et al., 2022).

This article is designed for forest and land managers, conservation biologists, conservation organizations, and other forest landowners.

North America's temperate forests evolved continuously in response to natural disturbances and changes in climate over the past 65 million years (Askins, 2014). Only in the past 10–15,000 years did humans arrive and manage forests with fire and tree removal for subsistence and safety near their settlements (Roos, 2020; Roos et al., 2021), and only in the past two centuries did humans manage forests intensively (including the suppression of natural disturbances like fire) for industry and other values at the regional scale (Williams, 1992).

Today, tree mortality is on the rise due to fire, insects, wind, drought and other natural disturbances that are increasing in frequency and intensity with anthropogenic climate change (Parmesan et al., 2022). In response to these impacts, intensified efforts to manage forests proactively to help them adapt to future changes has become a major priority among forest managers and many public and private conservation agencies in the United States (Prichard et al., 2021; Swanston et al., 2016). For instance, California pledged to actively manage at least 1 million acres of forestland per year over the next 20 years; the state spent 1.5 billion dollars in 2021 alone on "wildfire resilience" (Office of Governor Gavin Newsome, 2020). Additionally, a recent USDA Forest Service grant promotes active management on 15 million acres of eastern forest land owned by small private landowners. "Improving forest health" is one of the primary goals of this project (Purdue University, 2023).

Forest health and resilience are important tenets of adaptation. Yet definitions of forest health focus on the ability of forests to provide direct resources and services to people (Millar & Stephenson, 2015), rather than the ability of ecosystems to persist and adapt per se in the face of changing disturbances. Hence, forest adaptation projects are portrayed as necessary for protecting forest ecosystems from climate change, when these initiatives are often more about resisting and directing change to promote a particular set of natural resource values and objectives, including economic gain.

Recently, many natural resource managers have embraced the RAD framework for stewarding ecosystems undergoing rapid change (e.g., Schuurman et al., 2022). RAD stands for resist, accept, or direct change, with active management and intervention inherent in "resist" and "direct" and a passive, hands off approach characterizing "accept." Although relatively few forests are harvested each year (e.g., 2.6% of forest area across the northern United States; Thompson et al., 2017)—which gives a snapshot impression that a hands off approach ("accept") is the dominant management approach—this rate of harvest scales up to >50% of forest area cut in 20 years, suggesting that management is pervasive over a decadal time scale. In contrast, only 3% of land in the continental United States is currently protected under natural stewardship (i.e., Gap 1—managing forests largely free of human disturbance to allow natural disturbances to operate without interference; Peterken, 1996; USGS, 2022). Here we argue that a resist and direct approach to managing forests (e.g., mechanical thinning, prescribed burns, species selection, pre- and post-disturbance salvage/planting, and other fire suppression tactics) is appropriate in some forests intended for resource production, experiments, and human safety in the "wildland–urban interface." However, accepting the capacity of natural systems to adapt and be self-sustaining with natural stewardship is a critical and cost-effective approach in other forest contexts.

Although improved resilience and protection of biodiversity are goals of proposed adaptation management, active management may, in some cases, have little effect on future stand resistance (Morris et al., 2022), is often unnecessary for natural forest resilience (e.g., Cansler et al., 2022; Hart et al., 2015) and biodiversity (Thom & Seidl, 2016; Viljur et al., 2022), and is generally counterproductive to carbon storage, structural complexity, tree diversity, and resistance to invasive species. (Donato et al., 2013; Miller et al., 2018; Patton et al., 2022; Schwilk et al., 2009; Young et al., 2017; Table 1). Moreover, conservation evidence for the effectiveness of management interventions is often lacking or has mixed results (Sutherland et al., 2021), resources for interventions are limited, and management incurs substantial financial and other costs to society (Houtman et al., 2013). Depending on local considerations, and based on multiple values, natural or near natural forest stewardship is an effective approach to developing and sustaining forest complexity, diversity, and functionality and traditional/aesthetic values (Franklin et al. 2002; Miller et al., 2016; Miller et al., 2018; Sze et al., 2022; Waller & Reo, 2018). It is also an insurance policy as we face an uncertain future.

Human safety is a major consideration with respect to fire risk within communities and especially to individual homes. Depending on the region and climate risks, adaptation management and suppression efforts to protect the immediate area around residential homes (e.g., removal of combustible plants and debris, forest clearing, and forest thinning) in fire-prone areas is beneficial for safety (J. Cohen, 2008; Roos et al., 2021). Clearing this "home ignition zone" (i.e., trees and shrubs in a 30–60 meter buffer area around a house) and preventative fireproofing itself (i.e., metal roof, fire-resistant doors and windows, secured pet doors and attic vents) is primarily what reduces the ignition potential of a home (J. D. Cohen, 2001; J. Cohen, 2008).

In forests managed for resource production, some adaptation management efforts to maintain forest cover, species composition, and tree regeneration can be beneficial in some regions (Foster & Orwig, 2006; Sutherland et al., 2021). For instance, in western coniferous forests (e.g., *Pinus ponderosa* and *Pseudotsuga menziesii)* thinning and prescribed burns can, in some cases, reduce fire severity (Cansler et al., 2022; Yocom-Kent et al., 2015), increase densities of desirable conifer regeneration (Shive et al., 2013), and mitigate transformation of forest into non-forest vegetation following fire (Walker et al., 2018). However, the conservation evidence to date suggests that while mechanical thinning alone can be beneficial for forest understories and young trees (Sutherland et al., 2021), it can also

TABLE 1 Forest management objectives and outcomes from pre- and post-disturbance management relative to natural stewardship.

