COLORADO
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Department of Natural Resources

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January 26, 2017

Grand Mesa, Uncompahgre and Gunnison National Forests
Attn: Plan Revision Team
2250 South Main Street
Delta, CO 81416
gmugforestplan@fs.fed.us

RE: Grand Mesa, Uncompahgre, and Gunnison National Forests At-Risk Species Assessment

Dear Plan Revision Team:

Thank you for the opportunity to participate in the Assessment Phase of the Grand Mesa Uncompahgre Gunnison National Forest (GMUG) Plan Revision project. Colorado Parks and Wildlife's (CPW) statutory mission is *to perpetuate the wildlife resources of the state, to provide a quality state parks system, and to provide enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to serve as active stewards of Colorado's natural resources*. This mission is implemented through our 2015 Strategic Plan[1] and the goals it embraces which are designed to make CPW a national leader in wildlife management, conservation, and sustainable outdoor recreation for current and future generations.

CPW is concerned that the Assessments released to date by GMUG staff, including the At-Risk Species, Terrestrial Ecosystems, and Aquatic Ecosystems Assessments do not directly assess or address the specific challenges associated with managing populations of game and non-game species that are not Federally-listed or considered "at-risk" of persistence in the planning area. The USDA Forest Service Handbook (FSH) 1909.12, Chapter 20, Section 23.23b – Fish, Wildlife, and Plants, notes that the planning rule requires that the plan revision include standards and guidelines for integrated resource management to provide for ecosystem services and multiple use [including wildlife and fish], and that the plan components include:

> *Habitat conditions, subject to the requirements of 219.9, for wildlife, fish and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence and other activities (in collaboration with federally recognized Tribes, Alaska Native Corporations, other Federal agencies and State and local governments). (219.10(a)(5)).*

The same key ecosystems, special habitat features, and risk factors identified in the At-Risk Species Assessment also affect game and non-game species managed by CPW and our ability manage these species to achieve CPW's statutory mission of providing sustainable wildlife-

[1] Colorado Parks and Wildlife 2015 Strategic Plan (November 2015)
http://cpw.state.co.us/Documents/About/StrategicPlan/2015CPWStrategicPlan-11-19-15.pdf

related recreation for the public. With this in mind, CPW has provided specific comments for both at-risk and other species of interest, where applicable, throughout the Draft At-Risk Species Assessment (December 2017). In addition, we have provided additional comments on related assessments that were released in November 2017 and updates to the Draft Rocky Mountain Elk Species Assessment that was completed in 2005.

Draft Rocky Mountain Elk Species Assessment (2005)

CPW recognizes the efforts by GMUG staff to prepare and update the elk species assessment during previous plan revision efforts. Since 2005, elk population trends and recruitment rates on the GMUG have changed substantially. CPW has provided updates on population trends and recruitment rates in Attachment 1 – CPW Recommended Updates to 2005 Elk Species Assessment. Due to the public interest in elk on the GMUG, and the local and national significance and economic importance of Colorado's elk herd, CPW recommends designating elk as a Species of Interest and/or Focal Species for the plan, and incorporating specific plan direction and standards and guidelines for elk habitat management as described below and in Attachment 1.

Draft At-Risk Species Assessment (December 2017)

Page 1, Introduction: CPW agrees that the large populations of mule deer and elk on the GMUG attract large numbers of hunters which in turn provides significant sustainable economic benefits to business and communities in and around the GMUG. Please note that some of the economic benefits generated by these wildlife populations are attributable to watchable wildlife viewing and non-hunters.[2] In addition to widespread birding opportunities, deer, elk, Rocky Mountain and desert bighorn, moose, and Gunnison sage-grouse are all desired watchable wildlife species.

Page 2, Assessment 5 Development Practices: CPW is concerned that a management approach focused only on plan components that provide for broad ecosystem integrity and ecosystem diversity may not be sufficient to maintain the desired distribution and abundance of native species in the planning area given current trends and risk factors, particularly greatly expanded recreational use, habitat fragmentation, and wide-spread rapid forest conversion from disease and climate change. For species with known habitat requirements and population objectives, CPW recommends incorporating an adaptive management approach and specific habitat-oriented standards and guidelines such as those incorporated in the recommended updates for the Draft Rocky Mountain Elk Species Assessment 2005 (Attachment 1).

Page 5, Use of Best Available Science: Please incorporate CPW's State Wildlife Action Plan (SWAP) and reference this document, where appropriate, throughout the At-Risk Species Assessment.
http://cpw.state.co.us/Documents/WildlifeSpecies/SWAP/CO_SWAP_FULLVERSION.pdf

[2] U.S. Fish and Wildlife Service, Division of Economics. 2014. Wildlife Watching in the U.S.: The Economic Impacts on National and State Economies in 2011 Addendum to the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Report 2011-2. 16 pp. Arlington, VA

Page 10, Alpine Uplands: CPW recommends incorporating a description of ongoing range health monitoring and rangeland health standards for alpine uplands on the GMUG. In addition to the at-risk species identified, elk rely heavily on alpine environments in the summer and fall, and disturbance or degradation of these habitats from recreational development, climate change, and other stressors may dictate reproductive success in female elk and negatively affect growth and development of elk calves[3]. Note that in addition to increased OHV use, CPW staff are seeing a dramatic increase in foot traffic in alpine environments on the GMUG.

Page 14, Sagebrush Shrubland: CPW supports expanded weed management programs across these habitats. CPW is particularly concerned with cheatgrass infestations on big game winter ranges which can greatly decrease forage availability for big game and other species, including Gunnison sage-grouse. CPW agrees that cheatgrass infestations are likely to increase the frequency and severity of fire, and decrease the resiliency of this ecosystem.

Page 15, Spruce-Fir, page 16, Spruce-Fir-Aspen; page 17, Aspen, and page 28 Cottonwood Riparian Woodlands: Please add hoary bat to the general community type in these tables. It is noted from these habitats on page 52.

Page 19, Cool-Moist Conifer: American marten are partial to mesic conifer forest with dense canopy cover. Please add American marten to this table either under general or in its own community (canopy cover >30%).

Page 20, Warm-Dry Mixed Conifer and page 22, Ponderosa Pine: Please add hoary bat and fringed myotis to general community type. Townsend's big-eared bat could be added to general lists as well or to areas with cliff/rock crevices.

Page 23, Pinyon-Juniper: Please remove hoary bat from general community type. Note that they would occur in cottonwood riparian woodlands (p. 28) when it runs through PJ but not in PJ forest alone. Please also add fringed myotis and Townsend's big-eared bat to PJ table under general community type. Please add peregrine falcon to PJ table either under general or to cliffs. Add spotted bat under cliffs.

Pages 24-28, Riparian and Wetland Ecosystems, and pages 28-30, Aquatic Ecosystems: The Assessments that have been released make multiple references to grazing as it relates to riparian and aquatic health. Please include livestock grazing as an anthropogenic stressor listed for each of the Riparian and Wetland Ecosystems and Aquatic Ecosystems discussed.

Page 26, Montane-Alpine Wet Meadows and Marshes, and page 27, Montane-Subalpine Riparian Shrublands: Please include White-tailed ptarmigan in these tables.

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[3] Cook, R. C., Cook, J. G., Vales, D. J., Johnson, B. K., Mccorquodale, S. M., Shipley, L. A., Riggs, R. A., Irwin, L. L., Murphie, S. L., Murphie, B. L., Schoenecker, K. A., Geyer, F., Hall, P. B., Spencer, R. D., Immell, D. A., Jackson, D. H., Tiller, B. L., Miller, P. J. and Schmitz, L. (2013), Regional and seasonal patterns of nutritional condition and reproduction in elk. Wild. Mon., 184: 1–45. doi:10.1002/wmon.1008

Page 28-29, Aquatic Ecosystems, Rivers and Streams: "*Non-native fishes are economically and recreationally important on the GMUG, but still have detrimental impacts on native species through hybridization, predation, and disease transmission*." This sentence under-represents CPW's efforts and progress at responsible recreational fisheries management. Please consider rewording to state "*Non-native fishes are economically and recreationally important on the GMUG, but may have detrimental impacts on native species through hybridization, predation, and disease transmissio*n." CPW recommends adding a final sentence that reads "*Future management of non-native recreational fisheries on the GMUG should be conducted in cooperation with CPW to minimize detrimental interactions with native fisheries*."

Page 29, Rivers and Streams: Black swifts are strongly associated with cliffs with crevice access and often waterfalls which is generally limited habitat. Being placed under the general community type for rivers and streams may not be adequate. A waterfall habitat type is justified in the Table on p. 29.

Page 31, Non-Alpine Rock Outcrops and Cliffs: Please add spotted bat and fringed myotis to general community type for cliffs table. Please add black swift under new habitat type of waterfalls.

Pg. 32, Non-Alpine Rock Outcrops and Cliffs: Wildlife is impacted by both recreational climbers and hikers. Many hiking trails are routed below, above, or even through rock out crops. Please add hikers and hiking trails to this discussion.

Page 32, Snags and Down Woody Material: Please add fringed myotis to snags community type.

Page 34, Prey: CPW recommends listing wolverine as Associated At-Risk Species within the Prey – Small Mammals Ecosystem Feature table.

Page 35, Risk Factors - Small Isolated Populations: CPW recommends adding bighorn sheep to the list of species on p.35 with small and isolated populations at risk. Small isolated populations of bighorn sheep on the GMUG are at risk from genetic drift, stochastic events, anthropogenic disturbance, and disease events that lead to all age-class die offs.

Page 37, Risk Factors – Disease: Although mule deer and elk are not considered Species of Conservation Concern (SCC), please include in your assessments for big game a discussion of the risk that Chronic Wasting Disease (CWD), epizootic hemorrhagic disease, and blue tongue have for big game populations on the GMUG, especially mule deer.

Page 37, Risk Factors - Disease: White Nose Syndrome (WNS) has not been shown to impact Townsend's close counterparts back east, so it is not known yet what it will do in the west. Please add fringed myotis (a FS Sensitive Species) to this list. Even though the little brown myotis is not currently listed as a FS Sensitive Species it is undergoing 12 month findings by USFWS and is on the CPW SWAP list as a Tier 1 species due to the high potential of impact from WNS and massive die-offs seen in parts of its range where the disease exists. CPW recommends including little brown myotis on this list.

Page 38, Risk Factors – Hunting or Other Intentional Mortality: This section is awkward. Legal hunting should not be labeled a risk factor in the context of species persistence in the planning area due to CPW's statutory mission to perpetuate wildlife and maintain sustainable wildlife-related recreation for future generations. Please consider rewording or removing legal hunting from this discussion. Please add Gunnison sage-grouse to the list of species potentially impacted by intentional mortality.

Page 39, Risk Factors - Habitat fragmentation: Add "and degradation" to this risk factor heading. For your assessment of big game, deer and elk are species impacted by loss of functional habitat through fragmentation and degradation.

Page 39, Risk Factors - Habitat Fragmentation: CPW agrees that "Habitat fragmentation and connectivity is a complex and species-specific issue." Research efforts have been able to document the degree that mule deer and elk avoid roads and trails and how these features impact habitat connectivity.[4,5,6,7] For species with well-documented sensitivity to landscape features known to fragment habitat (e.g. roads and trails), CPW recommends incorporating specific standards and guides to minimize the impacts of these features and maintain habitat function. CPW also recommends annual monitoring of travel management plan implementation and incorporating adaptive management principles (soft and hard triggers) to meet habitat functionality objectives in a changing landscape.

Page 40, Risk Factors - Invasive or Non-Native Terrestrial Species: Bighorn sheep are a potentially impacted species, particularly on low-elevation winter ranges that are stricken with cheatgrass. The Almont Triangle on the Gunnison RD is a good example where cheatgrass is proliferating and diminishing the quality of winter range habitat for bighorn sheep. Please add bighorn sheep to this table.

Page 40, Risk Factors - Livestock and Wildlife Grazing, Browsing, and Trampling: Note that disease transmission from domestic livestock to the Rocky Mountain Bighorn sheep population in the Uncompahgre Wilderness is a concern for CPW. Please reference the USDA Forest Service (FS), Bureau of Land Management (BLM), Colorado Department of Agriculture (CDOA), Colorado Woolgrowers Association (CWGA) and CPW Memorandum of Understanding (MOU) for the Management of Domestic and Bighorn Sheep in Colorado.[8]

Page 42, Risk Factors - Vegetation Management and Alteration: Please add Abert's squirrel to the list of species potentially impacted by timber harvest (ponderosa pine). In addition, please add all bat species to the list of species potentially impacted by general herbicide use (spotted, fringed, Townsend's), and add fringed myotis to species impacted by Wildland fire.

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[4] Rost, G. and Bailey, J. distribution of mule deer and elk in relation to roads. The Journal of Wildlife Management 43(3), 634-641. 1979. Allen Press.

[5] Nietvelt, C.G. 2002. The effects of roads on wildlife: bibliography. Report prepared for U.S. Forest Service Bridger-Teton National Forest, Jackson, Wyoming. 73 pp.

[6] Preisler, H. K., A. A. Ager, and M. J. Wisdom. 2013. Analyzing animal movement patterns using potential functions. Ecosphere 4(3):32. http://dx.doi.org/10.1890/ES12-00286.1

[7] McCorquodal, S.M. 2013. A brief review of the scientific literature on elk, roads, and traffic. Washington Department of Fish and Wildlife.

[8] USDA FS, USDI BLM, CDOA, CWGA, and CPW. 2014. Memorandum of understanding for management of domestic sheep and bighorn sheep. 4pp.

For your assessment of mule deer and elk, please note that removal of shrub/broad leaf habitat can impact mule deer.

Page 43, Risk Factors – Recreation (Non-Hunting): CPW recommends adding helicopter-based recreation, primarily used for heli-skiing operations, as a risk factor for white-tailed ptarmigan, Canada lynx, brown-capped rosy finch, mountain goat, bighorn sheep, and for elk due to increase disturbance and energy expenditure during winter. Please add golden eagle, spotted, fringed, and Townsend's bats, and black swift to species potentially impacted by rock climbing. In addition, please add boreal toad and Gunnison sage-grouse to the list of species potentially impacted by illegal off-road/trail motorized vehicle use.

CPW recommends adding all types of trail-based recreation (not just alpine foot travel) and both trail-based and dispersed over snow travel to your list of recreation risk factors to wildlife. For your assessments for big game, note that CPW considers widespread impacts from non-hunting recreation a threat impacting CPW's ability to maintain wildlife populations on the GMUG. Please see our December 8, 2017 comments on the Recreation, Socioeconomic, and Terrestrial and Aquatic Ecosystem Assessments released in November 2017. Also note our comments on the Rocky Mountain Elk Species Assessment Draft completed in 2005 (Attachment 1), including specific recommendations on route densities and seasonal closures to help minimize these impacts.

Page 44, Species Not Recommended as Potential Species of Conservation Concern: While CPW recognizes that mule deer and elk are not currently at risk of long-term persistence in the planning area, in order to address existing landscape-scale threats and maintain resilient wildlife populations and related recreation opportunities on the GMUG, CPW strongly encourages GMUG to designate mule deer and elk Species of Interest and as Focal Species for developing specific plan components, including standards and guides that address the habitat needs of these species. For elk, see our comments (Attachment 1) on the Rocky Mountain Elk Species Assessment Draft completed in 2005. CPW can provide additional standards and guides recommendations for mule deer.

