



Kettle Range

CONSERVATION GROUP

October 27, 2022

Forest Supervisor Rodney Smoldon
Colville National Forest
Objection Reviewing Officer
Attn: Objections
765 South Main
Colville, Washington 99114

Submitted via email to: objections-pnw-colville@usda.gov

Re: – OBJECTION: Chewelah A to Z Stewardship Project Final Environmental Assessment and Draft Decision Notice

Objection Reviewing Officer:

Please accept this **Objection** on behalf of Kettle Range Conservation Project.

This Objection is filed to challenge the U.S. Forest Service's Decision Notice (DN) selecting the Proposed Action for the Chewelah A to Z Stewardship Project (Project) and analyzed in the Final Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI). We believe the DN and FONSI were reached in error pursuant to the National Forest Management Act (NFMA), the 2019 Colville Land Management Plan (LMP), National Environmental Policy Act (NEPA), Administrative Procedure Act (APA) and Title IV of the Omnibus Public Lands Management Act of 2009.

As required by 36 C.F.R. § 218.8(d), the objector's name, address, and telephone number are listed in the signature below.

Timothy J Coleman, ED
Kettle Range Conservation Group

[Redacted address]

Republic, Washington 99166

[Redacted phone number]

tcoleman@kettlerange.org

Chewelah A to Z Stewardship Project

Submitted by Objector Kettle Range Conservation Group

Submitted to:

Rodney Smoldon
Objection Reviewing Officer
Supervisor, Colville National Forest
765 South Main
Colville WA 99114

Pursuant to 36 CFR §214 and 36 CFR 218.8(d), Kettle Range Conservation Group (KRCG or Objector), seeks the reversal of the Chewelah A to Z Stewardship Project draft Decision Notice (DN) and Finding of No Significant Impact (FONSI), signed by Colville National Forest (CNF) District Ranger Joshua White, for the reasons described below.

In addition to, and in further explanation of, the objections and reasoning contained below, KRCG fully incorporates or attaches the following documents into this Objection:

- All oral comments made by KRCG Executive Director Timothy Coleman during Project area field trips organized by the CNF, and all written comments submitted to the CNF regarding the Chewelah A to Z Stewardship Project.
- All documents and comments submitted by the Northeast Washington Forest Coalition for this Project Prior to May 19, 2022, and its Objection to the Colville Land Management Plan & ROD.
- The First Amended Complaint for Declaratory and Injunctive Relief, filed in *Kettle Range Conservation Group v. USFS, et al.*, No. 2 :21-cv-00161-RMP (ECF No. 9, filed on August 3, 2021) and Motion for Summary Judgement, Case 2:21-cv-00161-SAB ECF No. 48 filed 10/14/22 (attached).
- All documentation contained in Chewelah A to Z Stewardship Project files and notes taken by CNF staff during Forest Service organized collaboration meetings held by the Three Rivers Ranger District, Colville National Forest.

PROJECT AREA DESCRIPTION

The Chewelah A to Z Stewardship Project encompasses approximately 58,358 acres in Stevens and Pend Oreille Counties, WA. The Project Area is also home to a diversity of plants and animals, including many species categorized as sensitive, threatened, or endangered by either the federal government or the state of Washington. Packs of state endangered gray wolves roam through the Project area, which also includes habitat for threatened Canada lynx, endangered grizzly bear and the elusive wolverine. Mature and old growth forests >20" dbh provide nesting habitat for the northern goshawk, pileated

and other regionally sensitive species of woodpecker, and lowland riparian areas support sensitive species of bat, frog, and trout.

BACKGROUND ON OBJECTOR

KRCG has fully engaged with CNF since 1976. Since 2002, KRCG has actively collaborated with CNF and the timber industry through the Northeast Washington Forest Coalition (NEWFC). We have participated in the Chewelah A to Z Stewardship Project development since its inception, attending Forest Service sponsored field trips and filing detailed comments both as KRCG as well as providing input to NEWFC comments. KRCG in its member role as a NEWFC Board of Director helped craft supports the coalition's 'Strategic Vision' document that was shared with CNF as an official organizational position regarding various CNF management activities. The primary reason for creating this document, was to update NEWFC Blueprint to reflect best available science and provide CNF with a set of principles that NEWFC would adhere to regarding all CNF projects.

Despite extensive collaborative input, written and verbal comments by NEWFC and separately by KRCG, the EA, DN & FONSI differ significantly from recommendations made by NEWFC and KRCG. The DN and FONSI are not in accordance with the legal requirements of NEPA, 42 U.S.C. 4321 *et seq.*, and its implementing regulations, NFMA, 16 U.S.C. 1600 *et seq.*, and its implementing regulations, the APA, 5 U.S.C. Sec. 706, the Collaborative Forest Landscape Restoration Program, (CFLRP), Omnibus Public Land Management Act of 2009 16 U.S.C. 7303(d). Sec 4003 (d) as amended, or the CNF LMP approved in 2019.

As a result of the EA and DN, staff, supporters, and members of KRCG will be directly and significantly affected by significant loss of biological diversity, natural scenery, degradation of wildlife habitat and impacts to non-motorized recreation that will result from full implementation of Chewelah A to Z Stewardship Project. Objector is an organization that represents wildlife, recreation and forest conservation activists who have spent decades of hard work to ensure protection of ecosystem diversity & integrity in the Columbia Highlands bioregion (including the CNF). The staff, supporters, and members of KRCG frequently use the Project area for summer and winter recreation, wildlife viewing, hunting, fishing, physical and mental health. The Chewelah A to Z Stewardship Project will significantly interfere with that enjoyment.

The selected alternative would destroy and degrade old growth forests, water quality, wildlife and fish habitat, scenic views, and the opportunities for solitude and recreation. Proposed logging, road construction and reconstruction in the selected alternative, if implemented, combined with historic natural and human-caused environmental impacts in the Chewelah A to Z watershed, will violate NFMA, the ESA and LMP.

The selected alternative does not fairly respond to public comment. It does not protect increasingly rare large diameter trees >20" the 2019 LMP "Desired Conditions" forest structure is meant to conserve and perpetuate. In dropping the former Eastside Screens 21" rule, the CNF touted its revised direction reached a higher bar. In reality the LMP provides very little guidance in this regard while maximizing agency deference to do what

Objection to Chewelah A to Z Stewardship Project Final EA, DN and FONSI

it wants regardless of best available science. Hence the Preferred Alternative sanctions logging three-quarters of the remaining 6% of the trees > 20" dbh in the project area.