	Management strategy and outcome (+ positive; − negative; ? unknown)			
Forest management objective	**Pre-emptive stand management (thinning, prescribed fire)**	**Natural stewardship (little to no management)**	**Post-disturbance management (salvage logging, tree planting, herbicide, site preparation)**	**References**
Procure timber products	+	−	+	Foster & Orwig, 2006; Donato et al., 2013
Reduce fuels near homes and building	+	−	+	J. D. Cohen, 2001; J. Cohen, 2008
Increase empirical understanding of adaptation management with experiments	+	+	+	Powers et al., 2010; Morris et al., 2022
Increase forest carbon storage	−	+	−	Bradford et al., 2012; Donato et al., 2013; Yocom-Kent et al., 2015; Moomaw et al., 2019; Patton et al., 2022
Increase forest structural complexity	+/−	+/−	−	Schwilk et al., 2009, Donato et al., 2013; Miller et al., 2016; Young et al., 2017; Stiers et al., 2018, Shell et al., 2021; Patton et al., 2022
Increase adult tree diversity	−	+	?	Stapanian et al., 1997; Zlonis & Niemi, 2014; Young et al., 2017; Miller et al., 2018; Morris et al., 2022; Patton et al., 2022
Reduce invasive plants	−	+	−	McIver & Starr, 2001; Schwilk et al., 2009; Willms et al., 2017; Fornwalt et al., 2018; Riitters et al., 2018
Reduce insect outbreaks and associated tree mortality	+/−	+/−	+	Foster et al., 2006; Youngblood et al., 2009; Stark et al., 2013; Hood et al., 2016; Knapp et al., 2021; Morris et al., 2022; Leverkus et al., 2021
Reduce impacts from windstorms to structure and composition	−	+	?	Valinger & Fridman, 2011; Sharma et al., 2021; Fortuin et al., 2023
Reduce fire severity and impacts in forests	+/−	+/−	+/−	Raymond and Peterson, 2005; Youngblood et al., 2009; Fraver et al., 2011; Thompson et al., 2007; Yocom-Kent et al., 2015; Bradley et al., 2016; Cansler et al., 2022
Maintain existing tree species composition	+/−	+/−	?	Hood et al., 2016; Knapp et al., 2021; Morris et al., 2022; Sharma et al., 2021
Promote density of tree regeneration	+/−	+/−	+/−	Donato et al., 2006; Schwilk et al., 2009; Donato et al., 2012; Royo et al., 2016; Santoro and

(Continues)

TABLE 1 (Continued)

Forest management objective	Management strategy and outcome (+ positive; − negative; ? unknown)			References
	Pre-emptive stand management (thinning, prescribed fire)	Natural stewardship (little to no management)	Post-disturbance management (salvage logging, tree planting, herbicide, site preparation)	
				D'Amato, 2019; Sutherland et al., 2021
Promote vertebrate diversity	+/−	+/−	−	Thorn et al., 2018; Sutherland et al., 2021
Promote invertebrate diversity	+	+/−	+/−	McIver et al., 2012; Campbell et al., 2018; Thorn et al., 2018; Bladon et al., 2022
Promote understory plant diversity	+/−	+/−	+/−	McIver & Starr, 2001; Lain et al., 2008; Abella & Springer, 2015; Thorn et al., 2018; Santoro & D'Amato, 2019; Sutherland et al., 2021

increase subsequent fire risk and vulnerability to severe wind damage from hurricanes (Fortuin et al., 2023; Raymond and Peterson, 2005). Additionally, "no evidence was found" to assess the effectiveness of mechanically removing understory vegetation for reducing wildfires (Sutherland et al., 2021).

A scarcity of empirical evidence is a notable problem of adaptation management strategies. A recent review article found that "most of the inference about intervention options has been drawn from theory rather than empiricism" (Prober et al., 2019); and according to the latest IPCC report, there is almost no evaluation of the success of adaptation approaches in the scientific literature (Parmesan et al., 2022). Establishing more long-term experiments with adaptation treatments and unmanaged controls (e.g., Morris et al., 2022) would provide much-needed information on this topic.

From an ecological perspective, it is questionable whether it is even desirable or necessary to reduce the frequency and intensity of fire and other disturbances away from human settlements and forests managed for sustained wood production (e.g., Bradley et al., 2016; Kulakowski, 2016). Even moderate to severe natural disturbances promote structural heterogeneity, create biological legacies and unique habitats, and can increase biodiversity (Carbone et al., 2019; Klaus et al., 2010; Santoro & D'Amato, 2019; Shive et al., 2013; Swanson et al., 2011). And while mechanical thinning may mimic some of the habitat benefits of low to moderate severity fires, it does not emulate the important habitat characteristics of high severity fires (Stephens et al., 2012).

1 | REEXAMINING LOSSES FROM NATURAL DISTURBANCE AND ADAPTATION MANAGEMENT

A common rationale for forest adaptation management is preventing future tree mortality, species compositional shifts, and carbon loss from natural disturbances. In some cases, thinning has been shown to reduce subsequent tree death from insects and drought compared to untreated areas, thereby promoting stand resistance and maintaining an existing species composition, while procuring sound timber (Hood et al., 2016; Knapp et al., 2021). However, in other cases prescribed burn treatments increased subsequent tree mortality (Knapp et al., 2021; Stark et al., 2013; Youngblood et al., 2009), and thinning and burn treatments generally promote the spread of invasive plants relative to controls (Schwilk et al., 2009; Willms et al., 2017). Additionally, loss of tree basal area and carbon storage from thinning and prescribed burning is often equal to or considerably greater than tree mortality and carbon loss from the disturbances themselves (Campbell et al., 2012; Hood et al., 2016; Knapp et al., 2021; Powers et al., 2010; Yocom-Kent et al., 2015). As a result, treated stands are not objectively more resistant or resilient to tree mortality or carbon loss—and in many cases are less so—if losses from the management itself are taken into account. Not surprisingly, natural forests in strictly protected areas store greater amounts of carbon, on average, than managed and unprotected areas (Collins & Mitchard, 2017; Moomaw et al., 2019).

In addition to natural forests, forests managed for longer rotations and larger trees also store more carbon than those that are more intensively managed with shorter rotation intervals (Waller & Reo, 2018). This has occurred, for example, on indigenous tribal lands in Wisconsin on which human population densities are low, the corresponding need for timber relatively small, and where old trees and forests are valued (Trosper, 2007; Waller & Reo, 2018). Protected areas and protected areas that overlap with indigenous lands have been shown to support greater connectivity and carbon stocks and have fewer human modifications and impacts (i.e., greater integrity) than adjacent unprotected areas (Parmesan et al., 2022; Sze et al., 2022).

Certainly, insects, disease, wind, and wildfire account for current and future tree death and carbon losses in forests (Thom & Seidl, 2016); however, in many cases disturbances such as insect outbreaks that target dominant tree species result in increased tree diversity in the post-outbreak stand (Morris et al., 2022). Additionally, carbon losses from fire and insects are often much less than models predict. For instance, Lodgepole pine (*Pinus contorta*) forests killed by mountain pine beetles (*Dendroctonus ponderosae*) in the southwestern United States underwent little net flux in carbon for a decade or more because of a cessation of respiration following tree death (Moore et al., 2013). In the Northeastern United States, eastern hemlock (*Tsuga canadensis*) forests killed by (simulated) Hemlock Woolly Adelgid (*Adelges tsugae)* insects maintained aboveground carbon storage, primarily in dead and downed wood, similar to pre-infestation forests (Raymer et al., 2013). With respect to fire, observations revealed that on average less than 5% of live tree biomass burns in western US wildfires when considered across the full range of fire severities (Stenzel et al., 2019). As a result, these authors reported that carbon models overestimate carbon loss from fires by up to an order of magnitude (i.e., a factor of 10) at local scales and by 59%–78% at the regional scale.