Page 45, Table 2, Species considered, but not currently identified as potential SCC:

- Golden eagle: CPW raptor database shows 9 records on the GMUG, some on each Forest, for this species. Golden eagle nest locations are fairly well documented and quality nesting habitat does not appear to be limiting on the GMUG.
- Cassin's finch: Considered a Tier 2 species in CPW's SWAP, currently indicated as "none" under state status.
- Grace's warbler: Tier 2 species from SWAP plan under State Status.

Page 50, Table 3, Species considered that are Regional Forester's Sensitive Species for Region 2, but are not currently recommended as potential SCC:

- Black swift: CPW recommends identifying instances of occurrence and generally evaluating the security of appropriate habitat (waterfalls) in order to make a non SCC determination. Habitat for this species is limited in nature and birds show high site fidelity, so they could be vulnerable to disturbance and may need targeted protection and management efforts.

- Hoary bat: CPW bat database shows 34 records for this species scattered across the forest, most of which have been collected in the last 20 years. The species should be common based on suitable habitat on the GMUG. Updated information on this and other bat species is coming out in February 2018 in the Colorado Bat Conservation Plan.
- River otter: This is a Tier 2 species in CPW's SWAP plan. CPW publicly available species activity data may need to be updated for this species.

Table 4, Draft potential species of conservation concern and evaluation criteria:

- Purple martin: This is a Tier 2 species in CPW's SWAP plan.
- Townsend's big-eared bat: A second record is identified in the CPW bat database from a mine on the Uncompahgre. This bat likely occurs across much of the GMUG based on recent modeling efforts but is elusive to capture. Notable colonies of these bats have been confirmed using similar habitat in close proximity to the GMUG. This is the most commonly identified bat species in abandoned mines and caves in Colorado and the Western U.S. Updated information on this and other bat species is coming out in February 2018 in the Colorado Bat Conservation Plan.

Page 70, Economic Sustainability of At-Risk Species: Bighorn sheep hunting licenses are administered by CPW through a drawing system. Interested hunters apply for the license they wish to receive and are awarded the license if they are successful in the drawing process. A resident sheep license costs $254, and a non-resident pays $2,149 for a bighorn license. It often takes 10-15 years for a hunter to be successful in drawing a bighorn ram license. This is due to incredibly high demand for bighorn ram hunting opportunities and a relatively small amount of available licenses due to the limited size of the population. In 2017, there were 17,739 applicants for 296 Rocky Mountain bighorn sheep licenses in Colorado.

In addition, CPW provides one sheep raffle license and one by sheep auction license each year. Funds generated from these licenses go to support bighorn management projects throughout the State. The 5-year average gross revenue for the annual auction license is $105,000 and for the raffle license is $88,600. The economic value of these licenses demonstrates the demand for bighorn sheep hunting and viewing opportunities and the importance that maintaining populations of this species has to Coloradans and visitors to our State.

Page 71, Forest direction goals for fish and wildlife were to: CPW recommends maintaining in the revised plan the forest direction goal to increase National Forest System winter range carrying capacity for elk and deer, but please note that recent research indicates a need to also incorporate forest direction and functional habitat standards for summer range and habitat connectivity to maintain the health of big game populations.[9,10]

[9] Cook, R. C., Cook, J. G., Vales, D. J., Johnson, B. K., Mccorquodale, S. M., Shipley, L. A., Riggs, R. A., Irwin, L. L., Murphie, S. L., Murphie, B. L., Schoenecker, K. A., Geyer, F., Hall, P. B., Spencer, R. D., Immell, D. A., Jackson, D. H., Tiller, B. L., Miller, P. J. and Schmitz, L. (2013), Regional and seasonal patterns of nutritional condition and reproduction in elk. Wild. Mon., 184: 1–45. doi:10.1002/wmon.1008

Page 72, Forest Plan Consistency with External Plans for Wildlife and Other Species: Big game populations in Colorado are managed by CPW to achieve population objectives establish for Data Analysis Units (DAUs). Each DAU encompasses the geographic area that represents the year-round range of a big game herd and includes all of the seasonal ranges of a specific herd. CPW prepares DAU plans (herd management plans) to integrate CPW's management goals with the concerns and ideas of land management agencies and the interested public to attempt to balance the biological capabilities of the herd and its habitat with the public's demand for wildlife recreation opportunities. The primary decisions in each DAU plan that drive management actions are how many animals should exist in the DAU (population objective) and what is the desired sex ratio for the populations (e.g., the number of males per 100 females) in order to maintain a resilient population and wildlife recreation opportunities. In order to meet CPW's DAU plan population and sex-ratio objectives on the GMUG, the revised plan must contain components specifically related to providing sufficient habitat quantity and quality consistent with promoting these objectives. Please reference the following DAU plans for mule deer and elk on the GMUG and the population and sex-ratio objectives they contain: D-12, D-18, D19, D-20, D-21, D-22, D-23, D-25, D-39, D-40, D-51, E-14, E-19, E-20, E-25, E-35, E-40, E-41, E-43, and E-52.

In addition, please incorporate the following wildlife plans:

- Colorado's 2015 State Wildlife Action Plan (CPW 2015)
  http://cpw.state.co.us/Documents/WildlifeSpecies/SWAP/CO_SWAP_FULLVERSION.pdf
- Recommended buffer zones and seasonal restrictions for Colorado raptors (CPW 2008)
  http://cpw.state.co.us/Documents/WildlifeSpecies/LivingWithWildlife/RaptorBufferGuidelines2008.pdf#search=recommended%20buffer%20zones%20for%20colorado%20raptors
- Colorado Bighorn Sheep Management Plan 2009-2019 (CPW 2009)
  http://cpw.state.co.us/Documents/WildlifeSpecies/Mammals/ColoradoBighornSheepManagementPlan2009-2019.pdf
- Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat (WAFWA 2012)
  https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5385708.pdf
- Colorado West Slope Mule deer strategy (CPW November 2014)
  http://cpw.state.co.us/Documents/MuleDeer/MuleDeerStrategy.pdf
- WAFWA Mule Deer MOU Revision 2015 (This is an MOU between WAFWA agencies, USDA-USFS, USDI-BLM and USDI-USFWS to establish cooperative framework to implement strategies to improve habitat conditions for mule deer to improve mule deer populations across the West.
  http://www.wafwa.org/Documents%20and%20Settings/37/Site%20Documents/Working%20Groups/Mule%20Deer/Publications/WAFWA%20mule%20deer%20MOU%202015%20revision.pdf
- North American Mule Deer Conservation Plan (WAFWA 2004)
  https://wildlife.utah.gov/pdf/NA_mule_deer_plan.pdf

[10] Johnson, B. K., Coe, P. K. and Green, R. L. (2013), Abiotic, bottom-up, and top-down influences on recruitment of Rocky Mountain elk in Oregon: A retrospective analysis. The Journal of Wildlife Management, 77: 102–116. doi:10.1002/jwmg.427

- Energy Development Guidelines for Mule Deer (WAFWA 2011) http://www.wafwa.org/Documents%20and%20Settings/37/Site%20Documents/Working%20Groups/Mule%20Deer/Publications2/Energy_Development_Guidelines_for_Mule_Deer_2013.pdf
- Habitat Guidelines for Mule Deer – Colorado Plateau Shrubland and Forest EcoRegion (WAFWA 2007) http://www.wafwa.org/Documents%20and%20Settings/37/Site%20Documents/Working%20Groups/Mule%20Deer/Publications/CPE_Mule_Deer_Habitat_Guidelines.pdf
- Colorado Gunnison's and White-tailed Prairie Dog Conservation Strategy (CPW 2010) http://cpw.state.co.us/Documents/WildlifeSpecies/Mammals/PrairieDogConservationPlan/ColoradoGunnisonsandWhite-tailedPrairieDogConservationStrategy_070910.pdf
- White-Nosed Syndrome Response Plan (CPW 2012) http://cpw.state.co.us/Documents/Research/WildlifeHealth/WNSResponsePlan.pdf#search=townsends%20big%2Deared%20bat

Pages 72-73, Need for Change Identified in the 2006 GMUG Comprehensive Evaluation Report: CPW recommends incorporating in the current plan revision the bulleted need for change items outlined on pp. 72-73 that originated in the 2006 Assessments.

Pages 73-74, Need for Change Identified for Current Revision Effort: CPW appreciates the USFS efforts to move towards wildlife conservation biology principles and less prescriptive direction; however, for species like big game with known habitat requirements and publicly driven tightly-managed population objectives, it is critical to incorporate specific plan components, including standards and guidelines, for maintaining the habitat parameters necessary to meet population objectives. CPW agrees that adaptive management principles should also be incorporated to address information gaps, new science and information, and unpredictable trends or rapid changes in habitat conditions.

*Risk of disease transmission between domestic sheep and Rocky Mountain bighorn sheep***.** CPW supports the identification of this issue in the Needs for Change section and the incorporation of plan direction and plan components to manage for effective separation of domestic sheep and Rocky Mountain bighorn sheep. Note that the Uncompahgre Wilderness Area is another area of significant concern for potential disease transmission between domestic sheep and bighorns.

*Conflicts/competition between big game and livestock for forage***.** CPW supports identification of this issue in the Needs for Change section and incorporation of plan components as identified on p.74. In addition, CPW recommends incorporating plan direction for increasing rangeland health monitoring and enforcement to develop data necessary to address range health and forage conflict issues.

Big game winter range concerns. CPW supports identification of this issue and conducting a comprehensive assessment of areas not suitable for winter travel, including areas where wildlife would benefit from seasonal motorized *and* non-motorized restrictions. The seasonal restrictions currently in place on the Almont Triangle and Flat Top Mountain on the Gunnison Ranger District are excellent examples of the GMUG staff and CPW working collaboratively to protect and manage critical big game winter ranges and Gunnison sage grouse habitat. There

are other areas across the GMUG where additional seasonal winter closures to motorized and non-motorized use may be needed to maintain the desired distribution of wildlife populations and wildlife recreation opportunities. One example is Soap Creek to West Elk Creek in the Gunnison Ranger District. This area includes a large tract of critical big game winter range for mule deer, elk, and bighorn sheep. CPW managers have observed increasing snowmobile use in this area during the winter months, which has the potential to negatively affect over-winter survival and/or displace big game animals into less suitable winter habitats. Another example is Iron Springs Mesa/Good Enough area on Uncompahgre Plateau (the south end of GMU 61). This area is not suitable for winter travel due to high densities of elk wintering on the forest. Other potential areas for closures include Dry Park and Telephone Draw near Nucla. CPW recommends including adaptive management provisions in the plan to help address the need to continue to evaluate additional areas for closures as habitat utilization changes and recreational use and other types of development expand on the forest.

Additional Need for Change Issue: CPW recommends incorporating plan direction to identify desired conditions for spring, summer, and fall functional habitats for big game, and to incorporate specific plan components, including standards and guides for these habitats, in order to maintain big game population objectives. Recent research has documented the importance of these seasonal habitats for reproductive success in big game populations, and the susceptibility of big game to disturbance in these habitats from expanded recreational activities.[11,12,13,14] CPW recommends identify route density and connectivity standards and guides in the plan in order to provide sufficient sanctuary areas for big game away from disturbances and other stressors such as spring-fall-summer recreation activities.

Appendix 1 – Threatened, Endangered, Proposed and Candidate species ecosystems and habitat characteristics:

- Gunnison sage-grouse: Please note that the Colorado State status is Species of Concern. This species is also listed as a Tier 1 species in the CPW's SWAP.
- Canada Lynx: Please recognize CO population of Canada lynx as an established viable population as determined recently by the USFWS and their recommendation to delist the species.

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[11] E. Phillips, Gregory & William Alldredge, A. (2000). Reproductive Success of Elk Following Disturbance by Humans during Calving Season. Journal of Wildlife Management. 64. 521-530. 10.2307/3803250

[12] Rogala, J. K., M. Hebblewhite, J. Whittington, C. A. White, J. Coleshill, and M. Musiani. 2011. Human activity differentially redistributes large mammals in the Canadian Rockies national parks. Ecology and Society 16(3): 16. http://dx.doi.org/10.5751/ES-04251-160316

[13] Ciuti S, Northrup JM, Muhly TB, Simi S, Musiani M, et al. 2012. Effects of Humans on Behavior of Wildlife Exceed Those of Natural Predators in a Landscape of Fear. PLoS ONE 7(11): e50611.10.1371/journal.pone

[14] Cook, R. C., Cook, J. G., Vales, D. J., Johnson, B. K., Mccorquodale, S. M., Shipley, L. A., Riggs, R. A., Irwin, L. L., Murphie, S. L., Murphie, B. L., Schoenecker, K. A., Geyer, F., Hall, P. B., Spencer, R. D., Immell, D. A., Jackson, D. H., Tiller, B. L., Miller, P. J. and Schmitz, L. (2013), Regional and seasonal patterns of nutritional condition and reproduction in elk. Wild. Mon., 184: 1–45. doi:10.1002/wmon.1008

Appendix 2 – Species Initially Considered, but Removed from Consideration based on "Known to Occur" Criteria:

- Columbian sharp-tailed grouse: Please acknowledge that historic records for sharp-tailed grouse exist from the Uncompahgre.
- Burrowing owl: In addition to being threatened, please add that burrowing owl is a "Tier 1 species" in CPW's SWAP.
- Fringed myotis: There are two records of fringed myotis on the Uncompahgre. Habitat suitability models that are nearly completed suggest much of the GMUG is likely to be occupied by this species.[15] Trees and rock crevices are likely to be used most often by maternity colonies of this species.[16]
- Spotted bat: This species is currently listed as a Tier 1 species in CPW's SWAP. Maternity roosts for this species are described from Mesa Verde NP. All were in rock crevices.[17] All captures of the species from western Colorado are highly associated with canyonlands and cliff country. Updated info on this and other bat species is coming out in February 2018 in the Colorado Bat Conservation Plan found on the Colorado Bat Working Group webpage.

Draft Aquatic and Riparian Ecosystems Assessment (November 2017):

Page 1, Key Issues for Aquatic and Riparian Ecosystems on the GMUG: The document discusses sampling of aquatic habitats and recommends moving away from inventory and monitoring of aquatic macroinvertebrates and shifting focus to monitoring fishes and amphibians. CPW welcomes continued coordination and collaboration with the USFS in assessing aquatic habitats and agrees with this shift in monitoring focus.