REASONS FOR OBJECTION

We object to Project DN, EA and FONSI for the following reasons:

1. The Project does not trend towards landscape resiliency, will not achieve historic reference stand conditions in mature (100 y/o) and old forest (150+ y/o) forest structure. The CNF does not have an up to date inventory of mature (>20" dbh) and old growth (>150 y/o) trees and as such it lack evidence as to the abundance or lack thereof of mature and old at a landscape scale.
2. The EA indicates that 75% of large trees are candidates for removal (3.3.1.1) and around 60% cover of the Dry Douglas-fir forest (32,191 acres) will be opened (Table 3.2). Given the large change in canopy cover we would expect a significant increase in peak water flows and potential impacts downstream in Chewelah.
3. The Purpose and Need erroneously defines Project forests as "nearly all trees over 20 inches diameter at breast height (dbh) were fire-adapted, drought-tolerant," and thus proposed logging will not restore Historic Range of Variability because a significant portion of the project area is wet and moist Rocky Mountain forest. LeFevre et al. (2020) reference stand conditions are incorrectly applied and do not align with Project area stand conditions.
4. A project as massive as A to Z Stewardship requires a more detailed analysis provided in an Environmental Impact Statement (EIS). The CNF projects 125 million board feet of logs will be removed, equivalent to 25,000 log truck loads, the largest project ever by the CNF. Project activities will occur on 70% of the project area and logging would occur on about 40,000 of the 58,000 acres in the project area. The size and scope of this Project is unprecedented and the effects of the project are highly controversial and uncertain, thus mandating the creation of an EIS.
5. The Purpose and Need preordains its Preferred Alternative because it is so narrowly focused on logging as a cure to restore historic conditions that is precludes consideration of diverse range of alternatives
6. Project analysis does not disclose the unreliability of project "vegetation treatments are needed to improve the health and vigor of forest vegetation to reduce the potential for severe wildfire and associated negative effects on erosion..." EA @ 4. Harvesting timber does not translate simply into reducing fire risk. (Stone, et al, 2008)

7. The EA and supporting documents do not reasonably analyze the relationship of human-caused wildfire ignitions to roads and does not assess sedimentation caused by roads and the impact of temporary roads associated with this Project.
8. The Project is clearly designed to produce a large volume and thus more about a commercial timber sale than it is a “restoration” project, and is thus otherwise unresponsive to public comment, purpose and need and science LeFevre (2020), Churchill (2007), Hessburg (2015), Stine (2014), Hessburg, Agee (2003) .
9. The Project did not provide adequate information to KRCG or the public to allow for effective collaboration or fully informed comment or objection.
10. The Project does not improve recreational opportunities to better align with social concerns, does not maintain scenic integrity and in fact degrades scenic integrity by clearcutting forests, leaving inadequate forest cover of a few trees per acre in what is currently a fully-stocked, natural-appearing forest, in the viewshed of 49 Degrees North Mountain Resort ski area.
11. The Project does not effectively analyze wildlife viability as required by the LMP.
12. Project area silvicultural prescriptions were not made available to the public prior to release of the Final EA, DN and FONSI.
13. The Project does not define what if any large woody debris will be retained after logging and how this meets requirements of the LMP.
14. The impact of livestock grazing is not reasonably analyzed and it impacts to aquatic species, wildlife, invasive weed expansion nor TES species.
15. The Environmental Assessment is woefully inadequate in taking a hard look at past, present and reasonably foreseeable environmental impacts, showing the need for a more thorough Environmental Impact Statement.
16. The Project activities will not address the lack of suitable wildlife habitat snags in the project area, and will in fact reduce future snag recruitment.

STATEMENT OF OBJECTIONS and SUGGESTED REMEDIES

The CNF has failed to respond to collaborative input and comments submitted by KRCG and NEWFC. Its insistence to log big trees larger than 20" dbh is not supported by science, its analysis does not explain its reasoning why a departure from science is rationale and thus it doesn't help the public understand why it is proposing to cut down three-quarters of the big/old trees in the Project area that it admits only has 6% of this forest component remaining after more than a century of logging.

75% of large trees are candidates for removal (3.3.1.1) and around 60% cover of the Dry Douglas-fir forest (32,191 acres) will be opened (Table 3.2). Given the large change in canopy cover we would expect a significant increase in peak water flows and potential impacts downstream in Chewelah.

CNF propensity for using clearcutting – it calls “regeneration” -- in full view of the most popular winter recreation facility in the CNF is outrageous. The scale of this project is so massive, yielding so much timber volume, it can hardly achieve a Finding of No Significant Impact. The facts as evidenced by its environmental assessment (EA), design elements and projected timber volume clearly demonstrate this Project is first and foremost about producing timber volume.

KRCG members use and enjoy the project area, especially for winter recreation. The CNF has demonstrated its disregard of social concerns raised about this massive project.

1. Landscape resiliency continues on downward trend. LeFevre Incorrectly Applied

The Project does not trend towards landscape resiliency, will not achieve historic reference stand conditions in mature and old forest forest structure. The CNF does not have an up to date inventory of mature (>20" dbh) and old growth trees and as such lacks evidence as to the abundance and lack thereof of mature and old forest at a landscape scale.

The EA indicates that 75% of large trees are candidates for removal (3.3.1.1) and around 60% cover of the Dry Douglas-fir forest (32,191 acres) will be opened (Table 3.2). Given the large change in canopy cover we would expect a significant increase in peak water flows and potential impacts downstream in Chewelah.

The purpose and need in the Environmental Assessment (EA) of the Chewelah A to Z Stewardship Project states that the purpose and need states:

“Lack of fire within the project area and extensive forest management have created forest conditions that are extensively dense and uniform with reduced spatial variability. Current forest structure in the project area is dominated by closed canopy, mid-seral conditions with high stocking where trees have reduced vigor and there is competition-related mortality. Species compositions have moved away from fire-adapted, drought-tolerant, early-seral species toward

shade-tolerant late-seral species. For instance, LeFevre et al. (2020) found in reference stand conditions stocking levels lower than those encountered in the project area and that nearly all trees over 20 inches diameter at breast height (dbh) were fire-adapted, drought-tolerant species. Thus, vegetation treatments are needed to improve the health and vigor of forest vegetation to reduce the potential for severe wildfire and associated negative effects on erosion and sediment delivery, peak flows, and water quality.” EA @ 4

LeFevre Incorrectly Applied

Unmentioned here is the watershed has been extensively logged for the past 100+ years. And CNF incorrectly applies LeFevre and stand conditions in the Project area.

