



Friends of the Clearwater

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November 16, 2020

Sent via mail and email: appeals-northern-regional-office@usda.gov

Attention: Objection Reviewing Officer
USDA Forest Service, Northern Region
26 Fort Missoula Road
Missoula, MT 59804

Re: Homestead Project Objection

Objection Reviewing Officer:

Pursuant to 36 CFR Part 218, Friends of the Clearwater (FOC) and Alliance for the Wild Rockies (AWR) file this objection to the final Environmental Assessment (EA) and draft Decision Notice and Finding of No Significant Impact (DN) for the Homestead Project. This timber sale is proposed for the St. Joe Ranger District of the Idaho Panhandle National Forests. The responsible official is District Ranger Matthew A. Davis.

Pursuant to Part 218, FOC is the lead objector. The contact person is Gary Macfarlane, FOC Ecosystem Defense Director, P.O. Box 9241, Moscow, Idaho 83843 (208-882-9755).

The DN documents the Responsible Official's decision to implement the proposed action, which "includes approximately 1,170 acres of even-aged regeneration harvest."

The EA Table 3 discloses the miles of road management actions proposed:

New road construction	4.0
Nonsystem roads to be added to the NFS	2.7
Temporary road construction	2.9
Road reconstruction	5.2
Road maintenance	32.7
Road decommissioning	25.8
Road storage	12.5

We note that EA Appendix B indicates 34.42 miles of decommissioning of “undetermined” roads alone, conflicting with the 25.8 miles figure in Table 3.

The EA proposes changes to motorized access in the Homestead project area:

Table 4: Proposed changes to the MVUM in the Homestead Proposed Action

Route Types	Current Conditions in miles	Proposed Action in miles	Route Changes in the Proposed Action (additions)	Routes Changes in the Proposed Action (removals)
Roads	39.8	36.8	216A (0.26 mi, Breezy Pt.)	548 (3.3 mi, Davies Creek 548 A (0.7 mi, Davies Creek Spur)
Motorized Trails	7.5	77	548 UA (1.1 mi) 548 UE (0.2 mi)	1936 B (1.1 mi, Daveggio Meadow OHV)

The 77 miles appears to be a typographic error—it should read 7.7 miles. If not, it would constitute a NEPA violation because nowhere else in the EA does the FS explain, disclosed, or analyze such a major increase in motorized trails.

As discussed in our previous comments at p. 3, the DN would implement the 2015 Revised Forest Plan. In carrying out its mission, AWR has participated in the public processes concerning management of the IPNF since the early days of (original) 1987 Forest Plan implementation, and has taken legal action at times to force the Forest Service to manage the IPNF in conformance with environmental laws such as the Endangered Species Act (ESA), the National Forest Management Act (NFMA), and the National Environmental Policy Act (NEPA). AWR and FOC also fully participated in the public process as the FS developed its Revised Forest Plan, including commenting at every stage and submitting a formal objection. And because the FS provided essentially no relief in response to the formal objection, we incorporate the documentation of our participation in the Revised Forest Plan public process within this Objection (See “RFP process” folder included with digital submission of this Objection.) By implementing the Revised Forest Plan with this project, the FS would be violating laws and regulations.

AWR also participated during the public process as the Northern Rockies Lynx Management Direction (NRLMD) was developed, and continues to believe that the RFP/NRLMD does not consider the best available science, and incorporates its comments on that forest plan direction within this Objection of the Homestead timber sale. (See folder entitled “NRLMD Participation”.)

In addition to the issues AWR and FOC raised in the above contexts, we also provided March 9, 2020 comments on the EA. We incorporate that comment letter into this Objection. Below we also present additional discussions on the same issues raised in previous comments where they’re warranted—explaining how the Homestead timber sale would not be in compliance with laws, regulations, and policy.

Our objection statements are connected to our prior comments on Homestead or issues that arose after the opportunity for comment. Attachments, references, and other incorporated documents are included on the data DVD with the version sent to the Forest Service via US mail postmarked on this date.

Thank you for considering our objection points.

Sincerely submitted,

A handwritten signature in black ink, appearing to read "Gary Macfarlane", written over a light gray rectangular background.

Gary Macfarlane
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And for:

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PUBLIC INVOLVEMENT AND THE NATIONAL ENVIRONMENTAL POLICY ACT

In the “Homestead Project–EA Comment Synopsis May 19, 2020” there are complaints from the Project Team Leader:

14	5	Team Leader	A comment letter was submitted on behalf of the Alliance for the Wild Rockies and Friends of the Clearwater. The entire letter was read and considered; however, it was difficult to identify project-specific, substantive comments for response, for a number of reasons. • The letter was 227 pages in length (the entire Homestead EA was only 57 pages and Appendices). • They incorporate their objection comments on the 2013 Forest Plan/FEIS and 2007 Northern Region Lynx Management Direction. • They include a list of 237 references (most of which were cited in their incorporated comments).	Their comments indicate a wide range of concerns – alternatives, Forest Plan direction and plan elements, snags, fire salvage, fire mitigation on private lands, watershed, soils, riparian areas, aquatic habitat, diversity, wildlife, access and recreation, inventoried roadless areas, wilderness, un-inventoried roadless areas, timber, social and economic systems, carbon sequestration and climate change, monitoring, scientific integrity, and cumulative effects. Unfortunately, they only loosely relate those concerns to the Homestead project and analyses (for example, by inserting the project name into their incorporated comment) and do not cite a single page number or specific location in the Homestead EA
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We wonder why the Forest Service (FS) is upset that our comments were many more pages than their EA. What is the relevance? The FS writes an EA with less than 50 page of alternative description and environmental analysis, for a **29 million board feet timber sale with 4 miles of new road construction**, in the Marble Creek watershed which the FS and others have hammered by road building, clearcutting, and splash dam operations spanning several decades, is planning to **clearcut over 1¼ more square miles** of national forest, is marketing this as “no significant impacts”, and somehow can’t fathom consternation from the public!

In the Comment Synopsis the Project Team Leader also takes offense that we cite well over 200¹ scientific references in our comments—most of the references published in peer-reviewed journals and/or are scientific statements made by others employed by the FS (some even employed at the IPNF). The subjects of inquiry by those scientists and FS specialists are obviously the wildlife, waters, and other natural features like those found in the project area.

In the Comment Synopsis the Project Team Leader also disparages our comments saying they “do not cite a single page number or specific location in the Homestead EA” even though no regulations require the public to cite page numbers or specific EA locations. In doing so the Project Team Leader insults project team specialists because apparently they are somehow not able to make the connection between, for example, the *Pekania Pennanti* on which the scientists we cited conducted their research, and *Pekania Pennanti* native to the project area. And the assertion that our comments “do not cite a single page number or specific location in the Homestead EA” is a blatantly false statement by the Project Team Leader.

¹ Actually, over 350.

FYI, we provided over 200 pages of comments because we found the EA to be extremely lacking in addressing the issues and risks expected of a 29 million board feet timber sale with 4 miles of new road construction including clearcutting over 1¾ more square miles of national forest. We did so at the EA comment stage because we didn't want the FS to further commit resources to a terrible idea.² We see no purpose for FS lecturing of those participating in the public review process. We've received no personal contacts from the FS with any constructive suggestions. The FS is likely making this public admonishment to set an example of how others who dare to disagree with their proposals in the future will be treated. We are not dissuaded.

Our take from the FS's hostility that they really wish the public would just go away and let them devastate our national forests in their usual service of greed.

We have included with our comments and this objection what we believe is the best available science. For several issues, the issue is controversial, and the FS has not reconciled the differences between their views and non-project team experts' views. An environmental impact statement (EIS) is warranted.

Without addressing any of the scientific issues we raise, the FS concludes that its massive clearcutting and roadbuilding scheme will have "no significant impacts" even though such management actions have already heavily damaged the project area.

And this "no significant impacts" conclusion omits consideration all of the relevant forest plan direction, that the EA fails to demonstrate project consistency with this relevant direction.

Apparently it's the FS's position that NEPA doesn't apply when conducting an EA.

The Comment Synopsis "identifies substantive comments received during Homestead Project scoping..." (We take that to mean comments on the EA.) The Comment Synopsis then hedges the Team Leader's dismissal of our comments by dedicating 40+ pages to respond to our comments. Perhaps our comments and concerns are substantial after all. Not that the FS really responds to our concerns or explains why it disagrees with science we've cited. Most of our comments were completely ignored.

As discussed in our previous comments at p. 3, the DN would implement the 2015 Revised Forest Plan. In carrying out its mission, AWR has participated in the public processes concerning management of the IPNF since the early days of (original) 1987 Forest Plan implementation, and has taken legal action at times to force the Forest Service (FS) to manage the IPNF in conformance with environmental laws such as the Endangered Species Act (ESA), the National Forest Management Act (NFMA), and the National Environmental Policy Act (NEPA). AWR and FOC also fully participated in the public process as the FS developed its Revised Forest Plan, including commenting at every stage and submitting a formal objection. And because the FS provided essentially no relief in response to the formal objection, we incorporate the documentation of our participation in the Revised Forest Plan public process within this

² When we provide scientific cites during the Objection period the Objection Reviewing Officer gripes that it's too late, and dismisses them.

Objection (See “RFP process” subfolder included with digital submission of this Objection.) By implementing the Revised Forest Plan with this project, the FS would be violating laws and regulations.

AWR also participated during the public process as the Northern Rockies Lynx Management Direction (NRLMD) was developed, and continues to believe that the RFP/NRLMD does not consider the best available science, and incorporates its comments on that forest plan direction within this Objection of the Homestead timber sale. (See folder entitled “NRLMD Participation”).