CPW would like to see more discussion of the value of recreational angling within the GMUG, and acknowledgement that CPW strives to maintain that value through the responsible management of native and non-native fishes. The management of Colorado River Cutthroat Trout is a priority for CPW, and these conservation fisheries are managed as a priority for long-term species persistence. There are multiple places within the GMUG Plan Revision documentation (see below) that suggest that stocking non-native salmonids is a threat to cutthroat trout persistence. While the stocking of non-native salmonids has historically reduced the range of Colorado River Cutthroat Trout through mechanisms like competition, predation and hybridization, the current stocking of non-native salmonids is conducted to provide sport fishing opportunities in fisheries where the stocking has been determined to have no impact to extant Colorado River Cutthroat Trout populations. Additionally, there are

[15] Hayes, M. A., and R. A. Adams. 2014. Geographic and Elevational Distribution of Fringed Myotis (Myotis thysanodes) in Colorado. Western North American Naturalist 74:446-455.
[16] Hayes, M. A., and R. A. Adams. 2015. Maternity roost selection by fringed myotis in Colorado. Western North American Naturalist 75:460-473. O'Shea, T. J., P. Cryan, E. A. Snider, E. W. Valdez, L. E. Ellison, and D. J. Neubaum. 2011. Bats of Mesa Verde National Park, Colorado: Composition, reproduction, and roosting habits. Monographs of the Western North American Naturalist 5:1-19.
[17] O'Shea, T. J., P. Cryan, E. A. Snider, E. W. Valdez, L. E. Ellison, and D. J. Neubaum. 2011. Bats of Mesa Verde National Park, Colorado: Composition, reproduction, and roosting habits. Monographs of the Western North American Naturalist 5:1-19.

other factors that limit cutthroat trout, including stream degradation, ecologically harmful water use, disease presence, and land ownership/land management issues.

Pages 3-4, Native Fish Distribution: The Plan Revision (Colorado River Cutthroat Trout Assessment, page 5) accurately points out that the current range of Colorado River Cutthroat Trout has been reduced to 14 percent of the historically occupied habitat. While it would be optimal to restore the entire lost habitat, many of the streams that have been invaded by non-native salmonids cannot be feasibly restored to manage for Colorado River Cutthroat Trout due to high habitat complexity, private land connection, ecologically harmful water use, disease presence, connections to other invaded fisheries and/or lack of adequate access to conduct restorations. CPW understands these limitations, and strives to prioritize Colorado River Cutthroat Trout restoration projects to streams where they are feasible and have a strong probability of long-term population persistence.

For fisheries that are not determined to be candidates for restoration, non-native salmonids are often utilized to provide recreational angling opportunities. Angling represents a valuable portion of the Outdoor Recreation Economy that defines Colorado. A 2014 study of outdoor recreation in Colorado estimated that angling contributes 1.9 billion dollars in total economic contributions to the Colorado economy annually, along with generating 127 and 138 million dollars in state and federal taxes, respectively, and supporting 16,413 jobs.[18] CPW is tasked with maintaining the angling opportunities that support this economy, and stocking salmonids is one of many tools that CPW utilizes to accomplish this task. It should be noted that many non-native recreational fisheries are supported by established populations of naturally reproducing salmonids. CPW stocks streams, rivers, lakes and reservoirs where there is a demand for angling opportunity, but where natural reproduction is absent or incapable of sustaining a recreational fishery.

Within fisheries where non-native salmonids have not been established, CPW often utilizes stocking of blue-lineage Colorado River Cutthroat Trout to provide an angling opportunity that is compatible with CPWs conservation objectives (pending specific management objectives and fish availability, CPW may transition to green-lineage Colorado River Cutthroat Trout in some waters in the future). Other species such as rainbow trout, brook trout and brown trout are stocked in high-use fisheries where harvest of cutthroat trout would not be desirable, or in fisheries where they can fill an ecological need (for example, using brown trout to control non-native species like white sucker through predation). The fisheries that CPW stocks have been evaluated to determine their connection to Colorado River Cutthroat Trout waters. CPW takes pride in providing recreational angling opportunities without impacting Colorado River Cutthroat Trout conservation populations.

Page 4, Non-native Cold-Water Fish Distribution: CPW monitors many aquatic habitats and maintains fish and amphibian sampling records to allow for improved assessment and management of aquatic resources. We recommend that descriptions of fish distribution and current cutthroat trout distribution (Colorado River Cutthroat Trout Assessment, Table 1), reflect combined knowledge which is the result of collaborative efforts by both USFS and CPW

[18] Southwick Associates. 2014. Economic contributions of outdoor recreation in Colorado: a regional and county-level analysis. Fernandina Beach, FL 32pp

aquatic biology staff. Table 1 in the Species Assessment for Colorado River Cutthroat Trout has some outdated information. CPW can collaborate with USFS to update the table with recent sampling efforts.

In addition to stating that "Self-sustaining populations of all three species (rainbow, brown and brook trout) can be found across the GMUG and CPW maintains Rainbow Trout populations through stocking in a number of streams, lakes and reservoirs," CPW recommends pointing out that CPW's goal is to provide recreational fisheries, and that stocking is completed in fisheries that are isolated from Colorado River Cutthroat Trout conservation waters.

Page 21-22, Invasive Plant Species and Aquatic Nuisance Species: This section provides information contrary to that reported on page 30 of GMUG Draft Forest Assessments: Identifying and Assessing At-Risk Species. This report indicates that two ANS species are present (*Myxobolus cerebralis*, the causative agent of whirling disease and *Batrachochytrium dendrobatidis* or chytrid fungus), while the At-Risk Species report indicates that no ANS species have been detected in lakes or reservoirs on the GMUG.

CPW is responsible for administering Colorado's Watercraft Inspection and Decontamination (WID) Program. The focus of this program includes containment of ANS and prevention of future introductions through watercraft inspection and decontamination, sampling and monitoring, education and outreach, communications and information, and applied research. CPW actively samples and monitors Taylor Park Reservoir to detect potential infestation by zebra or quagga mussels or other ANS, but CPW staff do not provide boat inspection and decontamination services at Taylor Park. Boating inspection and decontamination at Taylor Park Reservoir are conducted using CPW and USFS funds, but this service is contracted to an outside company.

Page 23, Dams and Reservoirs: At the end of the second paragraph "The primary use of reservoirs…" states that reservoirs are used primarily for agricultural and municipal water storage. It should be pointed out that these reservoirs often support valuable sport fisheries and outdoor recreation opportunities. These reservoirs are a big part of the recreation-related economy, particularly on the Grand Mesa.

Page 24, Grazing: The grazing section outlines a number of ecological impacts resulting from grazing, and the first paragraph ends with the statement "…however localized impacts to riparian and wetland systems still occur". CPW recommends adding plan direction and plan components, including standards and guidelines, for direct data collection to evaluate and address these impacts, particularly in Colorado River Cutthroat Trout drainages.

Draft Aquatic Species Assessments

Colorado River Cutthroat Trout Assessment, page 2: Paragraph 1 of the "Taxonomy" section discusses the status of the Greenback Cutthroat Trout and states that there is only one known population of this sub-species. This statement was accurate at the time of the Metcalf et al. 2012 publication, when there was one extant population present in Bear Creek within the Arkansas River Basin (outside of the Greenback native range). Since that time, Colorado Parks and Wildlife has conducted chemical reclamation projects on a number of Front Range

waters to successfully re-establish Greenback Cutthroat Trout within their native range of the South Platte Basin.

Colorado River Cutthroat Trout Assessment, page 2: Paragraph 2 of the "Taxonomy" section discusses the two lineages of cutthroat trout, the blue-lineage and the green-lineage, which are classified together as Colorado River Cutthroat Trout. We agree that green-lineage cutthroat, which were deemed to be native to the GMUG in Metcalf et al. 2012, are of the highest conservation value. However, CPW still actively manages blue-lineage populations on the GMUG, which still have significant conservation and recreational value. Although green-lineage cutthroat trout may be used in new projects, CPW plans to continue conservation efforts on both lineages of cutthroat trout on the GMUG until decisions regarding the taxonomic classifications and listing status of both lineages are made by the USFWS. It is possible that blue- and green- lineages will be determined to be genetically similar enough to manage as one sub-species, "Colorado River Cutthroat Trout," in which the blue- lineage populations remain valuable. Additionally, like the green-lineage, there are few blue-lineage cutthroat trout on the landscape within their native range, and the populations within the GMUG are contributing to the overall persistence of blue-lineage cutthroat trout.

Colorado River Cutthroat Trout Assessment, page 2: Paragraph 1 of the "Distribution and abundance" discusses the stocking of blue-lineage cutthroat trout by the State of Colorado. We recommend a clarification that these efforts were conducted to conserve native cutthroat trout and that prior to 2012, the best available science indicated the blue-lineage cutthroat trout was native to the GMUG. CPW generally transitioned to stocking of cutthroat trout rather than non-native salmonids for aerial plants of high-elevation lakes in the 1990s in an effort to expand populations of native cutthroat trout, while also providing angling opportunities. CPW is currently in the process of developing a broodstock for green-lineage cutthroat trout, which will allow a shift to use of green lineage cutthroat trout for stocking of some high lakes within the GMUG in the future.

Colorado River Cutthroat Trout Assessment, page 8: Second paragraph – While many of the streams within the GMUG are relatively cold, this paragraph does not sufficiently acknowledge that there are a large number of streams that are nearly too warm for Colorado River Cutthroat Trout on the GMUG. This is particularly true of streams that are on the Uncompahgre Plateau, where we have seven conservation populations of Colorado River Cutthroat Trout, along with a large number of additional salmonid streams. These fisheries will likely suffer from a water quality standpoint as the climate warms in the future. This should be acknowledged and addressed in the Species Assessment for CRCT.

Colorado River Cutthroat Trout Assessment, page 9: Paragraph 2 of the "Threats and Risk Factors" in the Colorado River Cutthroat Trout species overview discusses the utility of electrofishing as a tool for brook trout control. CPW agrees that electrofishing can be an option for control of invasive brook trout populations; however, mechanical removal of brook trout has been shown to have little success as a tool for complete eradication of undesirable fish species and is more often used for long-term suppression efforts.[19,20,21] The successful use

[19] Thompson, P.D. and F.J. Rahel. 1996. Evaluation of Depletion-Removal Electrofishing of Brook Trout in Small Rocky Mountain Streams. North American Journal of Fisheries Management 16: 332-339

of mechanical removal as a tool for complete eradication is limited to short stretches of relatively small streams which lack habitat features that reduce electrofishing efficiency (e.g. deep pools, large woody debris, thick riparian vegetation, undercut banks). Another drawback of mechanical removal efforts is that these removal projects typically involve several year commitments which are highly labor intensive.[22,23] Furthermore, brook trout, which are often the target of these non-native fish removal projects, often show population-level density-dependent increases in growth, fecundity, survival, and body condition following mechanical removal efforts meaning the populations can recover very rapidly if mechanical removal efforts are not continued.[24,25,26,27]

CPW recommends discussing chemical reclamation (e.g. application of a piscicide such as rotenone) as a tool for removal of non-native species and for cutthroat restoration on the GMUG because it is often the only tool available for complete eradication. CPW has utilized rotenone for chemical reclamation projects across the state for decades and these projects have proved to be one of the most effective tools for re-establishing native cutthroat trout. CPW recommends addressing common concerns and misconceptions regarding the use of rotenone. A common concern regarding the use of piscicides is the effect on aquatic invertebrate populations. Piscicides such as rotenone are toxic to all gilled organisms at certain concentrations. However, research has shown that aquatic invertebrates are much more resistant to these chemicals than fish, meaning that the concentrations used to remove fish typically do not result in a complete loss of aquatic invertebrate assemblages.[28] Any changes in species composition or diversity of aquatic invertebrates following application of a piscicide have often been found to be short term as nearby sources of aquatic invertebrates in

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[20] Meyer, K. A., J. A. Lamansky Jr., and D. J. Schill. 2006. An unsuccessful brook trout electrofishing removal project in a small Rocky Mountain stream. North American Journal of Fisheries Management 26:849-860

[21] Carmona-Catot, G., P. B. Moyle, E. Aparicio, P. K. Crain, L. C. Thompson, and E. Garcia-Berthou. 2010. Brook Trout Removal as a Conservation Tool to Restore Eagle Lake Rainbow Trout. North American Journal of Fisheries Management 30: 1315-1323

[22] Kulp, M. A., and S. E. Moore. 2000. Multiple electrofishing removals for eliminating rainbow trout in a small southern Appalachian stream. North American Journal of Fisheries Management 20:351-356

[23] Shepard, B. B., R. Spoon, and L. Nelson. 2002. A native westslope cutthroat trout population responds positively after brook trout removal and habitat restoration. Intermountain Journal of Sciences 8:193-214

[24] Donald, D. B., and D. J. Alger. 1989. Evaluation of exploitation as a means of improving growth in a stunted population of brook trout. North American Journal of Fisheries Management 9:177-183.

[25] Jenkins, T. M. Jr., S. Diehl, K. W. Kratz, and S. D. Cooper. 1999. Effects of population density on individual growth of brown trout in streams. Ecology 80: 941-956

[26] Peterson, D. P. and K. D. Fausch. 2003. Dispersal of brook trout promotes invasion success and replacement of native cutthroat trout. Canadian Journal of Fisheries and Aquatic Sciences 60: 1502-1516

[27] Roghair, C. N. and C. A. Dolloff. 2005. Brook trout movement during and after recolonization of a naturally defaunted stream reach. North American Journal of Fisheries Management 22: 777-784

[28] Finlayson, B., W. L. Somer, and M. R. Vinson. 2010. Rotenone Toxicity to Rainbow Trout and Several Mountain Stream Insects. North American Journal of Fisheries Management 30: 102-111

untreated waters quickly re-colonize these treated portions of stream.[29,30] A common misconception regarding the use of rotenone as a fisheries management tool is the effect on terrestrial wildlife and humans. Rotenone has an extremely low toxicity to humans at treatment concentrations (typically 1-3 ppm) and the consumption of fish that have been killed by rotenone will not negatively affect wildlife.

Colorado River Cutthroat Trout Assessment, pages 9-10: In the discussion of using mechanical removal as a means to control non-native fish species, we recommend the sentence beginning with "The possibility of using electrofishing…" should read "…to control Brook Trout in *Dyke Creek* was discussed…". Dyke Creek, not Beaver Dams Creek was discussed for mechanical removal of brook trout.

Colorado River Cutthroat Trout Assessment, page 10: The second paragraph beginning, "Cutthroat trout populations are also…" mentions grazing as a threat to Colorado River Cutthroat Trout but does not provide a detailed description of this threat. CPW recommends including a discussion of the impacts of grazing and how they may affect Colorado River Cutthroat Trout populations on the GMUG. Additionally, CPW suggests that this section incorporate plan direction for additional data collection to directly monitor grazing impacts and standards and guidelines to minimize the impacts of grazing in Colorado River Cutthroat Trout conservation population drainages.