The CNF cites the Forest Vision that NEWFC (KRCG as board participant) helped write, as well as the Collaborative Forest Landscape Restoration Project. Douglas fir historically occurred on warm-dry, cool-dry, and mesic (moist) sites. Clearly, logging large Douglas fir on dry sites using LeFevre as justification is inappropriate. The Project target 8,118 acres of dry Douglas fir for logging. One would think that retention of all older and larger Doug fir would have been required. LeFevre considers Douglas fir a drought and fire resistant species.

The dominance of ponderosa pine, Douglas-fir, and western larch on the warm dry, cool dry, and mesic Douglas-fir PAG historical plots is consistent with findings regarding historical reference condition studies in similar forest types in Oregon and Washington (Harrod et al. 1999, Churchill et al. 2013, Hagmann et al. 2013, 2014). These species are highly resistant to low- and mixed-severity fire and resilient to drought disturbance. (@ 586)

This research focuses on trees, and does not mention wildlife. It does not say anything about the Eastside Screens, but it says this about the historical tree mix, which again implies that no large Douglas fir should be removed:

The historical plots represent a wide variety of conditions in terms of density, composition, and tree sizes. Douglas-fir and western larch were present on all historical plots, representing an average basal area (BA) of 36 percent and 31 percent, respectively (Figure 2). BA ranged from 35.7 ft² ac.⁻¹ in the warm dry Douglas-fir PAG to 70.2 ft² ac.⁻¹ in the cold mesic subalpine fir PAG. Despite having the lowest BA, the warm dry Douglas-fir PAG supported large trees with quadratic mean diameter (QMD) values among the highest of the study (Table 3). The lowest QMD values occurred in the cool mesic Douglas-fir PAG. (@ 582)

The mature & old growth inventory that is supposed to take place across the National Forest System has not been completed, yet the CNF is rushing ahead logging large diameter trees up to 25 inches as if get as much of the big trees cut down as it can before the inventory is completed. This is similar to what occurred during the Roadless Area Review and Evaluation era when the CNF paid as little as \$25/acre to have bulldozers run

up and down what was a roadless landscape in the Kettle River Range and Selkirk Mountains. Given an up-to-date large/old tree inventory is lacking for the CNF and the fact that a nation-wide national forest inventory is underway, it would seem prudent to follow a Precautionary Principle here – not to mention the LMP direction re large tree guidance -- protecting all trees over 20 inches.

Much of the Project area is not in a dry forest Plant Association Group (PAG). Historic conditions for the CNF considered it primarily a “moist forest.” (Hessburg / Agee 2003) The 49 Degrees North Mountain Resort ski area immediately east of the Project area receives on average 301 inches of snowfall a year. According to the Weather-atlas.com Chewelah receives about 34.09 inches of snow per year, the moisture gradient from Chewelah up to pass level (Project’s east boundary) is dramatic.

The EA @ 125 describes Project area “is already below the HRV in large snags and down wood...” the Proposed Action would cut down large trees, particularly Douglas fir and undesirable, E. spruce, grand fir and subalpine fire, when in fact those trees will provide future snag recruitment. How can this provide necessary habitat for Williamson sapsuckers – identified in specialists report as a “landbird of concern?”

Indeed, this also calls into question are natural disturbances – ie wildfire, insects and disease -- which create snag habitat and large diameter woody surface material that are source of food & shelter for myriad species, being short-changed in what seems to be a clash between timber volume production and biological diversity? At the finest scale, animals use habitat features associated with specific forest structure attributes (e.g., snags for foraging and nesting); at the meso-scale (sub basin or watershed scale). (Stine 2014)

Here again, the LMP standards are so ephemeral, with so many exemptions – not the least of which is loggers picking and choosing which trees to cut (vis a vis Designation by Description), as the render them virtually meaningless. Consider this LMP standard:

FW-STD-WL-12. Large Snag Habitat

Because snags larger than 20 inches diameter at breast height are currently below the desired conditions, they shall be retained unless they pose a safety hazard. This standard does not apply in developed recreation sites, around recreation residences, in administrative sites, and within 200 feet of an open road designated for firewood harvest. An additional exception to this standard can occur in areas that have been identified as candidates for tree faller training sites through consultation with local biologists. (Chewelah A to Z Specialist Report Wildlife @ 69)

Landscape Level Analysis Lacking – Forest Resiliency at Risk

Title IV of the Omnibus Public Land Management Act of 2009, as amended, the direction under which the Northeast Washington Forest Vision 2020 (Vision 2020) was created and funded, states its purpose "is to encourage the collaborative, science-based ecosystem

restoration of priority forest landscapes...". NEWFC and KRCG as a member helped created Vision 2020 and was integral in getting the CNF additional funding.

Restoring forest landscapes requires a multi-scale approach, in keeping with the most rigorous science and technical information, including Landscape Ecology, which is the study of reciprocal effects of spatial pattern on ecological processes (Pickett and Cadenasso 1995). For example, large-scale patterns of vegetation structure and composition drive the major ecological processes that restoration actions focus on (i.e., disturbance, habitat, aquatics, etc.) (Hessburg et al. 2015). Therefore, ensuring resilient forests, capable of accommodating and responding to a disturbance, involves restoring landscape spatial pattern to baseline or reference conditions.

Fire behavior, including the proportion of low, moderate, and high severity, is shaped by the pattern of vegetation structure and composition while simultaneously altering that structure and composition. If the spatial pattern of vegetation structure and composition is characteristic (i.e., within the normal range of variability for the plant association or structure class), the fire will behave characteristically. When fires behave characteristically, landscapes can respond to fire characteristically and ecologically rebound.

Landscapes that differ in structure and composition from baseline or reference conditions will behave uncharacteristically in the event of a disturbance. For example, fire within mesic forest types is generally infrequent with a higher proportion of moderate to high severity patches. In contrast, fire in dry forest types is typically frequent with a higher proportion of low severity patches. If managers do not consider the landscape spatial pattern, management activities risk creating unique or unusual conditions to which fire and other disturbances will respond in novel or unexpected ways that undermine habitat and other values. Simply put, it is not possible to address landscape resiliency from natural disturbances without patterning restoration work at the landscape level.

The vegetation and implementation reports describe a set of objectives to reach the purpose and need, but these objectives are all at the stand level. The Project area needs to be modified to include landscape-level objectives such as mean patch size, patch density, connectivity, and fragmentation. The “commercial thin with regen” is vague and uninformative. Defining objectives by applying both the historical and future range of variability as the landscape analysis prescription and associated materials recommend is necessary.