In addition to the issues AWR raised in the above contexts, AWR provided March 9, 2020 comments on the EA. We incorporate that comment letter into this Objection. Below we also present additional discussions on the same issues raised in previous comments, as warranted—explaining how the Homestead timber sale would not be in compliance with laws, regulations, and policy.

Remedy: Provide written responses to each of our comments. Prepare an EIS that addresses the scientific controversy surrounding the Homestead proposal, and one that fully analyzes and discloses the direct, indirect, and cumulative damages that would occur under the proposed project, as our comments raise.

UNLAWFUL FOREST PLAN

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 3 – 7, and are incorporated herein.

George and Zack, 2001 “recommend that managers: (1) identify the wildlife species they want to target for restoration efforts, (2) consider the size and landscape context of the restoration site and whether it is appropriate for the target species, (3) identify the habitat elements that are necessary for the target species, (4) develop a strategy for restoring those **elements and the ecological processes that maintain them**, and (5) implement a long-term monitoring program to gauge the success of the restoration efforts.” (Emphasis added.) None of this is found in the revised Forest Plan.

The IPNF’s 2018 Scoping Notice for the Emerald Project states, “On May 20, 2014, Department of Agriculture Secretary Vilsack announced the designation of approximately 45.6 million acres of National Forest System lands across 94 national forests in 35 states to address insect and disease threats that weaken forests and increase the risk of forest fire. On the Idaho Panhandle National Forests (IPNF), 26 treatment areas (397,496 acres) were designated...” Since the FS has been claiming for decades that its IPNF timber sales are managing to prevent excessive insect and disease effects, if anything this insect and disease designation is a ringing indictment of the failure of FS management.

There are so many cumulative effects of the FS’s chosen way of achieving forest plan “Desired Conditions” for vegetation (manipulate the habitat using heavy-handed industrial activities). The Homestead EA simply does not view ecological damage through the same lens as it does for vegetation conditions. Here is a simple list other factors directly influencing biological diversity under the FS’s management regime, and their historic range of variability, or “HRV”:

FACTOR	HRV
Road density	zero
Noxious weed occurrence	zero
Miles of long-term stream channel degradation (“press” disturbance)	zero
Culverts	zero
Human-induced detrimental soil conditions	<1%
Maximum daily decibel level of motorized devices	zero
Acres of significantly below HRV snag levels for many decades	zero
Roadless extent	100%
Extent of veg. communities affected by exotic grazers (livestock)	zero
Extent of veg. communities affected by fire suppression	zero

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the issues identified in our objection to the Forest Plan and in our comments on the Homestead EA.

CUMULATIVE EFFECTS

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 7 – 8.

Remedy: Prepare an EIS which fully analyzes and discloses the direct, indirect, and cumulative impacts associated with the Homestead project.

ECOLOGICALLY DEFICIENT FOREST PLAN “DESIRED CONDITIONS”

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 8 – 12, and are incorporated herein.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the issues identified in our objection to the Forest Plan and in our comments on the Homestead EA.

CLIMATE CHANGE AND CARBON SEQUESTRATION

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 12 – 34, and are incorporated herein.

Millar et al. 2007 state:

Over the last several decades, forest managers in North America have used concepts of historical range of variability, natural range of variability, and ecological sustainability to set goals and inform management decisions. An underlying premise in these approaches is that by maintaining forest conditions within the range of presettlement conditions, managers are most likely to sustainably maintain forests into the future. We argue that although we have important lessons to learn from the past, we cannot rely on past forest conditions to provide us with adequate targets for current and future management. This reality must be considered in policy, planning, and management. Climate variability, both naturally caused and anthropogenic, as well as modern land-use practices and stressors, create novel environmental conditions never before experienced by ecosystems. Under such conditions, historical ecology suggests that we manage for species persistence within large ecoregions.

Mildrexler, et al., 2020 state:

- Large-diameter trees store disproportionately massive amounts of carbon and are a major driver of carbon cycle dynamics in forests worldwide.
- We examined the proportion of large-diameter trees on National Forest lands east of the Cascade Mountains crest in Oregon and Washington, their contribution to overall aboveground carbon (AGC) storage, and the potential reduction in carbon stocks resulting from widespread harvest. We analyzed forest inventory data collected on 3,335 plots and found that large trees play a major role in the accumulated carbon stock of these forests. Tree AGC (kg) increases sharply with tree diameter at breast height (DBH; cm) among five dominant tree species. Large trees accounted for 2.0 to 3.7% of all stems (DBH $\geq 1''$ or 2.54 cm) among five tree species; but held 33 to 46% of the total AGC stored by each species. Pooled across the five dominant species, large trees accounted for 3% of the 636,520 trees occurring on the inventory plots but stored 42% of the total AGC. A recently proposed large-scale vegetation management project that involved widespread harvest of large trees, mostly grand fir, would have removed ~44% of the AGC stored in these large-diameter trees, and released a large amount of carbon dioxide into the atmosphere.
- Given the urgency of keeping additional carbon out of the atmosphere and continuing carbon accumulation from the atmosphere to protect the climate system, it would be prudent to continue protecting ecosystems with large trees for their carbon stores, and also for their co-benefits of habitat for biodiversity, resilience to drought and fire, and microclimate buffering under future climate extremes.