Colorado River Cutthroat Trout Assessment, page 11: "While the Forest Service recognizes the importance of recreational angling to the economy of local communities and the state of Colorado, Forest Service lands support several native fish species that should be recognized as a higher priority for conservation than those species that can be maintained through stocking. Forest Plan direction should promulgate the importance of native fishes with standards and guidelines that apply to economically impactful non-native species, such as Rainbow Trout". The first sentence implies that non-native fishes are considered a higher priority than native species such as Colorado River Cutthroat Trout. This misrepresents the direction and priorities of CPW that are focused on the conservation of native fishes. CPW prioritizes the conservation of Colorado River Cutthroat Trout over non-native recreational fisheries, and makes effort to sustain recreational fisheries in ways that do not impact cutthroat trout fisheries. The second sentence is unclear as to whether the direction would be to promote native fish to have the same standards and guidelines that currently apply to non-native fish (this does not make sense, as native fish are currently managed with more emphasis on persistence than non-natives by CPW) or whether the direction is to create new standards and guidelines for non-native fish management. These two sentences imply that CPW places more emphasis on non-native fish management than on native fish management and that the non-native fish management is done in detriment to the native fish. Please acknowledge the

[29] Hamilton, B. T., S. E. Moore, T. B. Williams, N. Darby, M. R. Vinson. 2009. Comparative Effects of Rotenone and Antimycin on Macroinvertebrate Diversity in Two Streams in Great Basin National Park, Nevada North American Journal of Fisheries Management 29: 1620:1635

[30] Skorupski, J. A. 2011. Effects of CFT Legumine Rotenone on Macroinvertebrates in Four Drainages of Montana and New Mexico. Thesis Prepared for the Degree of Master of Science, University of North Texas.

efforts that CPW takes to provide recreational fisheries while maintaining native species such as Colorado River Cutthroat Trout.

Boreal Toad Assessment, page 4: The first paragraph in the "Threats and Risk Factors" section states, "Declines may be related at least in part to habitat destruction and degradation, water retention projects, predation by and competition with native and non-native species, fishery management activities, or other factors, but these factors have not been adequately assessed." CPW has demonstrated clearly that chytrid fungus (Bd) has eliminated populations of boreal toads (BOR) on the GMUG. To cast speculation toward other factors without adequately addressing the damage done by Bd is likely to misguide conservation efforts for this species. The primary threat to BOR is chytrid fungus. BOR are strong colonizers and have been successfully documented breeding in mud puddles in logging roads. Habitat loss is insignificant compared to the threat posed by Bd. CPW has observed multiple BOR populations crash on the GMUG soon after Bd is documented in the populations. There is little documented use of pesticides in BOR habitat, and acid rain/UV does not appear to limit BOR distributions.

Most concerning is the language relating to fisheries management. BOR historically were sympatric with trout, and CPW has multiple historic sites where we have documented strong reproduction, metamorphosis, dispersal and recruitment into adult populations on the GMUG in the presence of high numbers of both native and non native trout. While CPW has documented numerous predation events by corvids and shorebirds of all BOR life stages, we have never detected any **natural** predation by trout (native or nonnative) on any life stage of BOR.

We suggest that BOR recovery depends on dealing with Bd, and implying that distribution is limited by fishery management activities is inaccurate and will limit future recovery projects for both BOR and Colorado River Cutthroat Trout. Relatively few populations in Colorado have shown the ability to persist, even in the short term to Bd infections. While Bd is present on the GMUG, boreal toad populations in the Buzzard Creek drainage have shown resilience to Bd infections, and may provide valuable information for future management of BOR populations in the presence of Bd. Potential disturbances should be carefully evaluated to protect these existing populations. CPW recommends updating the Boreal Toad assessment with information from the October 2017 listing decision by the USFWS. This decision concluded that the listing of Boreal Toad is "not warranted" (Docket ID:FWS-R6-ES-2012-0003). There are no active petitions currently for boreal toad.

Boreal Toad Assessment, page 5: Conclusion Statement –"Prior to the introduction of non-native amphibians and the fungus *Batrachochytrium dendrobatidis* (Bd) the Boreal toad was abundant and widespread within its known range. Accounts such as Burger and Bragg (1947) observing young toads swarming in the shallow water and in vegetation near Cement Creek are a relic of pre-anthropogenic conditions." We recommend revising this statement to reflect Bd as the primary concern for BOR on the GMUG. In addition, the statement regarding introduction of non-native amphibians is inaccurate. Non-native amphibian introduction is not likely related to a decline in BOR abundance and distribution on the GMUG. Relatively few, if any non-native amphibians are present on the GMUG. The transmission of Bd is not completely understood, but Bd appears to be transferred via a variety of vectors and may appear in areas without exposure to non-native amphibians.

Bluehead Sucker, Flannelmouth Sucker and Roundtail Chub Assessment: The three species distribution on the GMUG is limited to tributary streams associated with the Gunnison, North Fork of the Gunnison, the Uncompahgre, Dolores and San Miguel Rivers below large impoundments such as the Aspinall Unit, Paonia, Vega, Ridgeway and McPhee Reservoirs. This use is often seasonal, with potential large influxes of adult fish during spawning season in ephemeral streams, and some year round occupancy in perennial streams. Protection and management of these spawning and rearing habitats associated with impoundments are critical for the longer survival of these species. Although management of scattered populations above these impoundments is not as critical due to their isolation and the high potential for hybridization with non native suckers, conservation measures should still be pursued.

Northern Leopard Frog Assessment: A CPW study on Northern Leopard Frog (NLF) distributions in the Southwest Region found that, unlike other Regions, NLF occupancy rates were similar to historic rates. NLF breeding locations had changed in response to development, but similar numbers were found in randomly selected habitats. Chytrid fungus is the most prevalent threat to NLF, with non-native bullfrogs being a secondary risk (a carrier of Bd, and a predator/competitor). High elevations and cold temperatures on much of the GMUG likely limit bull frog distributions to low elevation sites, except for edaphic features like those at Hot Springs Reservoir.

Draft Terrestrial Species Assessments (November 2017):

White-tailed Ptarmigan Assessment, page 187: Please add_snowmobiles and recreational skiing as threats in highly used areas that can have negative impacts for ptarmigan. These impacts can include flushing from preferred feeding, roosting or loafing areas and causing ptarmigan to expend extra energy when reserves may be low due to extreme temperatures and snow cover. Additional negative impacts for white-tailed ptarmigan by snowmobiles are compaction of snow and crushing of willows. Increase in winter recreational activities may also attract and allow unwanted predator species to access higher elevations.

Please also add concentrated sheep grazing and trailing in the alpine as a concern. Alpine systems can be easily degraded by over use. Wet areas are susceptible to trampling and drier sites have high erosion potential. Sheep consume many of the plant species important for white-tailed ptarmigan and species composition can be altered by domestic livestock grazing. Domestic sheep are often in the alpine during the brood rearing season of white-tailed ptarmigan and can cause separation and disruption of hen and chicks when chicks are young and vulnerable.

Draft Designated Areas Assessment (November 2017):

Page 12, Critical Habitat under the Endangered Species Act: Please reword the statement "*Only* 175,790 acres (20%) of designated Critical habitat occurs on GMUG NF". This 20% provides habitat for 31-33% of the Gunnison Basin population of Gunnison sage-grouse and is significant for this federally threatened species. Please delete "Only."

Page 13, Colorado Roadless Areas: Upper tier roadless areas typically have lower levels of fragmentation and habitat degradation and provide seclusion areas for big game and other wildlife. In order to maintain these seclusion areas, CPW recommends prohibiting motorized activities and motorized travel construction in upper tier roadless areas to the extent possible.

Draft Carbon Assessment (November 2017):

Reforestation is the greatest natural pathway to sequester carbon. Reforestation promotes and enhances biodiversity, air quality, water infiltration, flood control, and soil fertility. Wetland and wet meadow restoration can also promote carbon sequestration. The GMUG should identify methods to restore wetlands, slope wetlands, and wet meadows for carbon sequestration. Some techniques may include the reintroduction of beaver, opening meadows that are encroached by conifer forests, and Zeedyk restoration techniques such as simple rock structures (i.e., One Rock Dams) and plug and pond excavated structures.

Conclusion

CPW appreciates the opportunity to participate in the Assessment Phase of the GMUG Forest Plan Revision project. If you have any questions or would like clarification on any comment in this letter please contact Southwest Energy Liaison, Jon Holst at 970-375-6713.

Sincerely,

Patricia D. Dorsey, SW Region Manager

xc: JT Romatzke, NW Region Manager
J Wenum, Area 16 Wildlife Manager
Renzo Delpicolo, Area 18 Wildlife Manager
Scott Wait, SW Region Senior Terrestrial Biologist
Brad Petch, NW Region Senior Terrestrial Biologist
John Alves, SW Region Senior Aquatic Biologist
Lori Martin, NW Region Senior Aquatic Biologist
Michael Warren, NW Region Energy Liaison

ATTACHMENT 1 - CPW RECOMMENDED UPDATES TO DRAFT ROCKY MOUNTAIN ELK SPECIES ASSESSMENT (2005)

Rocky Mountain Elk (*Cervus elaphus nelsoni*)
Species Assessment
Draft

Prepared for the Grand Mesa, Uncompahgre, and Gunnison National Forests
May 2005

A Species Assessment was prepared for Rocky Mountain Elk by **Tom Holland**[1], 2001
Updated by **Matt Vasquez**[2] with contributions by **Leslie Spicer**[2], 2005
[1] Forest Wildlife Biologist, Grand Mesa, Uncompahgre, and Gunnison National Forests
[2] Biological Science Technician (Wildlife), Gunnison Ranger District

Reviewed and Edited by: Clay Speas, Forest Fisheries Biologist and Tom Holland, Forest Wildlife Biologist

Photo Credits**:** Top: Bull elk in Yellowstone National Park; Bottom left: Cow elk on the Forest; Bottom right: Elk calf on the Forest. Photos by Matt Vasquez.

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INTRODUCTION

In the 1991 Amended Land and Resource Management Plan for the Grand Mesa, Uncompahgre and Gunnison National Forests (Forest), Rocky Mountain elk (from here on referred to as elk) were identified as a management indicator species (MIS) due to its association with early succession spruce-fir, Douglas-fir, lodgepole pine, aspen, and shrub vegetation types (USDA Forest Service 1991). For the current Forest Plan revision, elk have been retained as a MIS. MIS have a dual functionality: 1) to estimate the effects of planning alternatives on fish and wildlife populations (36 CFR 219.19 (a) (1)) and 2) to monitor the effects of management activities on species via changes in population trends (36 CFR 219.19 (a) (6)). Elk have been retained as a MIS, primarily to address travel management objectives and because of their high economic importance to the state of Colorado and communities surrounding the Forest.

This document addresses the elk's suitability as a MIS and MIS selection criteria. This report updates the 2001 MIS Assessment for Rocky Mountain Elk on the Forest, and can be used as a supplement to the 2001 MIS Assessment. Detailed information on the species management status and natural history, biology, distribution, abundance, habitat, and ecology at the Forest-level is summarized in the current report.

The goal of this assessment is to summarize historical and current literature on elk to provide land managers and the public with an objective overview of this species within the Forest. Peer reviewed scientific literature and summarized data are the primary information sources used in this report. Local data sources (District wildlife biologists and the ~~Colorado Division of Wildlife~~Colorado Parks and Wildlife (CPW) staff) were consulted to provide information on distribution, localized abundance, and habitat condition for the Forest. This assessment provides recommendations for the current Forest Plan revision in terms of integrating elk habitat requirements into Forest management planning. This report is a working document that will be updated periodically as new information becomes available from peer-reviewed scientific literature and through monitoring of this species on the Forest. For instance, CPW is conducting two long-term studies focused on elk population drivers and elk landscape distribution throughout much of the GMUG. The distribution information produced from these studies can help drive decisions regarding elk habitat management and trail based recreation on the GMUG.

HABITAT CRITERIA USED IN FOREST-WIDE HABITAT EVALUATION

2001 MIS Habitat Criteria

In 2001, potential suitable habitat for elk on the Forest was identified based on the Natural Diversity Information Source (NDIS) database produced by the ~~Colorado Division of Wildlife~~CPW, which depicts seasonal concentration areas including summer and winter activity areas and major calving areas for elk. NDIS data revealed that the Forest is utilized primarily as spring, summer, and fall range by elk. NDIS data further revealed that most elk calving occurs on the Forest in sagebrush, Gambel oak and aspen ecosystems. Lower elevations of the Forest, along with adjacent BLM and private lands, were shown to provide winter range during moderate to severe winters, with the Forest providing a high percentage of winter range at higher elevations during mild winters. Essentially all vegetation types present on the Forest, especially those in the early successional stages near hiding cover, provide suitable elk habitat because they provided the habitat needs necessary to meet the life requirements of elk depending on the season.

Rationale

The ~~Colorado Division of Wildlife~~CPW NDIS database identified elk seasonal concentration areas and elk habitat distribution on the Forest. Elk are a habitat generalist typically associated with early succession vegetation including spruce-fir, Douglas-fir, lodgepole pine, aspen, and mountain shrub. Although a habitat generalist, elk dependence on early successional vegetation represents a large number of wildlife species that are also dependent on early successional vegetation.

2005 MIS Habitat Criteria

We utilized the ~~Colorado Division of Wildlife~~CPW NDIS database to determine where seasonal concentration areas, major calving areas, summer, winter, and severe winter range. In conjunction with NDIS data, Geographic Information System vegetation data, R2-Veg, was used to model potential elk habitat on the Forest (Figures 1 and 2). The R2-Veg database was produced by aerial photo interpretation in conjunction with some field verification; this is a working database with updates taking place periodically. At the Forest-level, R2-Veg should reliably depict suitable elk habitat on the Forest. R2-Veg attributes used for habitat modeling include vegetation cover type,

Comment [BK1]: CPW supports this concept as human use of roads appears to be increasing across the GMUG and trail based recreation is in high demand. There is a signifcant body of supporting literature on elk, roads, and recreation. If the MIS concept is not carried forward in the plan revision per the 2012 USFS Planning Rule, CPW supports designating elk as a Species of Interest or Focal Species for this purpose.

Comment [BK2]: CPW recommends that the GMUG update the habitat model and criteria utilized in this section. The high resolution maps from the described analysis are now based on the older habitat layers (R2-Veg). Landcover data such as R2-Veg or LANDFIRE do not accurately represent habitat features of anthropogenic importance (i.e., roads, trails, man-made structures) or other topographic data (i.e., slope, aspect, terrain ruggedness). In addition, CPW NDIS information has been updated since this document was prepared. CPW recommends an updated model utilizes an empirical based approach, such as that provided by resource selection function models. Data used in resource selection models can be generated by ongoing data collected on GPS collared elk in the Gunnison Ranger District and Uncompahgre Plateau elk studies. If an updated model cannot be incorporated, it is likely that important calving habitats will be underestimated. Additionally, the effect of roads and trails will not be properly accounted for without an updated model. See: (Benkobi, L., M. A. Rumble, G. C. Brundige, and J. J. Millspaugh. 2004. Refinement of the Arc-Habcap model to predict habitat effectiveness for elk. U.S. Forest Service Research Paper RMRS-RP-51, Rocky Mountain Research Station, Ft. Collins, Colorado, USA.). GMUG and CPW biologist can work together on this effort to better map areas as well as develop this empirical mapping approach based on resource selection functions.