At the patch or stand-level in fire-frequent forests, spatial patterns were complex mosaics of individual trees, clumps, and openings. This intra-stand (or intra-patch) variability influences "key aspects of resilience and ecosystem function such as disturbance behavior, regeneration, snow retention, and habitat quality in frequent-fire pine and mixed-conifer forests. There is a broad scientific consensus that restoration

treatments should seek to restore this mosaic pattern to restore resilience and maintain ecosystem function." (Churchill et al. 2013).

Chewelah A to Z Stewardship Project design elements, demonstrably like the Sherman Pass Project, Trout Lake CE and Deer-Jasper Project before them, do not adhere to Churchill (2017) nor Franklin, et al, forest restoration mosaic pattern nor stand composition.

Mature and old growth determinations are highly subjective

The LMP relies on its 20" dbh standard retention that is exceptionally subjective, and in many examples been shown to be biased toward two species of trees: western larch and ponderosa pine. It routinely allows logging large diameter Douglas fir, misclassifying it as a fire risk rather than fire resistant.

As Franklin, et al (2012) note:

Although it seems straightforward, classifying trees or stands as old is not a simple task. The age at which forests are deemed "older" is a social decision, influenced but not defined by scientific input, with age a commonly used surrogate in determining which forests are going to be preserved from timber harvest. Age limits can also vary based on ecological thresholds, management objectives, and ease of implementation. For example, in a prior analysis we have used 80, 120, and 160 years to identify "older" in MFs (Johnson and Franklin 2009), an age range that goes from retaining all late-successional forests (80), to retaining most mature and all old-growth forests (120) or (at a threshold age of 160) retaining the oldest mature and all old-growth forests.

In the Pacific Northwest, the occurrence of older trees and forests currently is far below the historic range of variability, despite their ecological importance (Oliver, Spies 2009).

The EA indicates that 75% of large trees are candidates for removal (3.3.1.1) and around 60% cover of the Dry Douglas-fir forest (32,191 acres) will be opened (Table 3.2). Given the large change in canopy cover we would expect a significant increase in peak water flows and potential impacts downstream in Chewelah.

A survey performed in 1936 estimated that old-growth stands dominated more than 70% of the forests in eastern Washington and Oregon. (Hejum 1994) In addition a panel of experts assembled by Congress (the "Eastside Panel") warned that these forests had already been "transformed," and that if current rates of logging continued, old- growth stands would soon occupy less than 10% of these forests. *Id.* at 19. The panel warned that such a loss would "jeopardize many components of the biological diversity of eastside forests and increase numbers of threatened, endangered, and extinct species." *Id.* at 5. In particular, the panel found that only 1% of the Colville National Forest ("Colville" or "Forest") consisted of old-growth stands protected from logging. *Id.* at 54. In 1995, the Service implemented recommendations from the panel to protect remaining old-growth habitat, adopting procedures to limit proposed timber sales that included a

ban on cutting trees over 21-Inches in diameter at breast height (“DBH”). See FP 002982-3028 (“21-Inch Rule”).

The 21-Inch Rule is often referred to as “Eastside Screens,” but that report included other proposed rules to protect old-growth habitat. Eastside Screens Report at 7-12.

The FS issued the ROD for the 2019 Plan on October 21, 2019, replacing the 1988 plan as amended by the 21-Inch Rule. FP 108254, 113724. The Final Environmental Impact Statement for the 2019 Plan (“FEIS”) considered six alternatives. The 2019 Plan ROD selected Alternative P, which abandoned the 21-Inch Rule and promised to open the largest percentage of Forest to logging. FP 108237-40. In place of a bright-line rule protecting old growth, the 2019 Plan ROD substituted a “guideline” containing a variety of circumstances. *Id.*; FP 109776-77.

Requested Resolution

- Modify objectives, and associated actions within the Project area to include landscape-level objectives such as mean patch size, patch density, connectivity, and fragmentation as described in NEWFC’s Strategic Vision.
- Retain all tree >20” dbh.
- Withdraw the Decision and complete an EIS analysis.

2. Wildlife Viability Depends on Wildlife Habitat Effectiveness

There is no supporting documentation regarding the abandonment of Eastside Screens (see also #10 below), nor monitoring data regarding management indicator / surrogate species.

The National Environmental Policy Act (“NEPA”) requires the Forest Service to take a “hard look” at potential environmental impacts and impacts to wildlife before approving a Project. The Forest Service failed to do so here. At best, CNF’s lofty claims its actions will only further benefit wildlife as seen through a lens of HRV is in fact guesswork. The EA @ 14 best describes this situation: *“Untreated areas and restrictions would be identified during implementation using these design elements to address overall project objectives and resource concerns.”* (emphasis added)

This is a textbook definition of “Conditions Based NEPA.” What is actually going to be logged and where roads, etc are going to be located is yet to be decided. So how can the FS know project impacts before it knows what it is going to do? Merely using ridges and streams GIS mapping in Project biological evaluation of wildlife travel corridors does not assess the use of these features by resident wildlife and is more of an assessment of geography.

Threatened, Endangered and Sensitive Species

According to the US Fish & Wildlife Service concurrence determination cursory analysis of the Chewelah A to Z Stewardship Project “may affect, not likely to adversely affect” Canada lynx and grizzly bear. Until recently, there were two Lynx Analysis Units (LAUs) overlapping the project area, Chewelah and Tacoma. There is habitat for Northern goshawk, great gray owl, grizzly bear, wolverine and is the known territory of the Dirty Shirt and Carpenter Ridge Packs of state endangered gray wolves.

How does the Project affect specific areas, habitats or features within the Project Area, say, for grizzly bear or C. lynx when the CNF has yet to determine its actual soil/forest/watershed disturbing prescriptive actions? Potentially grave cumulative impact fragmentation and loss of natural areas are the main drivers of biodiversity loss so strategies that counteract this loss are key to ecosystem health. Identifying and maintaining connectivity among protected areas and habitat patches is one strategy to maintain networks of natural areas. Connectivity for wildlife is typically modeled in a static environment that reflects a single snapshot in time. However, it has been shown that, when compared with dynamic connectivity models, static models can underestimate connectivity and mask important population processes (Zeller, K 2021).

As noted by the US Fish & Wildlife Service, the project area contains suitable grizzly bear habitat and whose range is expanding, and lynx foraging & denning habitat. Where are those habitats located? The EA and associated documents fail to meaningfully address the issue of distribution of habitat types after project implementation. Landscape genetic models, should be used to estimate landscape resistance for wildlife. (Zeller 2018) Further, the EA and associated documents fail to disclose and analyze the effect of the project on dense horizontal cover, a key and critical habitat component for lynx.