Tree declines from increased disturbances also impact non-tree biodiversity, and the direction of the impact (positive or negative) depends on the species guild or taxonomic group in question (Fleming et al., 2021; Thom & Seidl, 2016; Viljur et al., 2022). However, meta-analyses reveal that overall natural disturbances have either significantly positive or neutral effects on biodiversity (Thom & Seidl, 2016; Viljur et al., 2022). Pollinating insects, tree lichens, birds, reptiles, arachnids, and herbaceous plants tend to increase as a result of disturbance (Carbone et al., 2019; Fleming et al., 2021; Viljur et al., 2022), whereas epigeic lichens, mollusks, and mycorrhizal fungi are more likely to decline. Species diversity, on average, peaked at about 60% of forest area disturbed at the landscape scale (Viljur et al., 2022). To put that figure into perspective, the Yellowstone National Park fires of 1988, among the largest wildfires in the western United States, burned 45% of the Yellowstone landscape (Christensen et al., 1989). Additionally, the percentage of forestland in the United States impacted by natural disturbances at any given time over the past 30 years is well below 5%, peaking at about 8%–9% in the western United States (W. B. Cohen et al., 2016). These numbers suggest that biodiversity is unlikely to be reduced at the landscape scale by very large and severe disturbances and may continue to increase in the foreseeable future as natural disturbances become more intense and frequent.

2 | THE BENEFITS OF NATURAL RECOVERY

While often perceived as catastrophic, severe insect outbreaks can result in a decline in subsequent insect attacks for 60 years and result in a decreased (or lack of increased) risk of subsequent fire (Hart et al., 2015; Meigs et al., 2016). Severe fires can also reduce the susceptibility of forests to severe insect outbreaks for ∼100 years (Kulakowski et al., 2012) and in some cases can reduce future fire severity even when fire weather conditions are extreme (Cansler et al., 2022; Stevens-Rumann et al., 2016). Severely burned forests can reburn at high severity (Taylor et al., 2022; Thompson et al., 2007); however, burned areas that were salvage logged and planted with conifer seedlings experienced more severe reburns than burned areas that were left untreated (Thompson et al., 2007). In other words, natural forests have built-in resilience and adaptation capacities following many disturbances. At broad scales the resilience ("capacity to withstand and recover from environmental perturbations"; Forzieri et al., 2022) of natural forest landscapes typically exceeds that of actively managed forests, in large part because of a generally higher structural complexity and tree species richness in the absence of management (Bradley et al., 2016; Forzieri et al., 2022; Miller et al., 2016; Miller et al., 2018). Leveraging this natural capacity of forests to a greater extent via natural stewardship would result in substantial cost and carbon emissions savings by avoiding or reducing pre-emptive and post-disturbance management (Houtman et al., 2013; M. North et al., 2009), resulting in increased protection against species extinctions (Di Marco et al., 2019).

Directed adaptation strategies following disturbances often involve salvage, planting and other site preparation and management to facilitate forest regeneration (Donato et al., 2013; M. P. North et al., 2019). These types of interventions may make sense in forests prioritized for timber production if the goal is to extract resources and more reliably and rapidly regenerate sites that may be distant from seed sources, in challenging terrain, or exposed to suppression from invasive vegetation and intensive ungulate browsing (M. P. North et al., 2019; Ward et al., 2018). However, the evidence is mixed at best for the effectiveness of these interventions. According to the conservation evidence (Sutherland et al., 2021), thinning following wildfire has "tradeoffs between benefits and harms" on tree saplings and understory plants; and the evidence is limited and therefore the effectiveness "unknown" for removing burned trees and mechanically/chemically removing invasive plants to promote understory vegetation and young trees. Additionally, sowing seeds following wildfire is "likely to be ineffective or harmful," and evidence on the effectiveness of planting trees following wildfire is lacking (Sutherland et al., 2021).

In truth, most forests still regenerate without interventions, even after severe natural disturbances (Donato et al., 2016; Pielou, 1991; Santoro & D'Amato, 2019; Shive et al., 2013). In fact, natural regeneration often exceeds active restoration efforts (Cook-Patton et al., 2020; Donato et al., 2006), provides greater genetic diversity than planted seedlings (Swanson et al., 2011), and greater stand-level carbon storage in coarse woody debris (Donato et al., 2013). Additionally, in areas in which there is a general support for large carnivores such as wolves there is naturally reduced browsing pressures by ungulates and greater tree regeneration and diversity of forest understories (Flagel et al., 2016; Waller & Reo, 2018).

Perceived regeneration failures from severe fire, intensive ungulate browsing, or seed source limitations may, in many cases, be patchy or delayed tree regeneration that has other benefits when seedling densities, growth rates, and particular tree species are not primary concerns. As one example, low density regeneration reduces the severity of reburns, facilitating forest recovery (Cansler et al., 2022; Harvey et al., 2016). Heterogeneity of natural regeneration also avoids structural uniformity that occurs with planting and can extend the duration of early successional patches and gaps, there by accelerating the development of spatial and structural complexity (Donato et al., 2012; Reed et al., 2022; Swanson et al., 2011).

3 | CONCLUSION

In sum, we find the current climate adaptation paradigm that is focused on active management to be appropriate within a limited forest management context. In forests prioritized for experimental research, resource production, or safety within the "home ignition zone" of severely fire-prone areas, resisting and directing change with management can, in some cases, provide helpful solutions and useful knowledge about management. Unprecedented disturbances in these areas may necessitate flexible responses as conditions change (i.e., adaptive management). However, outside of these three contexts, accepting change with natural stewardship and exposure to natural disturbances and processes generally increases structural complexity, carbon storage, and tree species and other diversity. These accruing benefits, in turn, make forests more resistant and resilient to many future natural challenges and provide mitigation against climate change. Given the limited resources for actively managing forests, the mixed evidence of management promoting young trees and reducing fire and other risks, and little evidence that we can actively resist or direct change in unknown future conditions better than nature can, protecting more forests with natural stewardship is a cost effective way to harness the inherent adaptation and mitigation powers in forests and ensure that they are at their most functional to regulate planetary processes.

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Declaration of Michele M Dieterich

Pursuant to 28 USC § 1746, I Michele M Dieterich declare the following:

I am over 18 years of age and competent to provide this declaration. I have lived in Montana for 36 years and in the Hamilton area, for the last 12 years. I have been a member of Friends of the Bitterroot (FOB) for ten years.