Remedy: Choose the No Action Alternative. Revise the Forest Plan to take a hard look at the science of climate change. Prepare an EIS for this project if the FS still wants to pursue it, which includes an analysis that examines climate change in the context of project activities and Desired Conditions. We also would welcome, finally, an EIS on the entirety of U.S. Government climate policies.

ALLEGED FOREST IMBALANCE

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 34 – 39, and are incorporated herein.

See “Foresters and ecologists see forests differently” for a description of the huge difference between the Industrial Forestry worldview as demonstrated by the FS and an ecological perspective.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the issues we raised in our EA comments on this subject.

SOIL PRODUCTIVITY

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 39 – 56, and are incorporated herein.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues we raised in our EA comments on this subject.

NOXIOUS WEEDS

Objectors' March 9, 2020 comments on the EA raised this issue in detail at p. 56, and are incorporated herein.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues identified in EA comments and in above discussions.

WATER QUALITY AND FISHERIES

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 57 – 70, and are incorporated herein.

Perry & Jones (2016) looked at decades of hydrologic data from paired watersheds in the Western Cascades and found:

ABSTRACT: Analysis of 60-year records of daily streamflow from eight paired-basin experiments in the Pacific Northwest of the United States (Oregon) revealed that the conversion of old-growth forest to Douglas-fir plantations had a major effect on summer streamflow. Average daily streamflow in summer (July through September) in basins with 34- to 43-year-old plantations of Douglas-fir was 50% lower than streamflow from reference basins with 150- to 500-year-old forests dominated by Douglas-fir, western hemlock, and other conifers. Young Douglas-fir trees, which have higher sapwood

area, higher sapflow per unit of sapwood area, higher concentration of leaf area in the upper canopy, and less ability to limit transpiration, appear to have higher rates of evapotranspiration than old trees of conifer species, especially during dry summers. Reduced summer streamflow in headwater basins with forest plantations may limit aquatic habitat and exacerbate stream warming, and it may also alter water yield and timing in much larger basins. Legacies of past forest management or extensive natural disturbances may be confounded with effects of climate change on streamflow in large river basins. ...

Discussion - This study showed that, relative to mature and old-growth forest dominated by Douglas-fir and western hemlock or mixed conifers, forest plantations of native Douglas-fir produced summer streamflow deficits within 15 years of plantation establishment, and these deficits have persisted and intensified in 50-year-old forest stands This finding has profound implications for understanding of the effects of land cover change, climate change, and forest management on water yield and timing in forest landscapes. The size of canopy opening explained the magnitude and duration of initial summer streamflow surpluses and subsequent streamflow deficits, consistent with work on soil moisture dynamics of canopy gaps. . . . Together, the paired basin and experimental gap results indicate that even-aged plantations in 8 ha or larger clearcuts are likely to develop summer streamflow deficits, and these deficits are unlikely to be substantially mitigated by dispersed thinning or small gap creation. Relatively high rates of summer evapotranspiration by young (25 to 45 years old) Douglas-fir plantations relative to mature and oldgrowth forests apparently caused reduced summer streamflow in treated basins. Young Douglas-fir trees (in AND 1) had higher sapflow per unit sapwood area and greater sapwood area compared to old Douglas-fir trees (in AND 2; Moore, Bond, Jones, Phillips, & Meinzer, 2004). In summer, young Douglas-fir trees have higher rates of transpiration (sapflow) compared to old Douglas-fir trees, because their fast growth requires high sapwood area and because their needles appear to exercise less stomatal control when vapor pressure deficits are high. Leaf area is concentrated in a relatively narrow height range in the forest canopy of a forest plantation, whereas leaf area is distributed over a wide range of heights in a mature or old-growth conifer forest. In summer, these factors appear to contribute to higher daily transpiration rates by young conifers relative to mature or older conifers, producing pronounced reductions in streamflow during the afternoons of hot dry days (Bond et al., 2002). At sunset, transpiration ceases, and streamflow recovers. Hence, daily transpiration produces large diel variations in streamflow in AND 1 (plantation) relative to AND 2 (reference). . . . Reduced summer streamflow has potentially significant effects on aquatic ecosystems. Summer streamflow deficits in headwater basins may be particularly detrimental to anadromous fish, including steelhead and salmon, by limiting habitat, exacerbating stream temperature warming, and potentially causing large-scale die-offs . . . Reductions in summer streamflow in headwater basins with forest plantations may affect water yield in much larger basins. Much of the Pacific Northwest forest has experienced conversion of mature and old-growth forests to Douglas-fir plantations over the past century. Climate warming and associated loss of snowpack is expected to reduce summer streamflow in

the region (e.g., Littell et al., 2010). Declining summer streamflows in the Columbia River basin may be attributed to climate change (Chang, Jung, Steele, & Gannett, 2012; Chang et al., 2013; Hatcher & Jones, 2013), but these declines may also be the result of cumulative forest change due to plantation establishment, ... Despite summer streamflow deficits, young forest plantations in the Andrews Forest yield more water in winter, contributing to increased flooding (Harr & McCorison, 1979; Jones & Grant, 1996; Beschta, Pyles, Skaugset, & Surfleet, 2000; Jones, 2000; Jones & Perkins, 2010).