Textbook definitions of habitat do not entail application of a “hard look” as required by NEPA. Clearly, if Project analysis surveyed for whitebark pine (as USFWS advised), then the project area also harbors lynx and grizzly habitat. The EA notes that grizzly bear and wolverine habitat needs are similar and that 32% of the project area is suitable habitat for both.

The Endangered Species Act (ESA) prohibits federal actions that are likely to jeopardize the continued existence of an endangered or threatened species or adversely modify designated critical habitats. The U.S. Fish and Wildlife Service provided input on federally listed or candidate species for consideration in project planning. They specifically noted that the project is outside a grizzly bear management unit but that bears are slowly expanding their range. EA @ 83.

According to the Biological Assessment for the Land and Resource Management Plan Revision for the Colville National Forest:

“While lynx have been occasionally detected within their historical range in Ferry, Stevens, and Pend Oreille counties, these detections are too few to represent a resident population (Lewis 2016). In a recent status review, the WDFW concluded that given the 1) range contraction observed in Washington following protection efforts (federal listing in 2000), 2) the substantial loss of habitat in the last 20 years, and 3) the ongoing and anticipated threats to lynx population persistence, the State status of the lynx in Washington should be changed from State Threatened to State Endangered (Lewis 2016).”

In 2016, the Washington Fish and Wildlife Commission listed the Canada lynx as state endangered and the Canada lynx is federally protected as a threatened species under the federal ESA largely due to habitat loss. Any treatments applied in the proposed Chewelah A to Z Vegetation Management Project should prioritize habitat preservation and enhancement for the Canada lynx. There should be proactive selection of micro sites in treated areas that offer concealing and denning cover for C. lynx. C. lynx have shown a hierarchal preference for den selection preferring northeasterly aspects with slope of 24° or less with abundant down timber. (Squires 2008)) Logging and road construction planned for the Chewelah A to Z Stewardship Project will impact Canada lynx habitat.

In particular, because the distribution of habitat types matters greatly for a variety of species, including Canada lynx, Project area logging, roads – past and present – cumulatively matters greatly. For example, Forest Service and U.S. Fish and Wildlife analysis of forest management effects on C. lynx and C. lynx habitat explains that the Forest Service must analyze the abundance and distribution of C. lynx habitat in authorizing forest management activities, and recognizes that the need to maintain C. lynx foraging habitat in close proximity to C. lynx denning habitat may require alterations to the distribution of forest management activities.

USFWS Species Status Assessment in 2017 states that “lynx responded most positively to areas having greater than 50 percent suitable habitat and generally avoided areas having less than 30 percent suitable habitat.” *Species Status Assessment for the Canada Lynx @ 97*. If as the Project analysis notes this area contains just 32% of suitable habitat for grizzly and wolverine. Wildlife Specialists Report @32.

There is known gray wolf pack in the Project area and there are cattle allotments where forestry prescriptions could result in livestock grazing in areas not previously grazed and this could cause conflicts to arise with the Dirty Shirt and/or Carpenter Ridge Packs. The gray wolf is a state endangered species. Den and rendezvous sites should be identified

and Project treatments should not encroach within 0.5 miles of either a wolf den or rendezvous site.

Large diameter legacy trees should also be left intact on the landscape to provide trunk foraging opportunities for birds. These large legacy trees, with large crowns, offer ample cone production for bird and mammal seed forage, and offer perches for predatory birds such as hawks and owls, both documented in the Project area. Large diameter legacy trees with mistletoe present should be retained to provide habitat for species that rely on mistletoe brooms for nesting like the great gray, long eared and great horned owls. The 2019 CNF Forest Plan states that “FW-DC-WL-03. Habitat Conditions for all Surrogate Species: Habitat conditions (amount, distribution, and connectivity of habitat) are consistent with the historical range of variability (per FW-DC-VEG-03 and 04) and contribute to the viability of surrogate species and associated species” (LMP p. 60). However, the EA and specialist reports do not contain any analysis of the landscape pattern when addressing wildlife viability, a key consideration. How can you address wildlife viability without assessing how wildlife can move through a mosaic landscape?

Additionally, the spatially explicit landscape evaluation conducted to aid the forestry treatments includes an assessment of specific wildlife habitat, including northern goshawk, white-headed woodpecker, and American marten. However, these results are not part of the wildlife specialist reports. The analysis of available habitat for both white-headed woodpeckers and northern goshawks appears drastically different between both analyses.

Reconstructing old roads has ecological impacts to ecosystems similar to new road construction. Reconstruction, restoration and construction of roadways in the Project area will have significant impacts on TES species and elk. This new system of roads, added to the existing road system, will permit over snow motorized use during winter, a time of year when wildlife are at the highest level of stress.

Commercial logging, road construction and livestock grazing will impact sensitive wildlife seclusion and reduce landscape permeability to migrating TES species.

This Project will further increase habitat fragmentation and the viability of wildlife diversity. As landscapes are further divided, wildlife habitat suitability decreases. When a large habitat amount remains, few species are lost from either pool. As fragmentation reaches a critical level and species begin to die out. Habitat fragmentation is a principal threat to most wildlife species in the temperate zone. (Wilcove 1986) This Project degrades the viability of wildlife diversity. Silvicultural treatments will degrade snowshoe

hare and red squirrel habitat, impacting lynx habitat suitability and in violation of the Forest Plan (STD WL 06; GDL WL 06)

The EA does not fully analyze impacts the TES species including C. lynx, gray wolves, wolverine and grizzly bear. One important deficiency in the Project is that the final EA states that the reason for the ESA-effects determination of may affect, not likely to adversely affect for C. lynx is that the Project will avoid potential C. lynx den sites. But these sites are not disclosed, nor is there any firm commitment to avoid these areas. The failure to disclose these sites is a failure to disclose baseline conditions, and therefore a failure to take a hard look at effects.

Additionally, because the distribution of habitat types matters greatly for C. lynx (with foraging habitat needed to be in close proximity to denning habitat), preserving denning habitat only is not sufficient for C. lynx protection. The EA and associated documents fail to meaningfully address the issue of distribution of habitat types after Project implementation.

Further, the EA and associated documents fail to disclose and analyze the effect of the Project on dense horizontal cover, a key and critical habitat component for C. lynx. While reduction in horizontal cover is recognized in the Biological Evaluation, it is not analyzed. There is no disclosure of the amount of dense horizontal cover in different parts of the Project area currently, or how Project implementation would impact that on a site-specific level, including impacts to snowshoe hare. This violates NEPA.