I am a retired teacher and guide. I take a special interest in native wildflowers, wildlife, and birds that live in the forests that surround my home in the Bitterroot Valley.

Since I moved to the area, I have spent many hours biking, hiking, skiing, backpacking, and mountaineering in the Bitterroot and Sapphire Mountains. I am currently enjoying these activities in the Bitterroot National Forest (BNF) and plan to continue these activities in the area for as long as my body will allow. I hope that will be at least 20 more years. I enjoy the forest for its aesthetic beauty. I enjoy seeing and learning about the native species of plants, trees, birds, and wildlife. It brings me great joy when I see an animal or identify a bird in the wild. Just listening to bird song is enough to bring me a sense of well-being and calm.

I visit the Coulee trail a few times a week throughout the year. I regularly visit many locations in the Bitterroot National Forest including but not limited to Camas Peak, the North Fork of the Bitterroot, the South Fork of the Bitterroot, Baker Lake, Como Lake, Blodgett Canyon, Mill Creek, Willow Creek, Ward Mountain, Tin Cup, South Ward, Lost Horse Canyon, Chief Joseph Pass, and Goat Mountain.

The Programmatic Forest Plan Amendments (PFPA) include elk habitat (EHE), thermal cover, hiding cover, old growth, snag retention, and coarse woody debris (CWD). They will affect the wildlife, birds, and native plants that I enjoy.

I will discuss two recent projects, the Westside Project and Darby Lumber Lands II. I looked at these project areas before ground disturbing actions from the project and I have spent time in the areas after the projects were completed. The following are my observations and two reports.

Westside Project:

The Westside Project included site-specific amendments for EHE and CWD. It did not include an old growth amendment but used Green et al 2011 (Green) to identify old growth stands.

There was an area of old growth that I enjoyed visiting. It was a place where I found solace. My husband and I would just go there and sit and enjoy the many large trees surrounding us and listen to the birdsong. I pointed out the area to BNF personnel during scoping for the project. The silviculturist and the North Zone Biologist walked through the area and claimed it was not old growth. They were using Green minimum screening criteria to eliminate it from old growth status. After the area was cut, my husband did a study of the area using Green minimum screening criteria and found it to be old growth (Attachment 1).

During the summer of 2018 while the logging was in process. I and a group of friends were driving up the Camas Road and were stopped by a logging truck. The gentlemen warned us that a machine was cutting through the project area to get to a unit on this side of the area. We continued up the road and discovered the machine coming out of a steep slope through the unit mentioned above that we identified as old growth using Green. This created deep ruts (Attachment 2)

The BNF must have specific and quantifiable criteria for old growth and mature forests, so no mistakes are made. The PFPA will change the current Forest Plan old growth standards to guidelines. Standards are mandatory constraints while guidelines are constraints without mandate so they can be ignored.

The Amendment's proposed old growth guideline is, "FW-GDL-VEG-01: To promote the retention of old growth (see glossary) and contribute to biodiversity, vegetation management activities in old growth should retain old growth characteristics to ensure structure, function and process, as defined in Green et al. (2011) or new best available scientific information." There are no specific criteria for the BNF to use to identify functioning old growth. Green gives minimum screening criteria for finding potential old growth, it does not provide an exact definition for old growth. This will make it difficult for the BNF to consistently identify old growth across the forest and they have misidentified above mentioned stand during the Westside Project. The amendment says "should" retain instead of "will" retain further loosening the constraint. The guideline also allows the BNF to change how it defines old growth at their discretion without public process by including the last line, "or the new best available science."

I have been to many of the logged units in the Westside project. It makes me sad to wander through the logged old growth area described above and see the ground disturbance and weeds. Depending on the weather, the logged areas can dry out very quickly. By mid to late July, they are usually extremely dry. They are also filled with knapweed, St John's Wort, and other weeds including cheat grass. It is not as pleasant as it used to be to wander through the forest areas that have been logged.

In wintertime, there are few tracks in the open forest. There are many more tracks in the riparian areas and in areas that have not been logged. Year round, it is harder for me to see animals in the wild because there are many logged areas in the elevations that are easily reachable on foot. One reason I moved to the Bitterroot was to have the chance to see wildlife.

A road along Harlan creek built in the Darby Lumber Lands II project (DLLII) is in direct violation of the Streamside Management Zone (SMZ) rules. The DNRC originally fined the forest but retracted the fine due to a memorandum of understanding between the DNRC and the BNF (attachment 2). The EHE amendment will remove constraints for roadbuilding across the forest, and leave it up to the BNF;s discretion. This is a concern because the BNF has a record of violating state-wide protections of streams. I visited the area while logging activities were ongoing. The road had failed right above Harlan Creek and sediment was entering the stream (attachment 3).

I am also concerned for grizzly bears. They are moving into the project area. Two arrived last summer (2022), two others in 2021, one in Bass Creek in 2019, and one was captured on the Stevensville golf course in 2015. Grizzly bears are affected by road densities. Currently, the BNF does not have an amendment to protect grizzly bear habitat. The reducing of constraints on road densities in the project area, will adversely affect grizzly bears and their ability to occupy the Bitterroot Ecosystem.

I moved to the Hamilton area to be near the Bitterroot and Sapphire Mountains and the Selway Bitterroot, the Anaconda Pintler, and the Frank Church River of no Return Wilderness. I enjoy wandering through intact forests and seeing or hearing the wildlife and birds.

I am interested in the preservation of public lands and the benefits they provide to me, my family, and future generations.

If PFPA is put into practice, my enjoyment of the BNF and my opportunities for finding a sense of well-being and calm will be harmed. I worry that my young grand-niece will never experience an intact, biodiverse forest.

I declare, under penalty of perjury, that the foregoing is true and correct to the best of my knowledge.

Michele Dieterich

Michele M Dieterich signed on May 31, 2023

Westside project old growth logging, Bitterroot National Forest

The Forest Service claimed in the Bitterrroot National Forest Westside EA that there was no old growth in any of the Westside project cutting units. However, documents obtained by FOB through a FOIA request showed that a BNF wildlife technician had identified an area in unit 2c (later renamed 2d) as possible old growth, and that the BNF wildlife biologist later disqualified it because of "the presence of old stumps". No stand exam was ever done here, although they did 16 other old growth stand exams on the Westside project, finding no old growth. I then investigated this area and contacted BNF silviculturalist Cheri Hartless, who told me that, on a "walk-through", she had earlier concluded that it was not old growth. Now that many of the trees are cut, it is much easier to determine old growth status by extrapolating the ages/sizes of the cut trees to the remaining ones, with some coring to check these age interpretations.