Conclusions ... Long-term paired-basin studies extending over six decades revealed that the conversion of mature and old-growth conifer forests to plantations of native Douglas-fir produced persistent summer streamflow deficits of 50% relative to reference basins, in plantations aged 25 to 45 years. This result challenges the widespread assumption of rapid “hydrologic recovery” following forest disturbance ...

Despite the original EA’s determination that the Homestead timber sale cause a “may affect, likely to adversely affect” bull trout Critical Habitat, we see no Biological Opinion in the online documents. Also, changing this determination to “not likely to adversely affect” in the more recent EA does not alter the factual basis for the original determination.

Although the Biological Assessment predicts benefits to bull trout to mitigate the direct and indirect impacts of the timber sale, we also note there is no guarantee of timely—or any—such restoration actions because of the admitted lack of funding. From the EA Comment Synopsis:

Funding to carry-out any of this project is not secure. Potential sources of funding include appropriated funds, KV funds, grants, and retained receipt from other stewardship contracts.

The Marble Creek restoration would be prioritized with several other important projects on the Forest. How it ranks for funding among projects is based on several factors including ecological cost:benefit, partners’ interest and their ability to share costs. By getting the project through the NEPA process it becomes much more attractive to potential partners and ranks much higher for special initiatives.

So there’s no analysis of impacts if the restoration doesn’t happen, but the timber sale does.

Also, the FS hasn’t really provided any estimate of the amount of sediment that would muddy the project area streams due to log haul. We raised this issue in much detail in comments. The Biological Assessment admits the problem, and the following is the only scant discussion of the issue:

Log haul would occur over a period of approximately ten years. NFSR 321 is the collector road that all haul would eventually pass. There would be approximately 12 miles of this road that would receive increased use (approximately 4000 truckloads over a 6-year period) beyond what it currently receives for the public and industrial timber companies. NFSR 321 has a graveled surface and would receive maintenance such as dust abatement and drainage maintenance as needed. NFSR 321 lies within the RHCA of Marble Creek for approximately 9 miles. This road is used by the public and private industry and receives frequent maintenance and attention to BMP (e.g. #15.21, 15.22) compliance than less popular roads. The attention it receives reduces the potential for erosion from this road, and sediments entering Marble Creek and its tributaries.

However, lacking any sort of quantified estimate the analysis fails to support its “not likely” determination. Four thousand log truck loads through nine miles of RHCA along NFSR 321 will create a heavy burden on water quality and fish habitat. And what about other project area roads and RHCAs? The EA and DN violate NEPA and the ESA.

Mazza, 2015 addresses the importance of headwater riparian zones: “Riparian areas, where the terrestrial mingle with the aquatic, are special places. Riparian area around headwaters are particularly important because they have strong ecological connections to uplands and provide resources to the downstream system.”

The EA, Hydrology Report, and Fisheries BE all fail to specifically address the direction found in FW-DC-AQH-05 from the Revised Forest Plan:

Stream channels supply the required structure for desired stream habitat features such as pools, pool tails, banks, large woody material, backwaters, and riffles that provide aquatic species the necessary niches for holding, overwintering, spawning, cover, rearing, and feeding. The following criteria *generally* describe desired stream habitat conditions:

Stream water temperatures are within the state water quality requirements (IDAPA 58.01.02) for salmonid spawning, cold water biota and bull trout:

Salmonid spawning: daily maximum temperature is less than or equal to 13 °C (55.4 °F); maximum daily average temperature is less than or equal to 9 °C (48.2 °F).

Cold water biota: daily maximum temperature is less than or equal to 22 °C (71.6 °F); maximum daily average is less than or equal to 19 °C (66.2 °F).

Bull trout: Maximum weekly (7-day average) maximum temperature for June, July, and August is less than or equal to 13 °C (55.4 °F); maximum daily average (September, October) is less than or equal to 9 °C (48.2 °F).

Large woody debris occurs in near natural patterns of size and amount in channel, stream banks, and floodplain. Adequate sources of large woody debris are available for both long and short term recruitment based on riparian stocking densities.

Pool frequency varies by reach type:

- 1 per 5 to 7 channel widths in pool-riffle stream reaches;
- 1 per 2 to 4 channel widths in step-pool stream reaches.

Large pools for adult holding, juvenile rearing, and overwintering are common. Large pools are considered to have a residual pool depth greater than one meter, in streams with a wetted width greater than three meters (9.84 feet) wetted width.