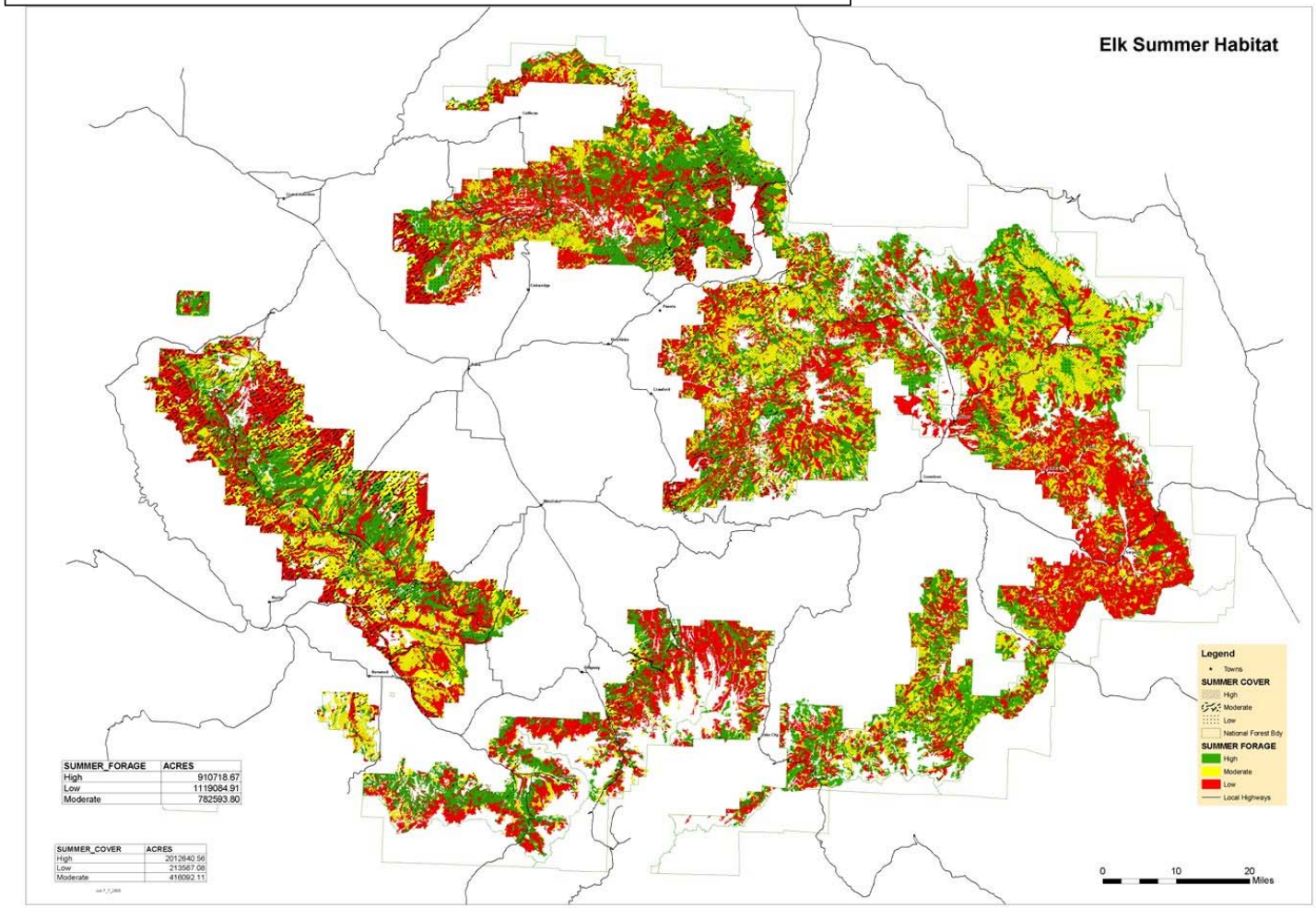
Comment [BK3]: CPW staff support this observation.

Comment [o4]: Please note that the terrestrial ecosystem assessments identified many ecosystems to be beyond early successional stages, indicating that habitat condition may be a factor limiting elk habitat effectiveness.

Comment [BK5]: CPW staff agree with this rationale

vegetation species mix, habitat structural stage, canopy cover, and patch size - for thermal cover areas (Table 1).

Figure 1. Elk summer foraging habitat on the Forest as modeled by R2Veg



Grand Mesa, Uncompahgre, and Gunnison National Forests
Rocky Mountain Elk (*Cervus elaphus*) Species Assessment

Figure 2. Elk winter foraging habitat on the Forest as modeled by R2Veg.

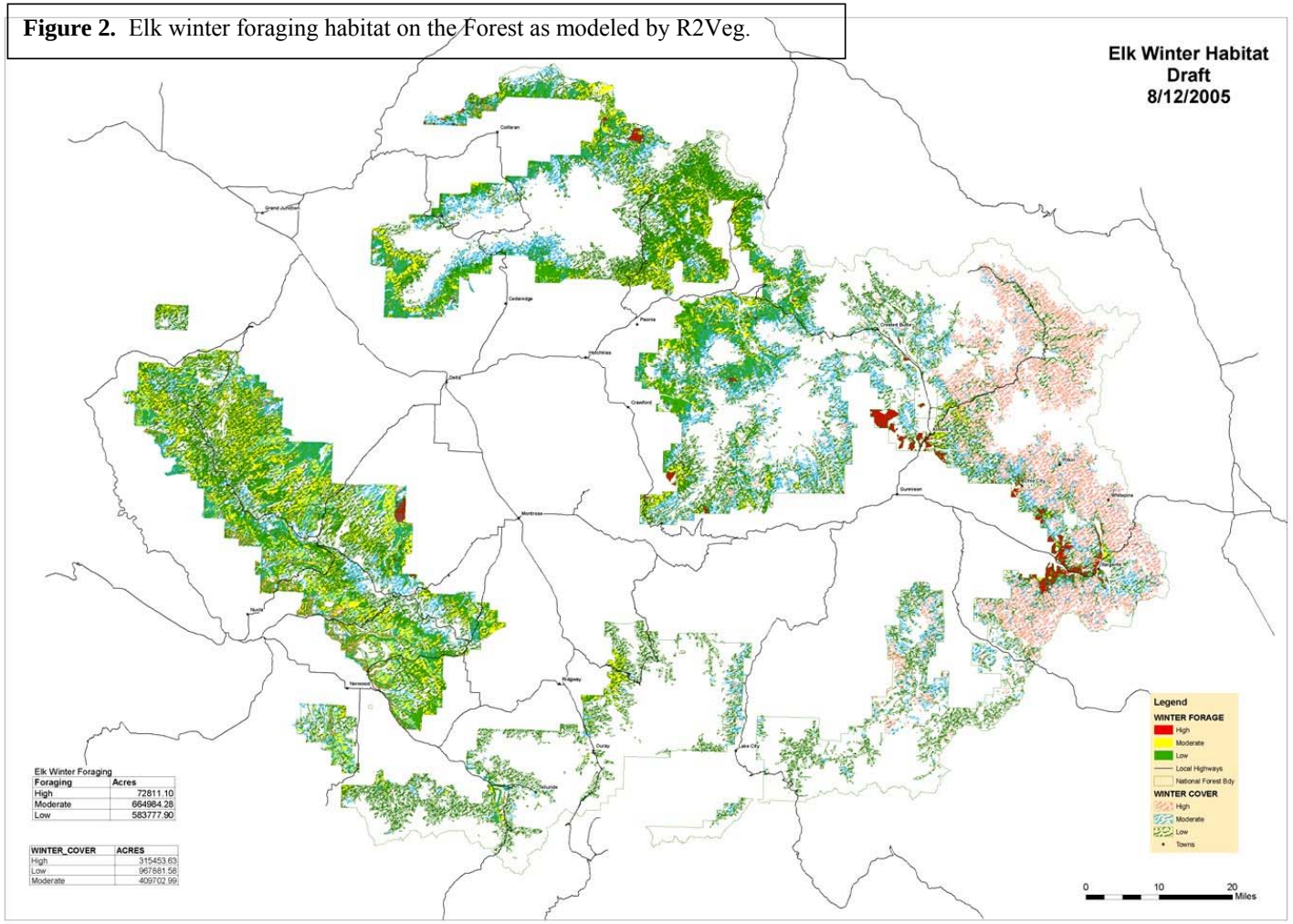


Table 1. Habitat parameters for modeling Rocky Mountain elk habitat on the Forest.

Habitat Parameter	High Quality (Optimum)		Moderate Quality (Marginal)		Low Quality (Poor)	
	Summer Foraging	Summer Cover	Summer Foraging	Summer Cover	Summer Foraging	Summer Cover
Cover Type and Habitat Structural Stage^						
Aspen	1, 2, 3a, 3b, 4a, 4b, 5	3b, 3c, 4a, 4b, 4c, 5	3c, 4c	2, 3a		
Douglas-fir	1, 2, 3a	3b, 3c, 4b, 4c, 5	3b, 4a	3a, 4a	3c, 4b, 4c, 5	
Gambel Oak	1, 2, 3a, 4a	3c, 4c	3b, 4b	2, 3a, 3b, 4a, 4b, 5	3c, 4c, 5	
High Elevation Riparian[1]	1, 2, 3a	3b, 3c, 4b, 4c, 5	3b, 4a	3a, 4a	3c, 4b, 4c, 5	2
Lodgepole Pine	1, 2, 3a	3b, 3c, 4b, 4c, 5	3b, 4a	3a, 4a	3c, 4b, 4c, 5	
Mountain Grassland[2]	1					
Mountain Shrub[3]	1				2	2
Pinyon-Juniper		3c, 4c	1, 2, 3a, 4a	2, 3a, 3b, 4a, 4b, 5	3b, 3c, 4b, 4c, 5	
Ponderosa Pine	1, 2, 3a	3b, 3c, 4b, 4c	3b, 4a, 4b, 5	3a, 4a, 5	3c, 4c	
Sagebrush	1				2	
Spruce-fir	1, 2, 3a	3b, 3c, 4b, 4c, 5	3b, 4a	3a, 4a	3c, 4b, 4c, 5	
Wet Meadow*	1					
	Winter Foraging°	**Winter Cover°**	**Winter Foraging**	**Winter Cover**	**Winter Foraging**	**Winter Cover**
Aspen	1, 2, 3c,		3a, 4a, 4b, 5	3c, 4c	3b, 4c	3a, 3b, 4a, 4b, 5
Douglas-fir		3c, 4c, 5		3b, 4b	1, 2, 3a, 3b, 3c, 4a, 4b, 4c, 5	3a, 4a
Gambel Oak	1, 2, 3a, 4a		3b, 4b	3b, 3c, 4b, 4c	3c, 4c, 5	2, 3a, 4a, 5
High Elevation Riparian[1]	1, 2, 3a		3b, 4a	3b, 3c, 4b, 4c, 5	3c, 4b, 4c, 5	2, 3a, 4a
Lodgepole Pine	1, 2, 3a	3b, 3c, 4b, 4c, 5	3b	3a, 4a	3c, 4a, 4b, 4c, 5	
Mountain Shrub[3]	1		2			
	1	Pinyon-Juniper	1, 2, 3a	3c, 4c 4a	2, 3a, 3b, 4a, 4b, 5	
	3b, 3c, 4b, 4c, 5					
Ponderosa Pine	1, 2, 3a, 4a		3b, 4b, 5	3b, 3c, 4b, 4c	3c, 4c	3a, 4a, 5
Sagebrush	1		2			2
Wet Meadow*	1					
Winter Cover Habitat Variables						
A. Tree Canopy Closure	≥ 70% multiple layering		40 - 69% single or multiple layering; and ≥ 70% single layering		if < 40%, then classify as foraging habitat	
B. Tree Canopy Height	≥ 12 m		≥ 3 m		if < 3 m, then classify as foraging habitat	
C. Habitat Interspersion: Distance of Cover From the Cover-forage edge	< 100 m		100 - 200 m		> 200 m	
D. Minimum Size of Thermal Cover Areas	4 ha		4 ha		4 ha	
Winter Foraging Habitat Variables						
E. Tree Canopy Closure	< 40%		< 40%		< 40%	
F. % Deciduous Tree Canopy	≥ 50%		25 - 49%		< 25%	
G. Habitat Interspersion: Distance of Forage From the Cover-forage edge	< 100 m		100 - 200 m		>200 m	
H. Elevation	<9,000 ft.		<9,000 ft.		<9,000 ft.	
Road Density/Use Habitat Effectiveness**						
	100% - 80%		**< 80% - 55%**		**< 55%**	
Primary Roads	0 - 0.5 mi per square mi		> 0.5 - 1.5 mi per square mi		> 1.5 mi per square mi	
Secondary Roads	0 - 0.71 mi per square mi > 2.142 mi per square mi > 1.0 - 3.0 mi per square mi		> 0.71 - 2.142 mi per square mi Primitive Roads > 3.0 mi per square mi		0 - 1.0 mi per square mi	
Adjusted Road Density (for square mile areas that have a combination of primary, secondary and primitive roads)	0 - 0.5 mi per square mi		> 0.5 - 1.5 mi per square mi		> 1.5 mi per square mi	
Habitat Use and Roads: Zone of Influence***.	Habitat > 0.5 mi from a road		Habitat between 0.25 - 0.5 mi from a road		Habitat < 0.25 mi from a road	

^ Habitat structural stages and cover types are based on the Habitat Capability Model (Ver. 4.0, USFS Rocky Mountain Region, last updated 1993) in conjunction with literature review.

[1] High elevation riparian comprises all riparian areas that occur within or adjacent to Forest, meadow, and shrubland cover types.

[2] Mountain grassland includes FOR, GAF, GFE, GPO, and GRA cover types.

[3] Mountain shrub includes SAL, SHR, SMS, SSN, and SWI cover types.

* Wet meadow comprises the GWE cover type.

** Refer to Forest Plans Standards and Guidelines (III - 77) regarding habitat effectiveness for elk in terms of adjusted road density based on coefficients for primary, secondary, primitive, and closed roads. For the habitat analysis, a 0.25 mi buffer will be applied for trails, and a 0.50 mi buffer will be applied for roads.

*** Apply two multiple buffer rings spaced 0.25 mi apart around roads to determine a zone of influence. Classify habitat as low quality if it falls within 0.25 mi of a road, moderate quality if it falls between 0.25 to 0.5 mi of a road, and high quality if it falls greater than 0.5 mi of a road.

° A 60:40 ratio of forage to cover habitat was considered optimum for winter elk habitat by several authors (Thomas et al. 1979, Smith 1985, Brown 1991).

C and G. Elk are typically associated with Forest edges (Cairns and Telfer 1980) and foraging often occurs within 200 m of cover (Thomas et al. 1979, Smith 1985).

D. To provide adequate protection for herds of elk, thermal cover areas need to comprise a minimum area of 4 ha (Wisdom et al. 1986).

Comment [BK6]: Other variables of interest are slope and aspect features. For instance, south and west facing slopes will provide forage habitat during most winters while north and east facing slopes may be avoided during most winter when snow is too deep

Comment [o7]: CPW recommends updating this table to account for both road an trail density impacts on habitat effectiveness. Please include standards and guidelines for both road and trail densities based on volumes and seasons of use.

Comment [o8]: CPW recommends updateing these buffers. The most recent research suggests an area of influence of 1km for roads and trails that have ATV traffic, 500m for mtn bikes, and 200m for horse and foot traffic. Preisler, H. K., A. A. Ager, and M. J. Wisdom. 2013. Analyzing animal movement patterns using potential functions. Ecosphere 4(3):32. http://dx.doi.org/10.1890/ES12-00286.1

Field verification, particularly for project-level analysis, may be required to determine the reliability of habitat modeling at the stand level.