Requested Resolution

- Complete a formal consultation with USFWS (BiOp) for impacts to endangered and threatened species from Chewelah A to Z Stewardship and all connected projects.
- Conduct a wildlife viability analysis in concurrence with the 2019 LMP
- Retain the largest 40 trees per acre on all logging units
- Limit regeneration cuts to 1 acre and in rare instances no more than 3 acres where not connected to steep slopes, rock outcroppings, alluvial fans or “balds” and in riparian influence zones

3. Logging Unit information is not provided

Objector requested site-specific Chewelah A to Z Stewardship Project forestry prescriptions and road location data be provided for public review prior to issuance of the EA and DN. Project documentation does not say where or to what logging would occur but instead leaves the public to guess where, across over, general definition *might*

apply. By another name this is called “conditions based NEPA” the conditions part of which is not really known until the contract phase. “Regeneration” and “shelterwood with reserves” logging is by definition a “clearcut,” that will occur across 4,452 acres in the Project area.

The term “implementation” appears throughout the EA and supporting documents, but the term is largely undefined. There are lists of unit numbers but without a map – who knows where these units are or what is planned in them? The lack of specificity is stunning. This statement pretty much sums it up.

“Short-term effects were evaluated for the period within 5 years of project implementation.” Silviculture report @ 3.

The problem is effects evaluation is not available. What can be found is how each and every box has been checked as to what category of implementation might effect, not what the effects will be.

The specific locations of these logging prescriptions are unknown and thus LMP definitions alone provide the public insufficient information as to what the Forest Service is planning to do and just how massive this project will be.

Commercial Thinning in Combination with Regeneration Harvest (COMBO

Commercial thinning in combination with regeneration harvest would occur on up to 24,818 acres (up to 11,858 acres in Douglas-fir Dry, up to 12,508 acres in Northern Rocky Mountain Mixed Conifer, and up to 452 acres in Subalpine Fir/Lodgepole Pine). EA @10. The question is, where exactly will this occur and how can the public validate what the CNF says is a problem – how can the public effectively participate in such a massive project?

A fundamental tenant of NEPA is the basic requirement to provide accurate information to the public so it can understand what its government is proposing to do. Yet the CNF doesn’t know with certainty what implementation metrics will be until sale preparation – after the fact of issuing a DN and FONSI.

Douglas fir has thick fire-resistant bark equal to ponderosa and western larch, yet are considered at higher risk of wildfire.

There is little to no information regarding unit prescriptions on the coarse scale map provided to the public in the EA. There is simply no way to do an in the field survey of this Project and understand what the selected alternative prescription will do without additional information.

Churchill 2017 et al, and other science has promoted tree clumping to restore HRV. Collaborative participants who submitted written comment and verbal comment during forest field trips requested tree clumps be retained. There is no indication the CNF will abide by science nor citizen input regarding maintaining clumping. In fact, the only use of “clump” in the EA was regarding aspen.

But here again, there is no detail, or insufficient detail provided in the EA and supporting documents to allow the public to understand what the CNF is actually going to do regarding clumping, large/old tree retention, etc. NEPA’s requirement that the Forest Service provide baseline data and evaluate environmental effects. There is simply no way for the Forest Service to take a hard look at environmental impacts if it doesn’t know where or to what extent it is going to cut down the forest.

In particular, because the distribution of habitat types matters greatly for a variety of species, including Canada lynx, Project area logging, roads – past and present – cumulatively matters greatly. For example, Forest Service and U.S. Fish and Wildlife analysis of forest management effects on C. lynx and C. lynx habitat explains that the Forest Service must analyze the abundance and distribution of C. lynx habitat in authorizing forest management activities, and recognizes that the need to maintain C. lynx foraging habitat in close proximity to C. lynx denning habitat may require alterations to the distribution of forest management activities.

USFWS Species Status Assessment in 2017 states that “lynx responded most positively to areas having greater than 50 percent suitable habitat and generally avoided areas having less than 30 percent suitable habitat.” *Species Status Assessment for the Canada Lynx* @ 97. If as the Project analysis notes this area contains just 32% of suitable habitat for grizzly and wolverine. Wildlife Specialists Report @32.

Requested Resolution

- Provide specific unit by unit data and a readable map
- Do not log trees >20” dbh regardless of species

4. Project Related Grazing Impacts Not Analyzed

The U.S. Forest Service is tasked with responsibly managing public lands livestock grazing so as not to impair the diversity and viability of native wildlife inhabiting our national forests. As the federal land manager, this responsibility means the Forest Service must carefully evaluate whether federal forest lands are suitable for domestic livestock grazing

and explore methods for reducing conflicts between wild animal populations and the cattle it authorizes to graze the Project area landscape.

The EA and supporting specialist's reports do not provide adequate information regarding what, if any, are anticipated impacts of grazing on TES species habitat? Where and how much "capable and suitable acres" exist within the Project planning area and what environmental and cumulative impact might these have when grazed by herds of livestock from June through October each and every year after Project completion? How many additional capable & suitable acres for grazing will result from this Project?

Answers to these questions should be quantified in range analysis, otherwise on what basis can a Finding of No Significant Impacts be determined?

In addition to Project impacts, drought has direct consequences to forest forage productivity. Climate change is decreasing water availability and increasing drought conditions in the Project area. Droughts negatively impact forest inventories by increasing mortality and reducing growth, decreasing forage availability. This is compounded by livestock grazing which further reduces forage and water available for wildlife and reduced vegetative cover for wildlife concealment as well as increased wind and water erosion. Drought and grazing alter plant community composition and habitat structure, and reduce regeneration of trees and shrubs which in turn alters the bird and small mammal communities. (Vose 2016)

The EA does not address the impacts of Project activities on recolonizing gray wolf, Canada lynx and grizzly bear related to grazing even though this Project will affect species and their habitat. Nor does the EA in any way attempt to address potential future impacts, assess range management issues directly connected to this Project that could only be addressed through application of silvicultural prescriptions to create pasture, transitory range and allow for such range improvements to livestock management, ie. Bunching & herding, sight distance and aquatic resource conservation.

The Wildlife Report focused on riparian area conflicts caused by cattle grazing, but then dismisses those for the most part because these areas are mostly fenced. But what is left to the imagination is just what quantifiable "impacts" are – what has been observed? And as to the effects of Project logging, we find this conclusion that can hardly be believed:

"Unregulated livestock use would not be affected by the Proposed Action." Wildlife Report @ 68.

Requested Resolution

- Identify specific locations where additional grazing acres will likely occur

- Analyze grazing ecosystem impacts from past, present and future and provide evidence to support the FONSI
- Pull the EA and DN/FONSI and fully analyze grazing impacts to TES habitat in an Environmental Impact Statement
- Amend the Forest Plan and grazing sections re TES species to comply with NFMA

5. *Wildfire*

A primary purpose of this project's "vegetation treatments are needed to improve the health and vigor of forest vegetation to reduce the potential for severe wildfire and associated negative effects on erosion..." EA @ 4. Yet Project analysis does not disclose the unreliability of project in achieving this goal.