Channel substrate is appropriate in size and distribution, based on geology, gradient, and topography, and supports spawning, macroinvertebrate production, and juvenile rearing.

Bankfull width-to-depth ratios are appropriate to channel type (see glossary):

- less than or equal to 12 in A, E, G channel types;
- greater than or equal to 12 in B, C, F channel types;
- greater than 40 in D channel types.

Bank stability in forested stream reaches:

- greater than or equal to 90 percent stable in C channel types;
- greater than or equal to 95 percent stable in A, B, and E channel types.

Habitat features at smaller scales are influenced by stream gradient, channel and floodplain width, elevation, geology, water quality, riparian vegetation, and other factors. Therefore, while these criteria generally describe desired habitat conditions, these values may not be achievable in all stream channel types.

Another forest plan element the FS does not demonstrate consistency with is FW-DC-AQS-02: “Non-native fish species (e.g., brook trout, rainbow trout, and brown trout) are not expanding into tributary streams on NFS lands. Impacts of non-native fish species on native salmonids, such as hybridization or displacement, are minimized to the extent possible.”

Still another forest plan element the EA does not demonstrate consistency with is FW-GDL-AQS-01: “Management activities that may disturb native salmonids, or have the potential to directly deliver sediment to their habitats, should be limited to times outside of spawning and incubation seasons for those species...” Nothing in the EA or Fisheries Report addresses this Guideline regarding timing of activities that inevitably increase sediment yields into streams.

The Homestead EA does not consider the fact that roads increase the efficiency of water transport during storm or snowmelt events, elevating water yields well above natural, with damaging effects. The EA ignores water yield and peak flows as factors. FS hydrologist Johnson, 1995 discusses many forms of road-related and other cumulative impacts the EA fails to consider.

The IPNF’s Camp Robin timber sale Hydrology Report explains why this is important: “Runoff from rain falling on snow has been associated with increased risk of damage to stream banks and flooding. Available data indicates that rain falling on snow in open areas produces more water available for runoff than rain falling in forested areas. Much of the project area (~80%) falls in the rain-on-snow zone based on elevation (between 3500’ and 4500’).”

The FS’s conclusion that there will be no significant increase in sediment is not supported by facts. PACFISH/INFISH buffers cannot stop the sedimentation once it enters the stream, and skid trails, landings, and temporary roads link to existing roads and ditches, where runoff goes down the ditch to a culvert and is conducted into small streams, which carry sediment into larger streams. Below is an illustration of this; the hillside ditch of the road is filled with fine sediment. It was taken on the Clearwater National Forest in the Lowell WUI project in 2018 (before the road in this exact same area was blown out from a landslide).



At center-top-third of this picture is a culvert, which you can't see because of the sediment. Below is a detail shot of the above picture where the culvert is.

FS hydrologist Johnson (1995) points out older roads feature ditches on the inside of the road which greatly increases drainage efficiency, causing peak flows to go far beyond any modeled predictions.



The sediment surrounding the culvert is abundant. If one were to walk to what is depicted on at the top of the above picture and turn around to take a picture of the culvert, the picture that follows is that angle.



Below is a second culvert in that same area, conducting sediment:



This is how sedimentation gets into the stream, which can be upstream of any logging buffers next to the stream. Yet, the FS bases its conclusion that there won't be sedimentation because PACFISH/INFISH buffers will stop it.

The following photos also illustrate a few of the problems associated with inadequate road maintenance. On July 7, 2019 an intense thunderstorm dropped rain and hail on portions of the Bitterroot National Forest. These photos are of an open Forest Service Road just south of Lake Como, probably FSR #550. All three were taken a few feet from one another. The first photo shows a stream of stormwater flowing down the road, where water flows off the surface into a draw in the landscape. The length of this stream of water on the road surface was over a quarter-mile—even around curves—essentially cutting a gully instead of flowing off the road within a short distance.



The second photo (above) shows this “stream” at the beginning of its flow off of the road at the location of the discharge of a small culvert (the culvert is not visible in the photo).

The third photo (below) shows the inlet of the culvert—empty of water despite the storm because of the tempering effect of the native forest vegetation in the draw above the road. (It also shows the culvert has begun to plug up since the time of installation or previous maintenance, meaning it is becoming vulnerable to a blowout during a subsequent storm event.)



The flow was not followed downslope to any water body destination, which it may or may not have reached before soaking into the soil. However, the photos show problems typical of roads without proper drainage features and/or lacking frequent enough maintenance, leading to accelerated erosion during storm or spring runoff events and necessitating more imminent maintenance steps needed to keep the road usable by the public.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues identified in our comments and in above discussions.

VIABILITY AND DIVERSITY

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 70 – 75, and are incorporated herein.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues we raised in our EA comments on this subject.

OLD GROWTH

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 76 – 82, and are incorporated herein.