Elk habitat modeling using R2-Veg is an attempt to produce elk habitat maps for the Forest that are further refined than seasonal range distribution maps. By producing refined habitat maps for elk, foraging and cover habitat within known summer and winter range areas on the Forest have been identified in terms of optimum, marginal, and poor habitat quality. Factors influencing elk habitat quality include habitat structural stage, tree canopy closure and canopy height, habitat interspersion (distance of cover and forage habitat from the cover-forage edge), size of thermal cover areas, percent deciduous tree canopy (for winter foraging), and road density (habitat effectiveness). Table 2 summarizes acres of modeled summer and winter habitats on the Forest.

Table 2. Acres of elk habitat on the Forest based on habitat quality.

Habitat Parameter	Habitat Quality			
	High	Moderate	Low	Total
Winter Forage	72,811	664,984	583,778	1,321,573
Winter Cover	315,454	409,703	967,882	1,693,039
Summer Forage	910,719	782,594	1,119,085	2,812,398
Summer Cover	2,012,641	416,092	213,567	2,642,300

Rationale

Elk are a habitat generalist, capable of utilizing most habitat types present on the Forest. However, specific habitat types are used depending on the season and not all habitat types on the Forest are used by elk at all times of the year. Importantly, identifying seasonal habitat use areas on the Forest is critical to gauging the effects of management activities on elk, particularly travel management activities and its influence on habitat effectiveness. Numerous literature sources support the habitat criteria used to model elk habitat on the Forest, including Thomas et al. (1979), Wisdom et al. (1986), Smith (1985), and Brown (1991).

Comment [BK9]: CPW agrees with this assessment. CPW is currently conducting long-term data analysis projects to better understand the seasonal habitat utilization patterns of elk across the GMUG and the data collected can be used to better understand elk habitat effectiveness and how different management actions, especially travel management decisions, could affect elk habitat use and effectiveness over time.

MANAGEMENT STATUS AND NATURAL HISTORY

Management Status

- The NatureServe database (www.natureserve.org/explorer) documents that throughout its range, elk have a ranking of G5; it is globally secure and common, widespread and abundant. It is also considered secure nationally and within the state of Colorado.
- **USFS Department of Agriculture, GMUG National Forests:** species is designated as a Management Indicator Species (MIS).
- ~~**Colorado Division of Wildlife**~~**Colorado Parks and Wildlife:** CPW~~The Division~~ manages elk under their Big Game Hunting Regulations.

Existing Regulatory Mechanisms, Management Plans, and Conservation Strategies

Under the National Forest Management Act (NFMA) the Forest Service is required to sustain habitats that support healthy populations of native and desired non-native plant and animal species on national forests and grasslands, including Management Indicator Species such as elk. Elk populations are intensively monitored by ~~the Colorado Division of Wildlife (CDOW~~CPW~~)~~, and ~~CDOW~~CPW elk population data is used extensively by the Forest in land management decisions. Additionally, the Forest recognizes the economic importance of elk to the state of Colorado and the communities surrounding the Forest and works cooperatively with the ~~CDOW~~CPW to meet elk management objectives. The Forest's 1991 Amended Land and Resource Management Plan includes standards and guidelines for elk habitat management (Table 3).

Table 3. 1991 Amended Land and Resource Management Plan standards and guidelines for elk habitat management.

Management Activities	General Direction	Standards and Guidelines
Aquatic and Terrestrial Habitat Management	Manage for habitat needs of indicator species.	Deer and Elk. Provide hiding cover within 1000 ft of any known calving areas.
		Deer, Elk, Black Bear, and Goshawk: In areas of historic shortage of dry season water, where there is less than one source per section, create one source per section.
	Maintain habitat for viable populations of all existing vertebrate wildlife species.	Maintain habitat capability at a level at least 40% of potential capability. (This standard varies with specific management area guidelines)
Habitat Improvement and Maintenance	Use both commercial and noncommercial silvicultural practices to accomplish wildlife habitat objectives.	In Forested areas, maintain deer or elk cover on 60% or more of the perimeter of all natural and created openings, and along at least 60% of each arterial and collector road that has high levels of human use during the time deer and elk would be expected to inhabit the area. Cover should be located and measured perpendicular to the road. Gaps between cover along roads should not exceed 0.25 mi. Roads with restricted use could provide for less cover. Maintain cover along 40% of each stream and river.
		In diversity units dominated by Forested ecosystems, the objective is to provide for a minimum habitat effectiveness of 40% through time. Habitat effectiveness will be determined by evaluating hiding and thermal cover, forage, roads, and human activity on the roads. Cover should be well distributed over the unit. Hiding and thermal cover may be the same in many cases. Minimum size cover areas for mule deer are 2-5 acres and for elk 30-60 acres.
		In diversity units dominated by non-Forested ecosystems, maintain deer and elk hiding cover as follows:

% of Unit Forested	% of Forested Area in Cover
35-50	At least 50%
20-34	At least 60%
<20	At least 75%

		These levels may be exceeded temporarily during periods when stands are being regenerated to meet the cover standard, or to correct tree disease problems, in aspen stands, or where windthrown or wildfire occurred. Maintain hiding cover along at least 75% of the edge of arterial and collector roads, and at least 60% along streams and rivers, where trees occur. Alter age classes of browse stands in a diversity unit, no more than 25% within a ten-year period.
	Improve habitat capability through direct treatments of vegetation, soil, and waters.	
	Maintain edge contrast of at least medium or high between tree stands created by even-aged management.	

In the 1991 Amended Land and Resource Management Plan, elk were also specified as a MIS for travel management, and in the current Forest plan revision, elk were also retained as a MIS for travel management objectives. Elk habitat effectiveness is influenced by the density of open roads and motorized trails, and by the amount of human activity on those roads and trails (Table 4).

Table 4. 1991 Amended Land and Resource Management Plan standards and guidelines for travel management objectives for elk.

Management Activities	General Direction	Standards and Guidelines
Transportation System Management	Manage public motorized use on roads and trails to maintain or enhance effective habitat for elk.	Objective level of habitat effectiveness for elk within each fourth order watershed is at least 40%. (This standard varies with specific management area guidelines)
		Habitat effectiveness will be determined by evaluating, in combination, hiding and thermal cover, forage, road density and human activity on roads. The HABCAP model accomplishes this analysis.
	Manage road use by seasonal closure if: Use causes unacceptable wildlife conflict or habitat degradation.	
	Keep existing roads open to public motorized use unless: Use conflicts with wildlife management objectives.	

Biology and Ecology

Fitzgerald et al. (1994) provides detailed information on the biology, ecology, distribution, and life history requirements of elk for the state of Colorado, which are summarized below. Patton (1992, 1997) provides a detailed life history account for Rocky Mountain elk, which is also summarized below. For a complete life history for elk (Patton 1992, 1997) refer to Appendix A.

Comment [BK10]: Most mapped calving areas typically already provide adequate hiding cover. Calving areas are not consistently mapped across the entire GMUG. CPW recommends incorporating adaptive management principles here as this standard may be difficult to achieve if calving areas are mapped more accurately across the GMUG

Comment [BK11]: Mapped calving areas on the GMUG are very limited as CPW staff historically only mapped calving areas coincidentally with other activities. In many locations on the GMUG specific calving areas haven't been identified as they are believed to be extensive, dispersed, and difficult to map accurately. Calving areas may be best identified on the GMUG using an empirical habitat modeling effort based on resource selection functions. This would be the most accurate approach to helping the Forest Service to evaluate land management actions in relation to calving areas. CPW can assis ... [1]

Comment [BK12]: CPW recommends removing this standard given the presence of hemmorahgic diseases and recently documented Chronic Wasting disease. Water is important for elk, but point source concentrations of water compound disease issues by concentrating elk and disease vectors.

Comment [BK13]: CPW recommends maintaining forest cover along roadways. Efforts to remove forest near roadways for fire mitigation will cause human activities on roads to have a larger disturbance impact on elk behaviors.

Comment [BK14]: CPW recommends incorporating adaptive management principles here. The density of forest cover that is actually optimal can be assessed with future data analysis of the ongoing elk studies. In areas like the Gunnison Basin, open habitat types are likely more important than once thought. Other research on elk populations in North America are supportive of this not ... [2]

Comment [BK15]: CPW supports the GMUG continuing to use elk as an MIS for assessing habitat effectiveness in relation to open roads, trails, and human activity. Extensive literature exists evaluating the impacts of roads and recreation on elk habitat use and reproductive success. If the MIS concept is not carried forward in the plan revision per the 2012 USFS Planning Ru ... [3]

Comment [o16]: Due to road and trail densities over-riding other habitat features contributing to habitat effectiveness, CPW recommends incorporating specific standards and guidelines for elk seasonal habitats tied directly to road and trail densities and their seasons of use. Direct standards and guidelines for seasonal habitats tied to road and trail densities will be easier to admin ... [4]

Elk are large ruminants that exhibit sexual dimorphism. Males (bulls) are significantly larger in size, weigh more than females (cows), and carry antlers that are shed yearly in later winter or early spring. Elk are generalist feeders, being both grazers and browsers. They are able to digest large quantities of low quality forage. Grasses, shrubs (including sagebrush), aspen twigs and bark are important winter forage components. In some areas of Colorado dead leaves also comprise a portion of their winter diet (Hobbs 1981). Generally, forbs are more important during late spring and early summer. Grasses increase in importance as the summer progresses, carrying into the fall (Fitzgerald et.al. 1994). In some areas of Colorado 77-90% of the summer diet is composed of grasses and browse constitutes 56% of the winter diet (Boyd 1970).

Under normal circumstances elk are nocturnal or crepuscular with regard to their activities. Elk tend to rest during the daytime, seeking shade and cover with good visual range. During winter elk do seek cover but may bed out on open slopes in the snow.

Many elk populations are migratory, while others are not. Elk typically exhibit altitudinal migrations, using different ranges for winter, spring (transitional), summer and fall (transitional). Summer ranges tend to be at higher elevations with winter ranges being at lower elevations. Mature bulls and cows, calves and young bulls are usually in separate herds during the spring and summer. The groups come together during the rut.

Breeding activities begin in late summer and are usually completed by the end of October. Mature bulls acquire harems consisting of cows with their calves. Females breed yearly, having up to three estrous cycles if initial breeding is unsuccessful. Yearling females are capable of breeding but only 29% of the yearling females carry calves into the fall. The success rate for mature females in Colorado is 76% (Freddy 1987). Bulls three years and older usually perform the majority of breeding. Yearling bulls that breed typically have a low conception rate. Adult cows normally produce one calf per year with twins being rare. Female bands will migrate together to calving grounds from their winter and spring ranges. The female will isolate herself from the herd to bear her calf. Calving sites are usually found where water, cover and forage are in close proximity. Two to three weeks after the calf is born, the cow and calf return to the herd.

Wildlife-Habitat Relationships

In Colorado, elk are generally found above 6,000' (1,800 m.). They utilize a variety of habitats, which include lodgepole (*Pinus contorta*), spruce-fir (*Picea englemannii & Abies lasiocarpa*), Douglas-fir (*Psuedotsuga menziesii)*, quaking aspen (*Populus tremuloides*) and mountain shrub types in conjunction with high mountain alpine meadows and lower elevation meadows and pastures, depending on the season. Elk require a combination of open meadows for foraging and woodlands for hiding cover, calving and thermal regulation (Figure 3).

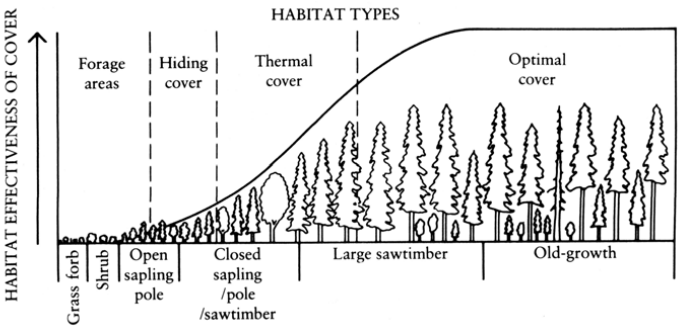


Figure 3. Development of stand conditions through time and cover habitat effectiveness (From Morrison et al. 1992).

The use of open areas by elk tends to decrease 110 yards (100 m) from the forest edge. Slopes from 15-30% are preferred (USFS 2002). Ideal winter range includes north and northeast slopes consisting of densely wooded lowlands for cover, combined with south and southwest facing slopes for foraging opportunities. High quality transitional range usually includes meadows or pasture, aspen groves, and other woodland types that provide high quality forage enabling elk to gain weight prior to winter. Open water availability is important in association with

Comment [BK17]: This statement may not be accurate in alpine environments. CPW recommends re-evaluating this criteria in high alpine environments during the summer as well as during the winter by analyzing elk GPS data.

the habitat types described. Elk can extract some water from consumed plants in the summer and eat snow during winter (NRCS 1999).

Elk herds on the Forest are altitudinal migrants, using high elevation woodlands consisting of spruce-fir, Douglas-fir, aspen and/or lodgepole pine stands combined with alpine and sub-alpine meadows during the summer. Transitional ranges include lower elevation aspen stands in conjunction with montane coniferous Forests. Winter range includes low elevation aspen, gamble oak, pinyon, juniper, sagebrush, especially where sagebrush slopes interface with ponderosa pine and aspen groves. Agricultural fields also provide winter range habitat used by some elk in areas adjacent to the Forest. Willow covered stream corridors are also important, used both for cover and forage on the Forest. Aspen is an especially important habitat component, potentially used by elk year round for forage, cover and calving.

Based on the U.S. Forest Service habitat structural stage classifications for dominant cover types, aspen stands classed 1 through 3C would provide a likely food source. Mature aspen stands in the 4A-5 habitat structural stages provide cover habitat, with food value at certain times of the year. Aspen stands within the 3A-4A habitat structural stages have the greatest potential for calving, providing enough understory cover and forage for cows and calves.

Cover requirements provided by spruce-fir, Douglas-fir and/or lodgepole would be in the 4A-5 habitat structural stage classes. Dense pole sized (3A-3B) stands also provide cover but may inhibit elk movement and provide little foraging opportunity. Regenerating conifer stands and shrublands (habitat structural stages 2T and 2S) may provide foraging and cover opportunities during the winter and summer, and may also be used for calving during the summer. During severe winters shrublands become critical for elk survival, in addition to lower elevation aspen stands. Parks, meadows and pastures, as previously mentioned, are a critical component within the life requirements of elk. These areas provide the majority of the grasses and forbs that elk depend on during spring, summer and fall.

Based on the habitat structural stage and habitat type requirements for elk, the Forest has an adequate mosaic of these habitats to support elk populations (Table 5). In terms of elk habitat acres by habitat quality, refer to Table 2.

Comment [BK18]: CPW recommends retaining these metrics for future comparison to updated empirical based resource selection function models. The R2-Veg data can be used as a baseline in the future modeling effort to assess how recent habitat changes related to spruce beetle and sudden aspen decline have changed the amount of suitable habitat of elk in the GMUG.