"Harvesting timber does not translate simply into reducing fire risk. However, forest thinning and other fuel treatment strategies can take many different forms, some of which can do more harm than good when considered with other factors that influence wildfire behavior, such as weather and terrain. One example of this issue can be seen in Montana during the 2003 fires. At the Cooney Ridge fire complex, an extensively and homogeneously logged watershed burned severely and uniformly due to remaining ground slash (which had attained low fuel moisture after overstory removal) and severe fire weather (low relative humidity and strong upslope winds)." (Stone, et al, 2008)

Neither the EA nor specialist reports acknowledge the uncertainty regarding forest fuels treatment, their durability over time and thus giving the public a false sense of security. It use the threat of wildfire to justify what would otherwise be an unpopular logging project on the doorstep of the City of Chewelah and in full view of the most popular mountain resort in the Colville National Forest.

Analysis fails to acknowledge the growing body of evidence that logging to "prevent" wildfire is been proven again and again to be false. "It is becoming more and more commonly accepted that reducing fuels does not consistently prevent large forest fires, and seldom significantly reduces the outcome of these large fires," Forest Ecology and Management. *Id.* at 871. (Bark v. USFS, 958 F.3d865) Bark also directed the USFS to a recent study published in "The Open Forest Science Journal" concluded that fuel treatments are unlikely to reduce fire severity and consequent impacts, because often the treated area is not affected by fire before the fuels return to normal levels.

The EA and supporting documents do not analyze the relationship of human-caused wildfire ignitions to roads and does not assess sedimentation caused by roads and temporary roads associated with this Project, nor does it analyze the effects of the project were highly controversial and uncertain.

The selected alternative does not use the “most effective” post-treatment fuel treatment that has been scientifically validated and recommended by state DNR, Pacific NW nor Rocky Mountain, et al research scientist recommendation that prescribed fire follow forest treatment prescriptions. Rather, the Project will rely on pile and burn treatments that can result in damage to forest soils and insufficient fuels reduction.

Requested Resolution

- Do not log any large tree >20” dbh.

6. Need for an EIS

A project as massive as A to Z Stewardship requires a more detailed analysis provided in an Environmental Impact Statement (EIS). The CNF projects 125 million board feet of logs will be removed during implementation, equivalent to 25,000 log truck loads, this will be the largest volume ever logged by a CNF project. Project activities will occur on 70% of the project area and logging would occur on about 40,000 of the 58,000 acres in the project area. The size and scope of this Project is unprecedented and the effects of the project are highly controversial and uncertain, thus mandating the creation of an EIS.

NEPA requires the Forest Service to prepare an EIS when it proposes a major federal action that *may* significantly affect the quality of the environment. 42 U.S.C. § 4332(2)(C); *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1212 (9th Cir. 1998) (“[A] ‘plaintiff need not show that significant effects will in fact occur....’ It is enough for the plaintiff to raise ‘substantial questions whether a project may have a significant effect’ on the environment.”) (citation omitted). Importantly, “the [Ninth] Circuit has established a relatively low threshold for preparation of an EIS.” *Natural Res. Def. Council v. Duvall*, 777 F. Supp. 1533, 1537 (E.D. Cal. 1991). If a plaintiff raises substantial questions regarding whether a project *may* have a significant effect on the environment, “a decision not to prepare an EIS is unreasonable.” *Blue Mountains Biodiversity Project*, 161 F.3d at 1211 (citing *Save the Yaak Comm. v. Block*, 840 F.2d 714, 717 (9th Cir. 1988)).

This Project reaches beyond the threshold of a finding of NO significant environmental impact. It’s connected actions encompassing a wide geographic area seriously challenges a conclusion that a less rigorous examination of environmental consequences in an environmental assessment framework meets necessary legal requirements.

Chewelah A to Z – is a HUGE land area that without a doubt cumulatively has significant impacts, especially to wide-ranging terrestrial species and watersheds. The forecasted timber cut of 125 million board feet – equal to 25,000 logs trucks, plus 60 miles of reconstructed road will have a significant impact to the natural environment. A Finding of

No Significant Impact for a project of this magnitude that will essentially remodel > 40,000 acres is fundamentally untenable. Taken together, past, present and future logging and road building this Project will have dire environmental impacts on fish, wildlife, and forest ecosystems. As such this Project must be more thoroughly examined in an Environmental Impact Statement.

In determining whether a proposed action may “significantly” impact the environment such that an EIS is required, both the context and intensity of the action must be considered. 40 C.F.R. § 1508.27. In evaluating intensity, the Forest Service must consider numerous “significance” factors. 40 C.F.R. §§ 1508.27(b)(1)-(b)(10). If the Forest Service’s action may be environmentally significant according to any one of the criteria, it must prepare an EIS. *Blue Mountains Biodiversity Project*, 161 F.3d at 1212; *Ctr. for Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1220 (9th Cir. 2008) (“an action may be ‘significant’ if one of these factors is met”); *Ocean Advocates v. U.S. Army Corps of Engineers*, 402 F.3d 846, 865 (9th Cir. 2005) (“We have held that one of these factors may be sufficient to require preparation of an EIS”); *Nat’l Parks & Conservation Ass’n*, 241 F.3d at 731. Even if no significance factor standing alone requires the preparation of an EIS, consideration of the significance factors cumulatively can require the preparation of an EIS. *Anderson v. Evans*, 371 F.3d 475, 494 (9th Cir. 2004) (requiring EIS based on consideration of multiple NEPA significance factors); *Cascadia Wildlands v. U.S. Forest Serv.*, 937 F. Supp. 2d 1271, 1283 (D. Or. 2013) (“[W]hen considered individually, none of these significance factors might require an EIS. However, when considered collectively, they do.”).

Here, the vast majority of the NEPA significance factors are implicated, as discussed throughout this objection (and incorporated into this objection point). For example, there are significant direct, indirect, and cumulative impacts from the Chewelah A to Z Stewardship Project; there will be impacts to areas with unique characteristics and ecologically critical areas; there are impacts to public health and safety; there are highly controversial and uncertain effects; and there are impacts to ESA-listed species and their habitat. Importantly, the draft DN/FONSI looks at these factors individually, but does not consider whether cumulatively they raise the significance of the Project such that an EIS is required. Note also that this is different than looking at the cumulative effects of the Project, but rather whether the synergistic effects of the significance factors requires an EIS. We like to think of determining whether an EIS is required as filling a bucket with water. Each significance factor adds some amount of water to the bucket, and when the bucket is full, an EIS is required. One factor might not fill the entire bucket, but when all the factors add their water to the bucket, it can still require an EIS. Here, the bucket is overflowing and the Colville is required to prepare an EIS.