Old growth is important for several reasons. For one, citizens enjoy visiting these groves, for the mystery it invokes:

The birth of “old growth” as the iconic forest can be encapsulated in a few words describing social meanings, time and space: re-enchantment trumped rationality; the eternal present absorbed the chronology of forest growth; mystical places colonized the choreography of sustained yield operations.

(Lee, 2009.) That opportunity doesn’t exist in logging plantations, even if some of the larger, older trees are retained. We find nothing in the FS’s perspective on old growth that recognizes these societal values.

In response to our comments, the FS disclosed in the latest EA:

Within the Homestead project area, there is approximately 2,161 acres of potential old growth, much of which is adjacent to existing old growth. There are about 563 acres in the warm/moist biophysical setting and approximately 1,598 acres in the subalpine biophysical setting (VEG-011). Potential old growth could contribute to an increase in future patch size and amount of old growth. These acres are generally dominated by shade-tolerant conifers in the large size class.

This latest EA then goes on to admit that some of this potential old growth would be logged away, without saying how much, and without analyzing impacts to old-growth associated wildlife. And despite the EA identifying its analysis “indicator or measure” for old growth as being “Acres: Number and proportion and patch size of existing old growth” the EA basically just totals the number of acres in the project area and declines to conduct any temporal or spatial analysis of patch size, connectivity, or landscape ecology.

Marcot, et al., 1991 make several points about old growth:

- In current planning and management activities on National Forests, old growth has several values (Sirmon 1985), and one of them is its importance as wildlife habitat (Meehan and others 1984, Meslow and others 1981, Raphael and Barrett 1984, Thomas and others 1988). Old growth provides optimal habitat for some management indicator species, including spotted owl, pileated woodpecker, and marten, and for many other species of plants, fish, amphibians, reptiles, birds, and small mammals (Harris and others 1982, Meslow and others 1981, Raphael 1988c, Raphael and Barrett 1984). It also provides thermal and hiding cover for ungulates, especially in winter (Schoen and others 1984, Wallmo and Schoen 1980). Old growth, therefore, plays an important role in providing for productive populations of some species of special ecological and administrative interest. For some of these species, old growth may be a key factor in providing for continued population viability.
- Additional values of old growth are as natural research areas for scientific study (Greene

1988, Sheppard and Cook 1988) and its ecological role in providing long-term forest productivity (Franklin and others 1981, Perry and others 1988). Other interests in old growth include its recreational, aesthetic, and spiritual significance (Anderson 1988), its contribution to watershed protection (Sedell and Swanson 1984), and its importance as a contributor to biological diversity (Harris 1984, Luman and Neitro 1980, Norse and others 1986).

- Without adequate inventories and without a clear understanding of the amount and distribution of old growth it is difficult for the decision maker to determine what is practical or feasible (Ham 1984:69).
- An old-growth inventory must be designed with a specified degree of reliability. The degree of error and confidence in the statements of amount and distribution should be known, at least qualitatively. The reliability of an inventory is a function of many factors. These include the correctness and usefulness of the classification scheme used; the quality of the sampling design by which remote-sensing images are interpreted and vegetation surveys in the field are conducted; the consistency with which inventory criteria are applied across various land units, taking into account the need to vary criteria by forest type and land form; the availability and quality of remotely sensed images; the expense and training involved in having people interpret the remotely sensed images; the experience and training of field crews; and the sample sizes used in field verification testing and from which subsequent classification strata are derived.
- Some wildlife species may have co-evolved with, and depend on, specific amounts and conditions of old-growth forests. Specific kinds, sizes, and patterns of old-growth environments are, therefore, keys to the long-term survival of these species. Land allocations affect the distribution of old growth across the landscape over time and the effectiveness of old growth as habitat for wildlife. Resulting spatial patterns of old growth influence the viability of many wildlife species that depend on the ecological conditions of old forests. Old growth may provide population “reservoirs” for species that find early successional stages of second-growth conifer stands marginal habitat.
- Landscape attributes affecting the perpetuation of old-growth dependent and associated wildlife include the spatial distribution of old growth; the size of stands; the presence of habitat corridors between old-growth or old-forest stands; proximity to other stands of various successional stages and especially for well-developed mature-forest stages and species with different seasonal uses of habitats; and the susceptibility of the old-growth habitat to catastrophic loss (such as wildfire, insects, disease, wind and ice storms, and volcanic eruptions).
- Stand size, in combination with its landscape context (the condition, activities, or both on the adjacent landscape that affect the stand), is of major significance in perpetuating old-growth resources and can have a major effect on their use by wildlife. Wide-ranging species may be able to use stands of various structural-, size-, and age-classes. If such stands are separated by unsuitable habitat or disruptive activities, however, the remaining old-growth stands become smaller in effective (interior) size, more fragmented, and

possibly not suitable for occupancy or for successful reproduction. An old-growth inventory that quantifies such stand and landscape attributes is a prerequisite for evaluating possible context and landscape effects on species' presence.