Table 5. Potentially suitable Rocky Mountain elk habitat on the Forest by vegetation cover type and habitat structural stage.

Cover Type	1	2	3A	3B	3C	4A	4B	4C	Total
Aspen		4,743	55,301	211,399	41,446	23,567	227,148	176,278	739,881
Cottonwood Riparian			248	100		2,530	1,532	42	4,452
Gambel Oak		291,383	472	82		416			292,353
Mountain Grassland	462,355								462,355
Mountain Shrub		165,073							165,073
Sagebrush		101,838							101,838
Wet Meadow	4,573								4,573
High Elevation Riparian (Blue Spruce)			101	242	560	234	597	836	2,570
Bristlecone Pine/Limber Pine			2,261	1,630	45	2,104	1,877	33	7,950
Douglas-fir			3,396	8,226	2,416	8,848	16,192	6,590	45,668
Lodgepole Pine		758	7,100	124,674	54,741	4,658	49,472	38,887	280,290
Pinyon-juniper			28,542	37,121	625	29,956	39,064	1,554	136,861
Ponderosa Pine		251	10,530	13,060	94	42,180	44,102	965	111,183
Spruce-fir		269	38,910	99,888	11,933	72,923	322,729	201,388	748,040
Total	**466,928**	**564,315**	**146,861**	**496,422**	**111,860**	**187,416**	**702,713**	**426,573**	**3,103,088**

Population Status and Trend

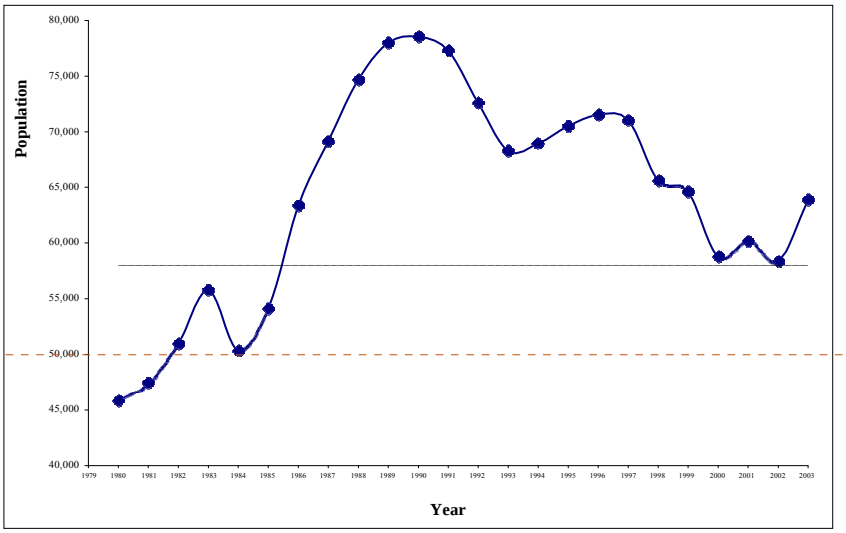
Historical Population Status

Elk populations on the Forest were extirpated in the late 1800s except for a few individuals. These small bands were augmented with elk relocated from Yellowstone in the early 1900s. With new game laws in place, elk began making a comeback in the '50s and '60s. Elk populations rose from the '80s to the early to mid '90s and have since dropped to levels that were characteristic of the late '70s and early '80s in many data analysis units.

Current Population Status

Elk populations are intensively monitored by the CPW~~olorado Division of Wildlife~~. Annual harvest and census data is used to estimate elk populations within specified geographic areas known as data analysis units (DAUs). Several DAUs overlap the boundaries of the Forest while some occur entirely within the boundary of the Forest. Currently, most elk herds in the state of Colorado are at or near population objectives.

The Forest contains either all or at least a portion of nine elk DAUs (Appendix B). Population estimates for these DAUs were analyzed to examine population trend since 1980 (Figure 4).



~~**Figure 4.** Rocky Mountain elk population estimates and trend for nine DAUs that include acreage within the Forest, 1980-2003.~~

Comment [BK19]: Replace this graph with new graph. Below.

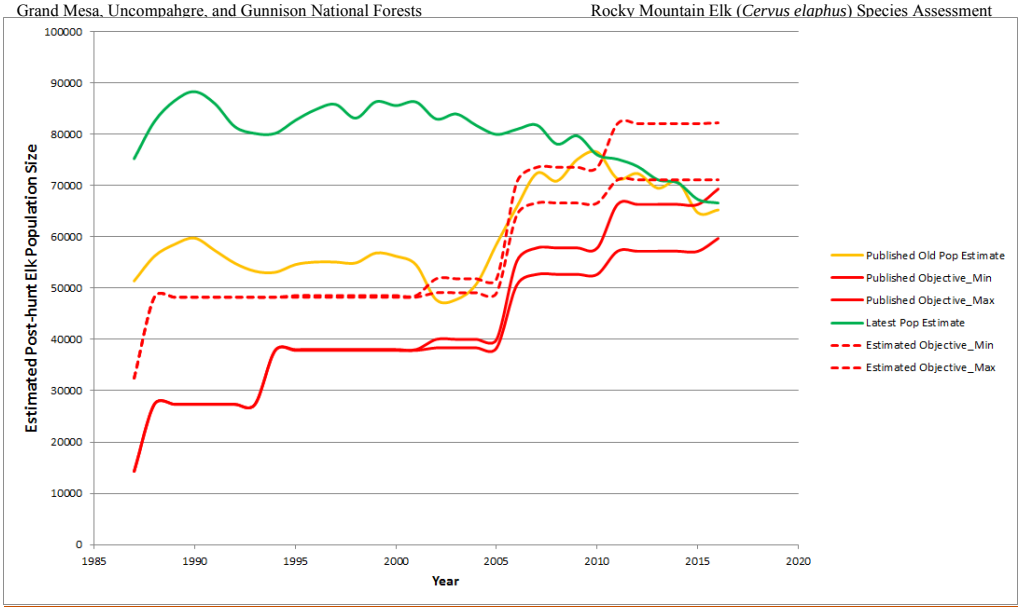


Figure 4: Elk post-hunt population size estimates for 1986 through 2016 for nine herds of the GMUG. Green line represent most current estimate of elk. Solid orange line represents population size estimates derived from older information (methods and data), but published annually by CPW. Dotted red lines represents estimated population size objectives. Solid red line represents the old objectives established at time of herd management plan creation, but often on population size estimates derived form the older information.

~~Although population fluctuations have occurred during this 23-year period, the above data indicates an overall increase in elk numbers across DAUs that occur on the Forest. In addition,~~ The total population estimate~~s~~ for all DAUs combined that include acreage on the Forest were ~~have been~~ above population objectives ~~since~~ from 1980 through 2009 (Figure 4) ~~(Figure 5),~~. Intentional efforts conducted by CPW to harvest elk and reduce the elk population, along with declining elk recruitment rates (Figure 5 and Figure 6) have reduced elk populations to now be under the objectives desired by stakeholders. Population estimates from 1986 through 2016 have indicated a long-term declining trend in elk numbers. ~~although several individual DAUs have been below population objectives at some point during this 23-year period. Refer to Appendix C for complete population data for each DAU that occurs on the Forest.~~ The graph also illustrates when models changed in the early 2000's to better utilize the data CPW collects, This model change resulted in an automatic increase in estimated population of 30%, on average. Ideally, any currently approved population objective would have been adjusted at that time based on public desires: maintain the elk population, or increase or decrease. This did not happen, so consequently there has been a disconnect between old objectives based on the old model (roughly 30% below new population estimates and new objectives had they been adjusted along with the model). New objectives based on the new model is the only remedy, but other higher priorities within CPW have prevented many herd plans from being updated. One option, when dealing with objectives that have not been updated, is to compare the old objective + 30% to the current population estimate to gauge whether the current population is above, within, or below what the public desired as expressed in the last approved herd management plan.

Calf elk recruitment, the addition of a calf being born and surviving year to join the population as a yearling, is a concern CPW staff are monitoring across all elk populations, but especially herds that have declining observed calf:cow ratios. Figures 5 and 6 illustrate the declining observed calf:cow ratios across the GMUG. To address the declining trend in recruitment, CPW has initiated a pilot elk study with 2 study areas, one on the Uncompahgre Plateau and the other in southeast Colorado near Trinidad. The study plan includes capturing and collaring adult female elk in the winter and checking pregnancy rates and body condition, while fitting pregnant cows with vaginal implant transmitters to be able to capture and monitor the survival of calves from the previously collared cows. Newborn calves were then captured and fitted with expandable GPS collars to monitor survival and habitat use in relation to collared cows. While one major aspect of the study is to assess calf survival, CPW staff plans to use the acquired GPS data from the adult females and calves to model seasonal habitat use and proximity to roads. CPW

will also analyze habitat use patterns in relation to hunting seasons and general recreational use. One theory for the declining calf:cow ratios on the Uncompahgre was density-dependence affects causing a decrease in calf recruitment as the population was exceeding carrying capacity, however, calf recruitment has continued to decline even as the elk population has been estimated to decrease by 25%. CPW staff are trying to evaluate if pregnancy rates, habitat condition, stress, or predation are limiting calf recruitment on the Uncompahgre Plateau.

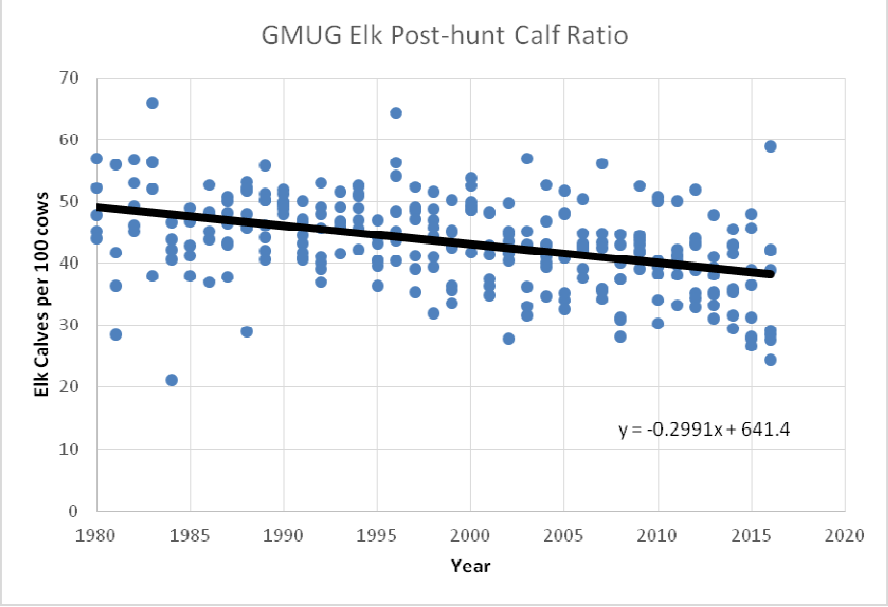


Figure 5. Elk calf ratios for defined elk herd management unit (DAUs: E14, E20, E24, E25, E35, E41, E43, E52) overlapping the GMUG by year. Each data point represents a single calf ratio estimate from a defined herd. Linear trend line indicates elk calf ratios GMUG wide have declined by approximately 10 calves per 100 cows in an approximate 30 year time period.

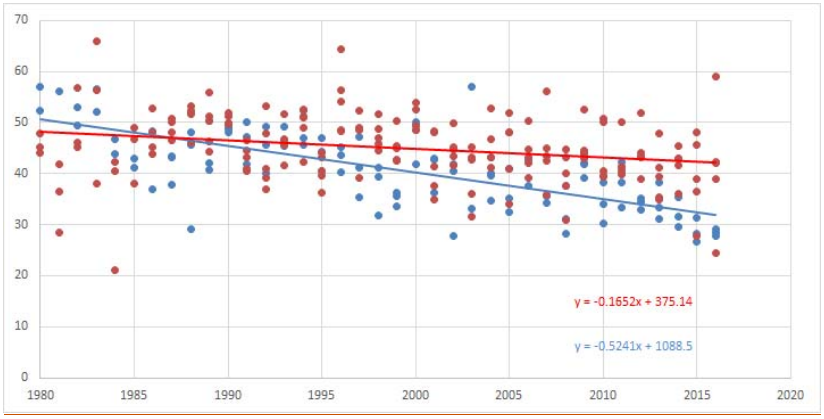
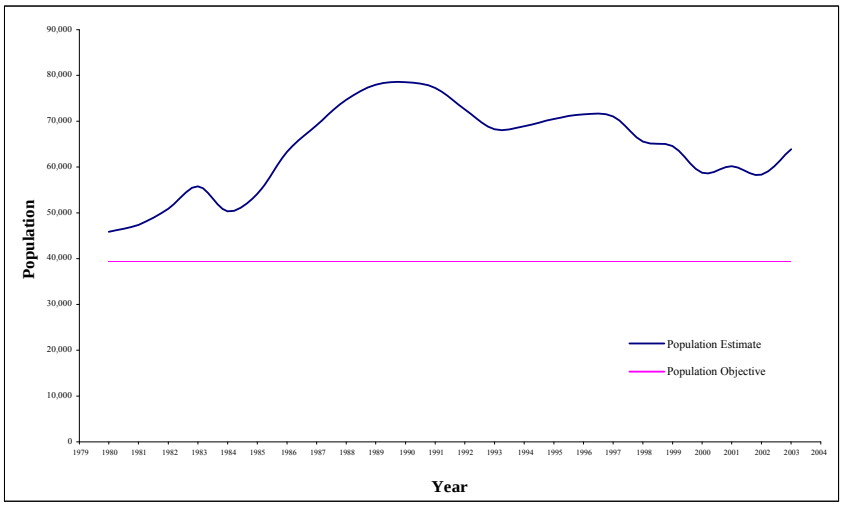


Figure 6: Calf recruitment rates for the GMUG elk herds. Red dots and line = E14, E52, E41, E43, and E25 (Gunnison Basin and Grand Mesa). Blue dots and line = E20, E24, E35 (Uncompahgre Plateau and Montrose area).



~~Figure 5. Elk population estimates compared to population objectives for all DAUs combined that include acreage on the Forest.~~

Comment [BK20]: Deleted this figure as it is captured on Figure 4.

Factors Influencing Elk Population Numbers and Causes of Population Fluctuations

Over the last two decades many elk herds in Colorado have changed their habits due to the ever-increasing destruction of habitat through development and the increasing disturbance by humans in their natural habitats. To avoid disturbance, many elk herds move to winter ranges on private lands early in the season. Game damage problems have become common in areas where elk use large tracts of private land to avoid hunting pressure or other disturbances such as ~~All Terrain Vehicles (ATVs)~~Off-highway vehicles (OHV). Numerous factors may influence elk habitat preference, seasonal distribution, and habitat use. These include snow depth, forage quality and availability, competition with domestic livestock, and disturbance from human activity, all of which in turn may influence population numbers and cause population fluctuations. Impacts on elk that occupy the Forest include habitat alteration from recreational activities, primarily trail-based recreation~~ATVs~~, logging, mineral development, and livestock grazing. If habitat alteration or disturbance is severe enough, areas may become unsuitable, forcing elk into less disturbed areas on Forest or nearby adjacent private lands. ~~The shift from public to private lands during the hunting seasons may be attributing to below objective harvest, thus allowing elk numbers to increase above CDOW objectives (Holland, personnel communication).~~

Comment [BK21]: CPW recommends removing this statement as we are currently at objective across most of our elk herds in the area. Some herds may still be over objective, however, in the coming years CPW staff will be updating herd management plans that will better reflect the status of elk in the GMUG planning area as being at objective or even below desired objectives in some areas.