In this area, I outlined a 25 acre stand of Ponderosa Pine-Doug Fir old growth (90% PP; 10% DF); 21 of those acres were logged as part of unit 2c (later renamed 2d). The old growth map on the last page shows this stand. There was a sort of embayment of 3-4 acres in the old growth that was not old growth, but I included it in the 21 acres anyway because I did not want to gerrymander the boundaries.

The 21 logged acres would have to have 168 trees (8 per acre) over 170 years old and greater than 21 inches in diameter to qualify as old growth under USFS standards (Greene et al, 1992). I counted 185 such trees in the 21 acres , even including the embayment acres that were not old growth. Unfortunately, the Forest Service cut at least 19 old Doug Firs and 20 old Ponderosa pines, reducing the density to 7 per acre and taking this stand out of old growth status, a violation of HFRA. Of course, BNF did not even acknowledge that this stand was old growth, so HFRA laws did not apply! The oldest Ponderosa cut was 269 years, and the oldest Doug Fir that was not hollow was 237 years, although a few hollow ones were probably older. Every single large Doug Fir was cut in this stand, except for 2 marked wildlife trees. According to Cheri Hartless, these Doug Fir "were encroaching on the crop trees and were diseased". Disease can be as simple as a "thinning crown" or root disease nearby (although none had been documented within this old grove). Of course, the crop trees are Ponderosas.

A look at the ages of adjacent trees showed that the Ponderosas and Doug Firs in any given area were almost exactly the same age, suggesting that they grew up together and there was no encroachment by either species. Large areas had 150-year-old Ponderosas and Doug Firs. Because the 150-250 year old trees, of both species, all started growing well before fire suppression started, fire suppression or any other human activity (logging, grazing, etc) had nothing to do with the species composition.

It *was* a classic mixed Ponderosa Pine-Doug Fir Old Growth Forest. Remaining are now 143 old Ponderosas and 2 old Doug Firs (the wildlife trees)--not enough for old growth status. Many other old growth attributes were also lost: I did not examine remaining snags and large dead and downed debris, important components of old growth forests (Kaufmann et al 2007; Green et al., 1992), but it looks like many snags were cut because they were "hazardous". It is also hard to document the damage to the understory, but the amount of ground disturbance is astounding.

The feller-buncher is on tracks and goes everywhere, including steep slopes up to 55% in violation of the Forest Plan and the Westside design criteria, cutting whatever trees are in its way. The tree in the center of the top photo had orange paint on it but was cut anyway because it was in the way. The bottom photo shows the 2-foot-deep ruts left behind. We saw the first knapweed and mullein filling in the tracks left 3 months earlier.

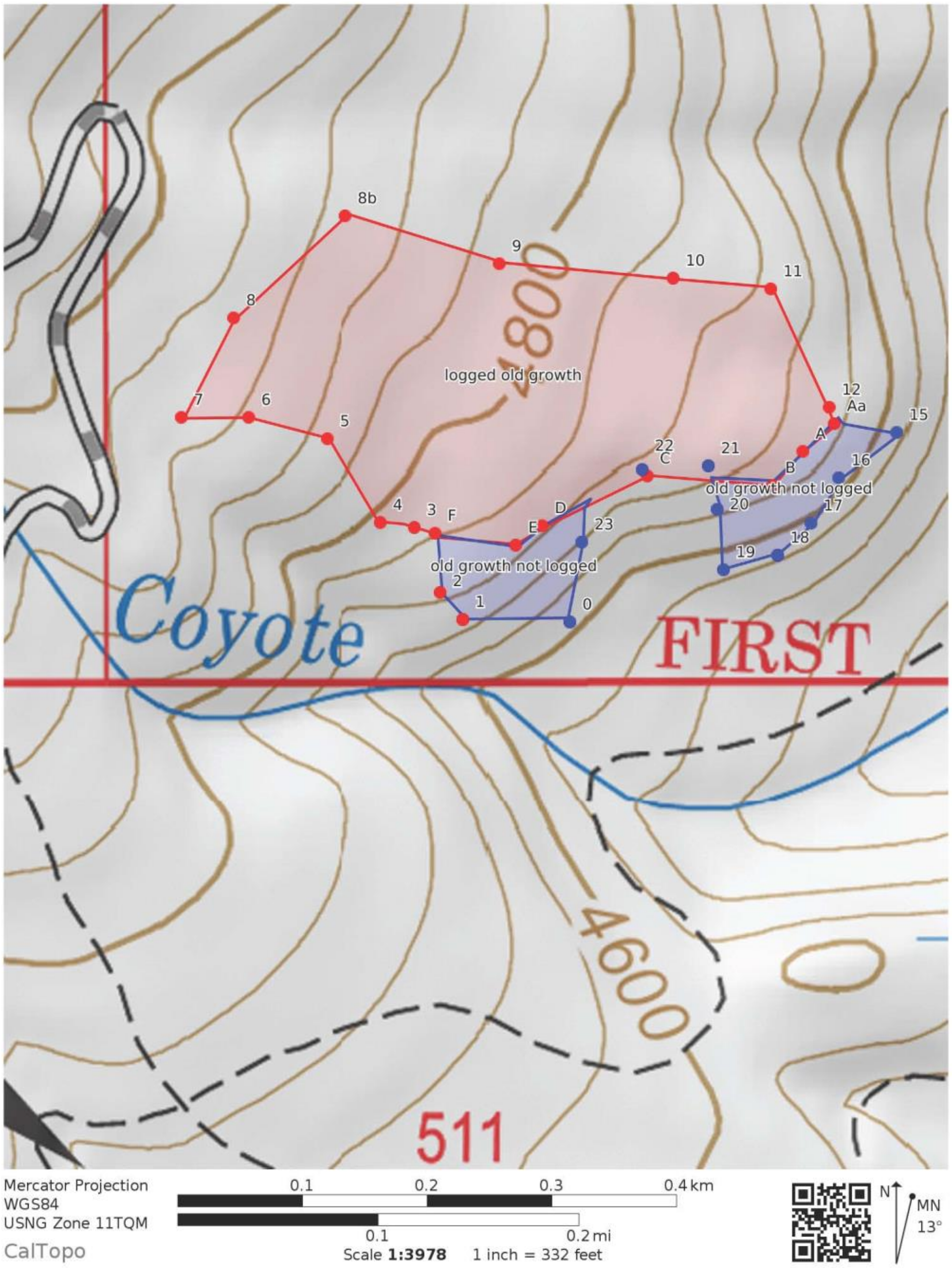
A former BNF wildlife technician had identified this area of fox or coyote dens before the logging. In this view there are at least 4 stumps with 170-230 years of annual rings.