The Project NEPA needs to assess if there are “irreversible and irretrievable commitment of resources.”

Project NEPA failed to take a hard look at past, present and future cumulative environmental impacts associated with the Chewelah A to Z Stewardship Project, added to Mill Creek A to Z, Lone and Power Lakes projects that are geographically connected east, north, south in this westerly sub range of the Selkirk Mountains. All of these projects have made or are making significant changes to the forest ecosystem including large clearcuts, logging trees >20” dbh and road construction.

The EA and supporting documents did not adequately address the viability of TES species. The EA and supporting documents did not evaluate changes to grazing management nor impacts to TES species. Soule’ et al (1988) described how fragmentation can affect entire ecosystems through “faunal collapse.” The spatial and temporal scale of logging, road building coupled with historic and current other uses – e.g., livestock grazing – have a significant impact.

Requested Resolution

- Provide a supplemental information documentation as identified above stated reasons and impacts of this action.
- Pull the EA and draft DN and redo Project NEPA analysis, issuing an Environmental Impact Statement

Conclusion

KRCG appreciates your consideration of the information and concerns in this Objection. Pursuant to 36 C.F.R. § 218.11, we respectfully request the reviewing officer allow adequate time for Objector to prepare thoroughly for any resolution meeting and that only objectors and officially registered interested parties be invited to participate in the meetings.

If you have any questions, please do not hesitate to contact us.
Sincerely,



Timothy J. Coleman
Kettle Range Conservation Group

tcoleman@kettlerange.org

Attachments: The First Amended Complaint for Declaratory and Injunctive Relief, filed in *Kettle Range Conservation Group v. USFS, et al.*, No. 2 :21-cv-00161-RMP (ECF No. 9, filed on August 3, 2021)

Motion for Summary Judgement, Case 2:21-cv-00161-SAB ECF No. 48 filed 10/14/22 (attached).

References Cited

Churchill, D.J., et al. Historical Forest Structure, Composition, and Spatial Pattern in Dry Conifer Forests of the Western Blue Mountains, Oregon, PNW-GTR-956, 2017

Jerry F. Franklin, S Trent Seager, and K. Norman Johnson. 2020. An Open Review of the: Proposed Action and Alternatives in the US Forest Service Pacific Northwest Region's Forest Plans Amendment: Management Direction for Large Diameter Trees in Eastern Oregon Environmental Assessment.

Mark Henjum, et al. 1994. Interim Protection of Late Successional Forests, Fisheries, and Watersheds: National Forests east of the Cascade Crest, Oregon and Washington.

Franklin, J. F., and K. N. Johnson. 2012. A restoration framework for federal forests in the Pacific Northwest. *Journal of Forestry* 110:429–439

Hessburg, P. F, and J.K. Agee. 2003. An environmental narrative of Inland Northwest United States forests, 1800-2000. *Forest Ecology and Management*. 178 (1-2): 23-59.

Hessburg, P. F., D. J. Churchill, A. J. Larson, R. D. Haugo, C. Miller, T. A. Spies, M. P. North, N. A. Povak, R. T. Belote, P. H. Singleton, W. L. Gaines, R. E. Keane, G. H. Aplet, S. L. Stephens, P. Morgan, P. A. Bisson, B. E. Rieman, R. B. Salter, and G. H. Reeves. 2015. Restoring fire-prone landscapes: seven core principles. *Landscape Ecology* 30:1805–1835.

Miles E. LeFevre , Derek J. Churchill, Andrew J. Larson , Sean M.A. Jeronimo, Jamie Bass, Jerry F. Franklin, and Van R. Kane, 2020. Evaluating Restoration Treatment Effectiveness through a Comparison of Residual Composition, Structure, and Spatial Pattern with Historical Reference Sites. Oxford University Press *For. Sci.* 66(5):578–588

Oliver, Marie; Spies, Tom; Duncan, Sally. 2009. Old growth revisited: integrating social, economic, and ecological perspectives. *Science Findings* 110. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 5 p.

Squires, J. R., Decesare, N. J., Kolbe, J. A., & Ruggiero, L. F. (2008). Hierarchical den selection of Canada lynx in western Montana. *Journal of Wildlife Management*, 72(7), 1497. <https://doi.org/10.2193/2007-396>

S. T. A. Pickett; M. L. Cadenasso. 1995 Landscape Ecology: Spatial Heterogeneity in Ecological Systems *Science*, New Series, Vol. 269, No. 5222 (Jul. 21, 1995), 331-334.

Stine, P., P. F. Hessburg, T. A. Spies, M. G. Kramer, C. J. Fettig, A. J. Hansen, J. F. Lehmkuhl, K. L. O'Hara, K. Polivka, P. H. Singleton, S. Charnley, and A. Merschel. 2014. The ecology and management of moist mixed-conifer forests in eastern Oregon and Washington: a synthesis of the relevant biophysical science and implications for future land management. USDA Forest Service. Pacific Northwest Research Station. General Technical Report PNW-GTR- 897:254.

Stone, C., Hudak, A., Morgan, P. Forest Harvest Can Increase Subsequent Forest Fire Severity, Proceedings of the Second International Symposium on Fire Economics, Planning, and Policy: A Global View. General Technical Report PSW-GTR-208

Vose, J. M. (2016). Effects of drought on forests and rangelands in the United States: A comprehensive science synthesis.

Washington Department of Fish & Wildlife, *Canada lynx*. (n.d.).
<https://wdfw.wa.gov/species-habitats/species/lynx-canadensis#conservation>

Wilcove Ds, Mclellan Ch, Dobson Ap. Habitat fragmentation in the temperate zone. 1986. (Originally published in Conservation Biology: The Science of Scarcity and Diversity. Sinauer Associates Inc., Sunderland, 1986.)

Zeller, Katherine A.; Wattles, David W.; Bauder, Javan M.; DeStefano, Stephen. 2020. Forecasting seasonal habitat connectivity in a developing landscape. Land. 9: 233.

Zeller, Katherine A.; Jennings, Megan K.; Vickers, T. Winston; Ernest, Holly B.; Cushman, Samuel A.; Boyce, Walter M. 2018. Are all data types and connectivity models created equal? Validating common connectivity approaches with dispersal data. Diversity and Distributions. 24: 868-879.