CONSERVATION

Threats

~~Although Colorado Division of Wildlife elk population data indicates an overall increase in elk population estimates for the Forest from 1980 to 2003, increasing populations do not necessarily translate to good habitat conditions.~~ Management activities that negatively impact elk are primarily related to the long-term cumulative effects of ~~these~~ all human activities on elk~~their~~ habitats. Human disturbances associated with roads and trails influence elk habitat effectiveness, and growing private development, especially in elk migration corridors and winter range, may also affect elk number and distribution. Some riparian areas and meadows on the Forest are in fair or poor condition from livestock and wild ungulates contributing to higher utilization levels on these important foraging areas.

Management Recommendations

Timber harvest, thinning, and prescribed fire are management activities that can be used to improve elk habitat and ensure the maintenance of food and cover requirements provided roads are closed to prevent human access. In the

long term, quality habitat for elk is dependent on projects specifically designed to provide understory forage

recovery, especially away from streams and riparian vegetation to distribute elk use, and to improve small parks and openings through meadow maintenance and thinning near these sites. Browsing on seedlings and saplings by livestock and wild ungulates, has affected aspen regeneration in some areas of the Forest in the past, but new information suggests regeneration is occurring in some areas due to decreased domestic and wildlife utilization. Habitat improvement projects designed to promote aspen regeneration, combined with habitat improvement projects that distribute elk use over large areas, may allow for aspen recovery and improvement of elk habitat. Effective Travel Management Plans and maintaining road densities of 1 mile/sq. mile will also minimize disturbance to elk, helping to keep then on Forest lands where adequate harvest of animals can be attained.

The 1991 Amended Land and Resource Management Plan provide standards and guidelines for elk habitat management (Tables 2 and 3). For additional management recommendations see the Resources Section of Appendix A.

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Appendix A

A COMPLETE LIFE HISTORY FOR ELK

Compiled by Patton (1992, 1997)

SPECIES
- Common name: Elk
- Scientific name: *Cervus elaphus*
- Subspecies:
  - *Cervus elaphus* subsp. *nelsoni* (Rocky Mountain elk)
  - *Cervus elaphus* subsp. *manitobensis* (Manitoba elk)
  - *Cervus elaphus* subsp. *roosevelti* (Roosevelt elk)
  - *Cervus elaphus* subsp. *nannodes* (Tule elk)
- Taxonomy:
  - Order: Artiodactyla
  - Family: Cervidae
- Weight: 227-363 kg (500-800 lb)
  - Adult cows weigh about 272-295 kg (600-650 lb)
  - Newborn calves weigh between 14 and 16 kg (30 and 35 lb)
- Maximum ecological longevity: 20 years
- Young per year: Generally 1, twins are rare
- Gestation period: 210-225 days
- Breeding season: September-October, with several estrous cycles.
- Mating: Polygamous
- Young born: May-June, usually in a secluded area. Cow-calf groups are formed and maintained through summer.
- Annual increase: 15-30 percent
- Antlers: Only males have antlers. Mature bulls have 6 points, male calves have buttons. Yearling bulls can have spikes without brow tines. Antlers are shed in March-April. Growth starts in May and continues until August when velvet is rubbed off. Weight of antlers is 11-14 kg (25-30 lb).
- Dentition: I0/3, C1/1, P3/3, M3/3 = 34
- All permanent teeth are present at 36 months.
- Major distribution: States of Arizona, New Mexico, Colorado, Utah, Nevada, California, Washington, Oregon, Idaho, Montana, Wyoming, and Provinces of British Columbia and Alberta. Elk can live Either in mountains or plains.
- Behavior: Gregarious. Bulls collect a harem of cows and calves. Young nonbreeding bulls are tolerated in harem. Combat between mature bulls for control of harem can result in death. Summer-winter migration or nonmigratory.

HAZARDS
- Severe winters, drowning, rutting combat.

PREDATORS
- Mountain lions (mostly on young), coyote (mostly on young), bears.

DISEASES
- Anthrax, anaplasmosis, brucellosis, tick-born fever, foot rot, eperythrozoonosis, chronic wasting disease.

RESOURCES
- Winter food: Mostly grasses and shrubs.
- Summer food: Transitions from grasses to forbs.
- Water: Free water is needed.
- Management Practices: Food and cover requirements and management practices vary according to habitat conditions that the local population has adapted to. It is not wise to use data from another area far

removed from the local management situation until there has been an effort to validate the data. Some general guidelines follow that may be applicable for local populations. Elk should be free from human disturbance; some recommendations are as follows:

1. 1.6 km (1 mi) of road/2.58 km^2 (1 mi^2) of habitat for primitive type roads.
2. 0.8 km (0.5 mi) of road/2.58 km^2 (1 mi^2) of habitat for secondary roads.
3. 0.4 km (0.25 mi) of road/2.58 km^2 (1 mi^2) of habitat for primary roads.

Approximately 40 percent of the occupied habitat should be in the following cover classes: hiding (20 percent) and thermal (20 percent).

Hiding cover is any vegetation capable of hiding 90 percent of a standing elk at 60 m (200ft).

Thermal cover is a Forest stand at least 12 m (40 ft) in height with tree canopy cover of at least 70 percent. This is achieved in many closed sapling-pole stands and by all older stands. The other 60 percent of the habitat can consist of openings of 12 to 16 ha (30 to 40 ac) or distances across an opening of 365 m (1200 ft).

Water sources need to be no more than 1.6-2.4 km (1-1.5 mi) apart for maximum habitat use.

Space: In general, depending on habitat quality, a small herd (30-50) of elk requires approximately 400 ha (1000 ac) each of winter or summer habitat.

HUMANS

Disturbance by humans is a major management problem in many areas.

MAJOR REFERENCES

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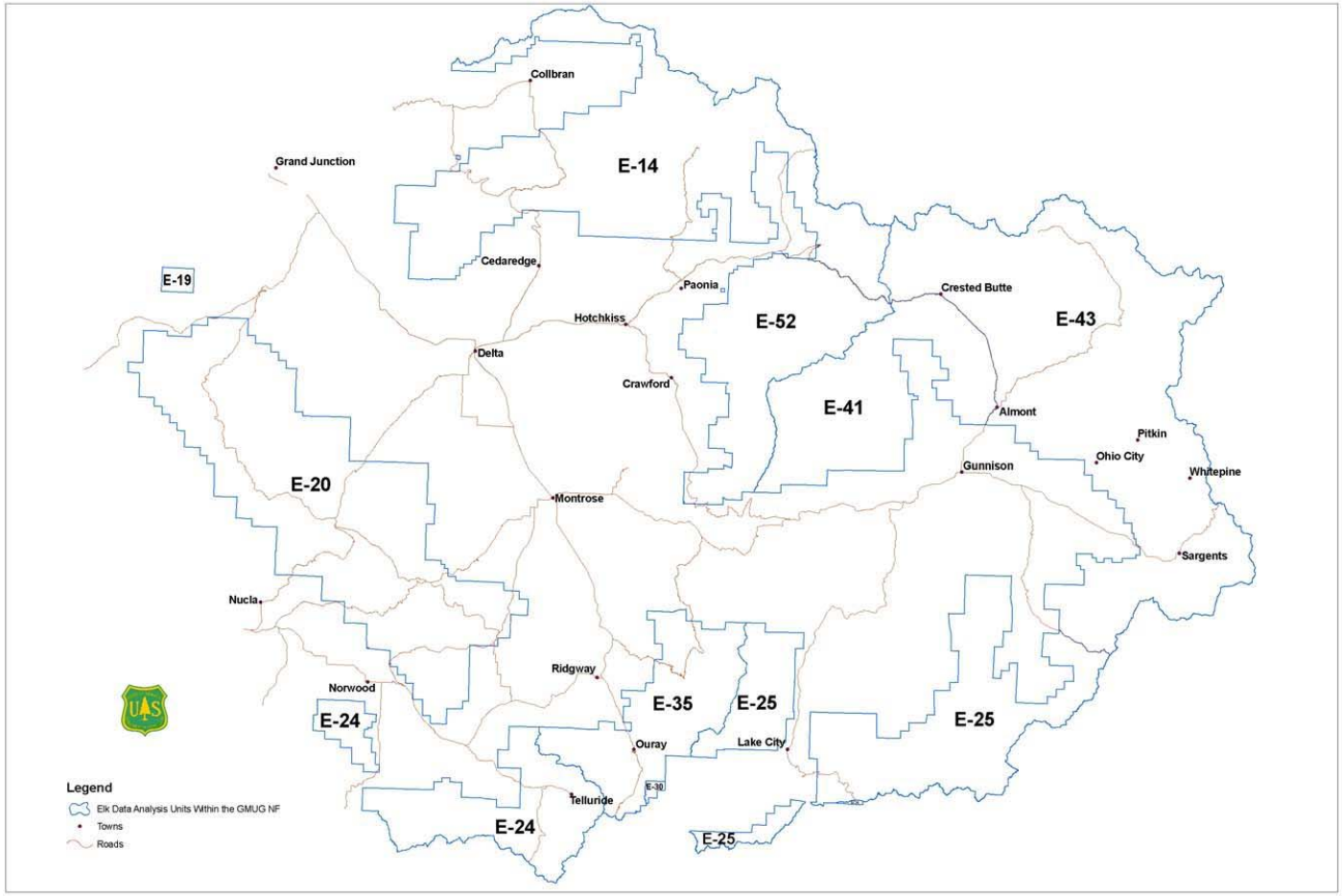
Grand Mesa, Uncompahgre, and Gunnison National Forests Rocky Mountain Elk (*Cervus elaphus*) Species Assessment

Appendix B. Elk Data Analysis Units on the Forest



Appendix C. Elk population estimates compared to population objectives for each Data Analysis Unit that contains acreage on the Forest, 1980-2003

	Data Analysis Unit									
	E-14	E-19	E-20	E-41	E-43	E-52	E-24	E-25	E-35	
	Population Objective									Total
	10,500	2,400	3,050	3,500	3,500	2,350	10,200	4,500	2,900	39,400
Year	Population Estimate									
1980	9,744	584	6,247	4,096	4,514	2,475	9,512	4,753	3,929	45,854
1981	9,903	586	6,508	3,778	4,441	2,609	10,241	4,736	4,584	47,386
1982	10,359	774	6,789	4,246	4,737	2,906	10,975	4,894	5,238	50,918
1983	10,946	797	7,256	4,263	5,754	3,004	12,005	5,407	6,355	55,787
1984	9,765	841	5,886	3,915	4,956	2,638	12,085	4,827	5,407	50,320
1985	10,155	941	6,040	4,461	5,519	2,714	13,918	4,897	5,458	54,103
1986	11,970	1,112	6,526	4,871	5,923	3,344	18,222	5,392	5,977	63,337
1987	13,494	1,189	6,949	5,519	6,751	4,021	18,129	6,187	6,913	69,152
1988	15,010	1,246	7,926	5,987	7,252	4,551	18,083	6,830	7,797	74,682
1989	16,072	1,393	9,079	6,073	7,294	4,753	18,438	7,004	7,892	77,998
1990	16,189	1,569	9,758	5,586	6,479	5,123	18,747	6,858	8,229	78,538
1991	16,168	1,697	9,953	5,195	6,210	4,838	18,112	6,975	8,143	77,291
1992	14,551	1,761	9,334	4,921	6,127	4,912	17,730	6,603	6,660	72,599
1993	13,228	1,832	8,034	4,967	5,832	4,358	17,187	6,773	6,048	68,259
1994	13,229	2,006	8,449	5,218	5,872	4,428	17,104	6,710	5,923	68,939
1995	13,317	2,067	8,701	5,529	6,112	4,517	17,598	6,770	5,909	70,520
1996	13,924	2,239	8,707	4,599	5,516	4,731	19,393	6,697	5,701	71,507
1997	14,135	2,308	8,773	4,693	5,241	4,619	18,808	6,809	5,657	71,043
1998	13,188	2,335	8,453	4,336	4,689	3,841	15,744	7,360	5,620	65,566
1999	12,687	2,401	8,623	4,270	4,664	3,857	14,878	7,683	5,558	64,621
2000	11,060	2,365	9,135	3,880	3,723	3,836	12,093	7,002	5,659	58,753
2001	11,670	2,710	9,110	3,850	3,820	3,840	14,260	5,510	5,390	60,160
2002	10,020	2,850	11,040	3,580	3,480	3,260	13,850	4,540	5,710	58,330
2003	11,460	2,860	9,990	5,400	4,180	3,350	16,710	4,530	5,400	63,880

Comment [BK22]: This table contains outdated historical population estimates. Past population estimate data will change as new data and modeling methods are incorporated. The trend graph provided in Figure 4 is a better representation of elk population changes relative to stakeholder desires expressed in the objectives.

Page 11: [1] Comment [BK11] **Blecha, Kevin** **1/26/2018 9:05:00 AM**

Mapped calving areas on the GMUG are very limited as CPW staff historically only mapped calving areas coincidentally with other activities. In many locations on the GMUG specific calving areas haven't been identified as they are believed to be extensive, dispersed, and difficult to map accurately. Calving areas may be best identified on the GMUG using an empirical habitat modeling effort based on resource selection functions. This would be the most accurate approach to helping the Forest Service to evaluate land management actions in relation to calving areas. CPW can assist the Forest Service with this effort.

Page 11: [2] Comment [BK14] **Blecha, Kevin** **1/22/2018 12:16:00 PM**

CPW recommends incorporating adaptive management principles here. The density of forest cover that is actually optimal can be assessed with future data analysis of the ongoing elk studies. In areas like the Gunnison Basin, open habitat types are likely more important than once thought. Other research on elk populations in North America are supportive of this notion. It is suggested that these specific habitat requirements are difficult to maintain and adhere to, especially if not based on data from older literature.

Page 11: [3] Comment [BK15] **Blecha, Kevin** **1/26/2018 9:07:00 AM**

CPW supports the GMUG continuing to use elk as an MIS for assessing habitat effectiveness in relation to open roads, trails, and human activity. Extensive literature exists evaluating the impacts of roads and recreation on elk habitat use and reproductive success. If the MIS concept is not carried forward in the plan revision per the 2012 USFS Planning Rule, CPW supports designating elk as a Species of Interest or Focal Species for this purpose.

Page 11: [4] Comment [o16] **orange** **1/26/2018 9:10:00 AM**

Due to road and trail densities over-riding other habitat features contributing to habitat effectiveness, CPW recommends incorporating specific standards and guidelines for elk seasonal habitats tied directly to road and trail densities and their seasons of use. Direct standards and guidelines for seasonal habitats tied to road and trail densities will be easier to administer for individual projects/project NEPA than the existing functional habitat model.