Before and after photos show that the leaning tree that was marked for saving was cut, probably because of its hazard to humans. The tree was hollow, and had 136 annual rings outside the hollow part, so was probably at least 200 years old. There were probably 8 *felled* trees per acre more than 170 years old in the area. The remaining forest may still qualify as OG, but many of its other attributes have been lost.

Before and after photos of an old grove. In this view, there are 9 stumps that ranged in age from 170-218 years old. The remaining large trees are probably of similar age.


Above is the largest Doug Fir in the area before and after. This Doug Fir would have been cut because it has a “thinning top and dead branches throughout the crown” (BNF silviculture), except it was marked as a wildlife tree. Today it still stands but is isolated from any other trees or cover. Does it have the same value for wildlife?

Before and after photos of two large Doug Firs with dwarf mistletoe (BNF). Note boulder next to left one for reference. The one on the right was 190 years old; the one on the left only 150. The new permanent road is directly behind the left one. Note the rocks in the foreground that establish the photo point.



Map showing old growth logged in red and remaining old growth in blue on the Westside project. This was a classic old growth ponderosa pine-Doug fir forest, although every large Doug fir was cut except for two marked as wildlife trees.

July 2018

Machine drives up steep slope in old growth area of the Westside Project during logging operations.

On the Camas Road, we encountered a truck driver at the bottom of the road who warned us that a machine was cutting through the project area and would be coming down the road. We continued up the road and encountered this machine (see photo 1) coming up out of the old growth stand that BNF did not identify as old growth and heading down the road.

Photo 1: Machine that cut through the project area through the old growth stand.

We stopped to see the area and found deep ruts pictured below (photo 2-4).

Photo 2: The area where the machine climbed onto the road.

Photo 3: Deep ruts from the machine

Photo 4: Fresh, deep ruts from the machine with person for scale.

These deep ruts on the steep slope were reported to the soils person on the BNF. He inspected the area and claimed that it was acceptable disturbance.

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

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April 6, 2021

Mr. Eric Winthers
District Ranger
Darby Ranger District
U. S. Forest Service
712 N. Main St.
Darby, MT 59829

Re: SMZ Violation on Roan Creek.

Dear Eric,

Regarding the Notice of Violation and Repair Order sent to the Forest Service via certified mail and received on December 9, 2020, the Office of General Counsel and our DNRC attorneys now agree and have clarified that the DNRC does not have authority to assess fines on the Forest Service for a Streamside Management Zone (SMZ) violation under the MOU dated September 27, 2016 (FS Agreement No. 16-MU-11015600-003). The Notice and Order along with the associated penalties are hereby officially and formally withdrawn. At your earliest convenience please destroy the Notice of Violation and Repair Order sent to you.

We appreciate that this process has resulted in the Forest Service putting a higher priority on determining whether, under the September 2016 MOU, an Alternative Practice, (AP), is needed for planned work. Improved communication within the various Forest Service sections and with the DNRC can eliminate this type of situation going forward. The request of an AP in this case would have resulted in the same work being allowed but with sideboards and mitigation measures clearly spelled out, avoiding any potential violation of the Montana SMZ Law. If the Forest Service believes an AP may be needed, an ideal protocol would be to contact the DNRC Service Forester early in the process so a review can take place and the AP prepared and ready to be implemented well before any on-the-ground work takes place.

Protecting the water resource is the prime objective of the Montana SMZ Law. By working together to address these questions of what is needed before proceeding with the work we will all benefit. DNRC appreciates the high level of cooperation in this investigation. This case is closed.

Sincerely,

Roger M. Ziesak
Forest Practices Program Manager
MT Dept. of Natural Resources & Conservation

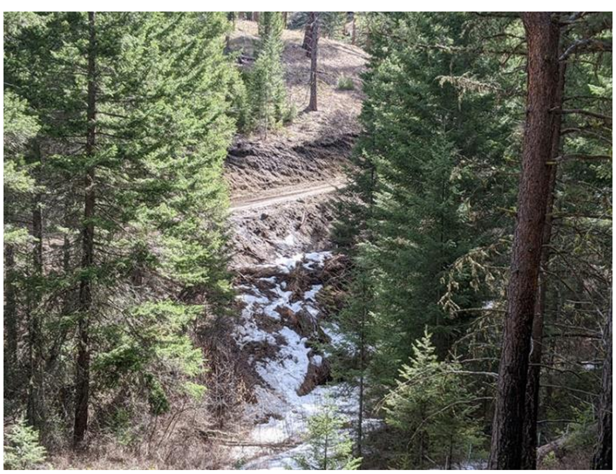
Friends of the Bitterroot - Darby Lumber Lands Phase II Implementation Monitoring Report

DLL2 Design Features ignored:

On April 1, 2021, members of Friends of the Bitterroot explored a rumor that logging operations were proceeding in March as is prohibited in the design features mandated in the project, the forest plan and the contract signed by Pyramid Lumber.

Our first concern was the Roan Gulch “road” that had long become a well vegetated trail that had been reconstructed paralleling the stream with 25 feet of the waterway. This is in violation of the Montana Streamside Management Zone Regulations.

We entered the project area from the opposite side of Roan Gulch. One can see the road cut through the trees and the stream below.



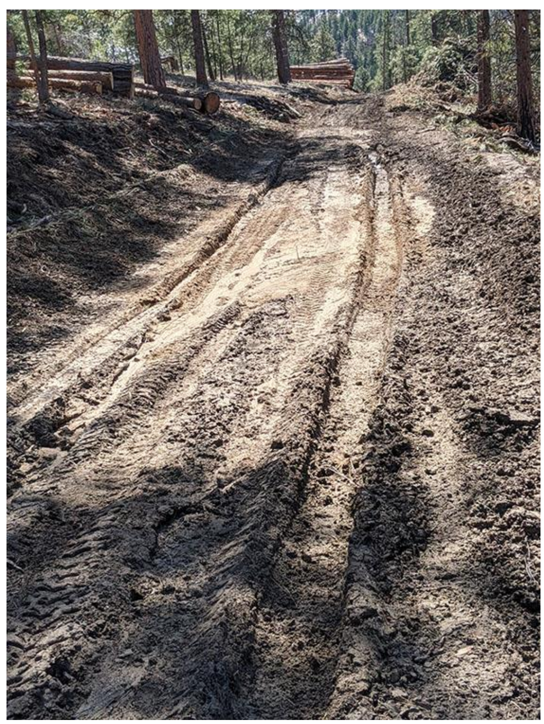

The road is too close to stream. Reconstructing it, removing all vegetation, and widening it is illegal. This illegal reconstruction, accompanied by logging operations and log hauling during spring melt will cause problems for Roan Gulch into the future.

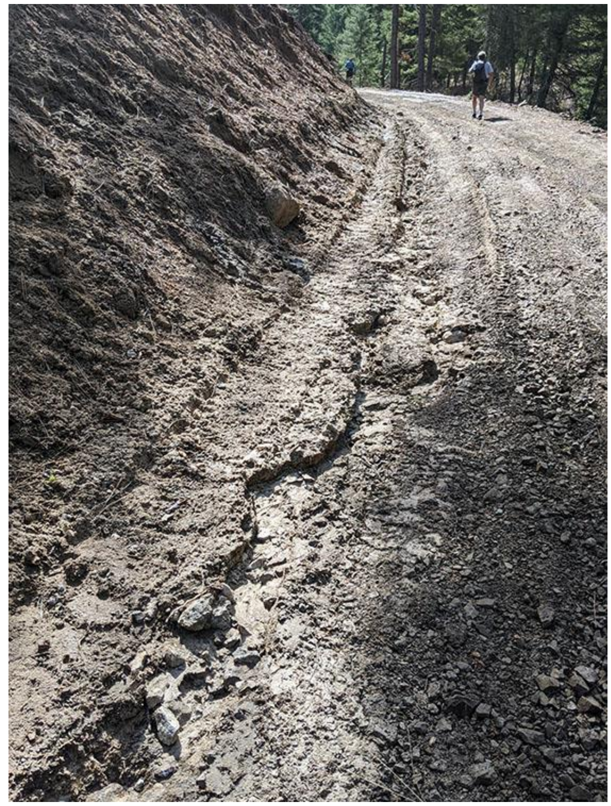

Rocks and debris were dumped onto the steep slope just above the stream.

Along the road we saw evidence of pooling and deep rutting from vehicles associated with spring melt conditions.

Further down Roan Gulch paralleling the stream we came upon a road failure with a strawbale thrown into the path of sediment rushing into the stream.

Road damage was apparent on the new system road switchbacking above Road Gulch and another road failure, this one with logs seemingly laid across the break in the edge of the road.





Sediment pooling.

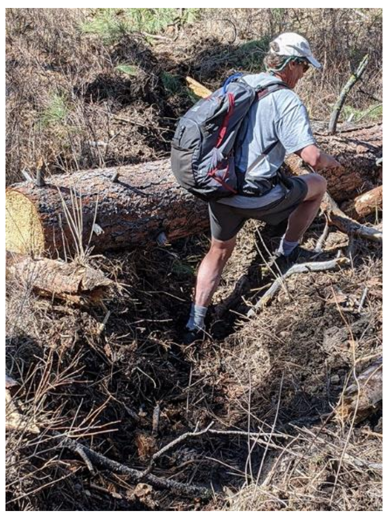

Road failure with logs piled in break in roadway from two angles.

We also found numerous ruts in the landscape deeper than 2 inches.





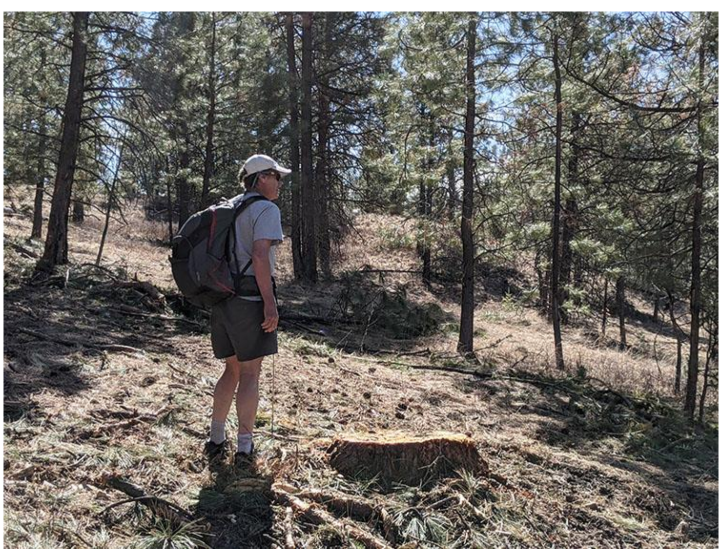
We also found slopes over the 40% limit for machine work including the following 44% slope with a deep rut in the lower part of the slope.



A number of ruts were found on slopes over 40% like this one. In the small area we visited, we found 3 slopes, 43%, 44%, and 45% with evidence of ground based logging.

Soil was disturbed throughout the area due to ground base logging operations in wet conditions.

We found that large trees were taken and smaller trees left behind. This is not a forest resilient to disease and fire. The trees removed have withstood the test of time. Though we are often told that these projects will retain large trees.



A large stump surrounded by small diameter trees

This slope is filled with small diameter trees that will be susceptible to fire and clumping as recommended by Andrew Larsen is not evident. The tree in the foreground is surrounded by cut stumps.

These trees look stressed from machine damage, not resilient to insects, disease and fire.

Declaration of Michael Hoyt

Pursuant to 28 USC § 1746, I, Michael Hoyt, declare:

1. I am over 18 years of age and competent to provide this declaration.
2. I have been a member of Friends of the Bitterroot (FOB) for many years.
3. I live in the Bitterroot Valley, Ravalli County, Corvallis, MT. I am an environmental researcher, photographer, and author of three guidebooks for specific areas in the Bitterroot National Forest (BNF). I have hiked, climbed, skied, taken photographs, and performed research in the Bitterroot and Sapphire Mountains for almost two decades.
4. I am continuing to visit places in the Bitterroot and Sapphire Mountains and will do so during the remainder of 2023 and subsequent years for as long as I am able. I begin outings into the BNF from trail heads and other publicly available access points to enjoy the flora and fauna and for recreation and research, all of which provide me with aesthetic pleasure.
5. For example, I regularly hike and climb in multiple locations in the Bitterroot Mountains (e.g., Blodgett Canyon, Mill Point, Gash Point, Bear Creek Overlook, Sweeney Peak and Canyon, Lost Horse Canyon, Canyon Lake and North Canyon Peak, Camas Lakes and Peaks, Downing Mountain, Rock Creek Canyon, Lolo Peak, Soda Spring Canyon, Bass Creek Canyon and Larry Creek, Kootenai Canyon, Saint May Peak, Little Saint Joe Peak, Big Creek Canyon, Fred Burr Canyon, Sheafman Canyon, Sawtooth Canyon, Roaring Lion Canyon, Ward Mountain, Tin Cup Canyon, Chaffin Canyon, Trapper Creek Canyon, Boulder Canyon, Trapper Peak Area, Warm Springs Area, Piquett Creak Area, Piquett Peak, etc.) and in the Sapphire Mountains (e.g., Burnt Fork Lake Area, Willow Creek Area, Blacktail Point Area, Kent Peak Area, Weasel Creek Area, Bald Top Mountain, Schultz Saddle Area, Chief Joseph Pass Area, etc.)
6. The stated purposes of the Forest Plan Amendment Package (FPAP) being proposed by the Bitterroot National Forest is to:
   - Apply the best available science to elk habitat,
   - Apply the best available science to manage old growth, and
   - Rectify inconsistencies in the Forest Plan regarding coarse woody debris and snags.
7. Based on the aftereffects of previous projects that contained some version of these proposed Forest Plan amendments, I believe the actual intent of the FPAP is to, bypass NEPA and NFMA analysis requirements, reduce meaningful public participation in future planning processes, and enable an increase in the amount of timber removed from the BNF on an annual basis.
8. Therefore, the FPAP will ease the BNF's acquisition of federal funding set aside for "vegetation management" alleged, but only supported by questionable verification, to

reduce natural disturbances (i.e., wildfire, insects, and disease). Hence, the BNF has an overriding financial interest in the FPAP.

9. Those objectives are to be accomplished by removing numerous Forest Plan "standards," each of which either mandate or eliminate specific management activities, and, replacing them with "guidelines" which have historically been treated by the Agency as little more than suggestions.
10. I reside in Montana's Bitterroot Valley because of its proximity to the National Forest, Wilderness, mountains, abundant wildlife, and the richness of natural ecosystems not diminished by human interference.
11. I have a long-term interest in the preservation of public lands and the benefits they provide to the natural environment, wildlife, and humanity.
12. If the FPAP is enacted, my recreational, aesthetic, and research will be imminently harmed.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed on June 2, 2023.

Michael Hoyt

Declaration of Jeff Lonn

Pursuant to 28 USC § 1746, I, Jeff Lonn, declare:

1. I am over 18 years of age and competent to provide this declaration.
2. I have been a member of Friends of the Bitterroot (FOB) for many years.
3. I live in the Bitterroot Valley, Ravalli County, Hamilton, MT. I work as a research geologist, and am also a volunteer environmental researcher, an avid backcountry skier, birdwatcher, hiker, backpacker, and whitewater boater. I spend part or all of almost every day, year-round, in Bitterroot National Forest (BNF), and have been doing so for many years. BNF is where I go to for recreation and research, to find solitude in wild country, and to enjoy the aesthetics of forest ecosystems that have not been degraded by humans. I reside in Montana's Bitterroot Valley because of its proximity to the National Forest, Wilderness, mountains, abundant wildlife, and the richness of natural ecosystems not diminished by human interference.
4. I am continuing to visit places in the Bitterroot and Sapphire Mountains and will do so during the remainder of 2023 and subsequent years for as long as I am able.
5. The proposed BNF Forest Plan Amendment (FPA) will change the definition of old growth (Green et al, 1992) and use that definition to manage old growth. Management direction for old growth was not the intent of Green et al (1992). However, many other scientists have given management direction (for example, Yanishevsky; 1994; Hessburg et al., 2015; Fielder et al., 2007a,b; Wales et al., 2007; Rapp, 2003) and all recommend retaining all or nearly all old or large trees. They recommend that roads fragmenting habitat not be built, yet the FPA also proposes to change elk habitat protections, allowing higher road densities. The proposed FPA also changes standards for snags and coarse woody debris. The FPA removes standards for all these issues and replaces them with guidelines that are weaker and not enforceable.
6. In short, the FPA weakens protections for wildlife and for wildlife habitat. Because site specific amendments nearly identical to the proposed FPAs have been repeatedly attached to many timber projects, it is logical to conclude that these amendments will ease approval for timber projects.
7. All previous timber projects had the purpose of "improving resilience to disturbances such as wildfire, insects, and disease." But the biggest disturbance in all these projects has been the logging, and the result is always fragmentation of habitat by roads, removal of wildlife hiding and thermal cover, degradation of habitat, an exponential increase in invasive weeds, and a big increase in illegal motorized activity. None that I know of have ever improved the forest ecology; all have impaired it.

8. I am familiar with the results of recent timber projects, the Hayes Creek, Como, Westside, and Darby Lumber Lands 2, and in all cases they severely degraded wildlife habitat and the natural environment. For example, on the Westside project, the majority of a 25-acre old growth ponderosa pine-Doug fir forest was logged, with BNF never acknowledging that it was old growth. This was a place I had visited often, now severely degraded.
9. The proposed FPAs will result in further diminishment of my enjoyment of BNF. For example, the photo below shows an area I visit daily. It was identified on Westside project documents as old growth, presumably because it met the standards for old growth in the 1987 BNF Plan. As you can see from the photo, it contains many large trees over 2 feet dbh (mostly PP + some DF), big logs on the ground, large snags, structural and species diversity, and an intact native ground cover including abundant mosses and lichens. It surely functions as old growth. However, these trees may not meet the age requirement of 170 years of Green et al (1992), and so while they were protected under the 1987 Forest Plan, they will not be under the new FPAs. If this area becomes eligible for logging (so-called management), my almost daily visit to this area will be ruined.

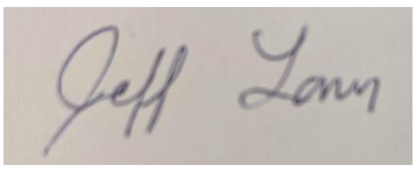
10. Many studies found that logging increases atmospheric carbon dioxide over just leaving the forest alone to adapt naturally (Bartowitz et al., 2022; Campbell et al, 2011; Harris et al, 2016; Law and Warring, 2015; Law et al, 2017; Reinhardt and Holsinger, 2010; Stenzel et al, 2019). Because the proposed FPA is designed to increase logging, it will also increase

atmospheric carbon dioxide, leading to further climate change, which here in the Bitterroot region, means hotter and drier summers, with more wildfires. I’m tired of the heat and smoke; aren’t you?

11. I have a long-term interest in the preservation of public lands and the benefits they provide to the natural environment, wildlife, and humanity.
12. If the FPA is enacted, my recreational, aesthetic, and research will be imminently harmed.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed on June 2, 2023.



Jeff Lonn

Hamilton, Montana

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