Foster et al., 1996 state:

The maintenance of many natural ecosystems requires the protection not only of current old-growth areas, but also of naturally disturbed forests that represent future old-growth. To ensure the continued presence of old growth, these areas must be maintained within a landscape that is adequate in size to allow for the continuing mosaic of disturbance and for the dispersal of organisms and processes among patches. The protection and value of naturally disturbed old-growth patches is often a point of controversy among natural resource managers, conservationists and ecologists. Many of the most intensively studied and revered old-growth forest areas have been recently disturbed in catastrophic ways (for example, in the USA: Tionesta Scenic Area in Pennsylvania, Cathedral Pines in Connecticut, Five Ponds Wilderness Area in New York's Adirondack Park). Pressure to salvage-log such areas to reduce fire hazard or to recoup economic loss is often intense and yet preservation of damaged old-growth ecosystems provides important ecological lessons and forms a critical element in old-growth research and preservation.

Franklin and Spies, 1991 make several relevant points about old growth:

- Old-growth forest is a biological or ecological concept that presumes ecosystems systematically change as they persist over long periods. An ecosystem has, in effect, a series of linked life stages ...which vary in composition, function, and structure. Such progressions can take a very long time in forests because the dominant organisms, trees, typically live very long.
- Characterizing old-growth forests is possible based on these concepts. Obviously, a series of ecological attributes must be considered because of the many relevant compositional, functional, and structural features. For practical reasons, however, a working definition—one for everyday use in gathering stand data—emphasizes structural and compositional rather than the conceptually important functional features that are difficult to measure.
- Old-growth forests are later stages in forest development that are often compositionally and always structurally distinct from earlier successional stages.
- The age at which forests become old growth varies widely with forest type or species, site conditions, and stand history.
- Structurally, old-growth stands are characterized by a wide within-stand range of tree sizes and spacing and include trees that are large for the particular species and site combination. Decadence is often evident in larger and older trees. Multiple canopy layers are generally present. Total organic matter accumulations are high relative to other developmental stages. Functionally, old-growth forests are characterized by slow growth

of the dominant trees and stable biomass accumulations that are constant over long periods.

- Our failure to study old-growth forests as ecosystems is increasingly serious in considerations of old-growth issues. Without adequate basic knowledge of the ecosystem, we risk losing track of its totality in our preoccupation with individual attributes or species. Definitional approaches to old growth based on attributes, including those that we have presented here, predispose us to such myopia. The values and services represented by old-growth ecosystems will be placed at ever greater risk if we perpetuate our current ignorance about these ecosystems. It will also increase doubts about our ability to manage for either old-growth ecosystems or individual attributes (for example, species and structures) associated with old growth. We must increase ecosystem understanding and management emphasis on holistic perspectives as we plan for replacement of old-growth forests. How can we presume to maintain or re-create what we do not understand? Some may presume that ignorance (on ecological values of old growth) is bliss, but this attitude creates high risk that we will continue to be blindsided by subsequent discoveries.

Bollenbacher and Hahn, 2008 discuss “Maintaining Resilient Old Growth Forests: Impacts of Forest Management on Wildlife”:

When OG stands are treated to increase their resilience, how do these treatments affect wildlife? Few studies have rigorously tested this question, despite the persistent need for information. Inferring causation from treatment effects requires an experiment. Experimental standards—randomization, replication, and controls—are not routinely incorporated into project planning, nor are the funding and time needed to examine population responses.

Bollenbacher and Hahn, 2008 make further points:

- Relative to harvested forests, OG stands had higher species richness (Mazurek and Zielinski 2004; birds: Beese and Bryant 1999), supported more small mammal individuals and biomass (Rosenberg and Anthony 1993; Carey 1995; Carey and Johnson 1995), and allowed for greater movement and genetic diversity (tailed frog *Ascaphus truei*: Wahbe et al. 2004, 2005).
- Related studies examining wildlife responses in OG stands compared to younger stands revealed extensive variability, which may be attributed to differences among studies in location; stand type, treatment and size; and pre- and post-treatment stand conditions. Clearly, more work is needed; in particular, we need to rigorously investigate OG treatment effects on forest structure and composition and wildlife populations in the Northern Region.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues we raised in our EA comments on this subject.

SNAGS AND DEAD TREE HABITAT

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 82 – 86, and are incorporated herein.

Rose, et al., 2001 is scientific information on dead wood in forest ecosystems. They make several good points, citing dozens of other scientific sources (internal citations omitted):

- Decaying wood has become a major conservation issue in managed forest ecosystems. Of particular interest to wildlife scientists, foresters, and managers are the roles of wood decay in the diversity and distribution of native fauna, and ecosystem processes. Numerous wildlife functions are attributed to decaying wood as a source of food, nutrients, and cover for organisms at numerous trophic levels. Principles of long-term productivity and sustainable forestry include decaying wood as a key feature of productive and resilient ecosystems. (Internal cites omitted.)
- Inputs of decaying wood are crucial to most aspects of stream processes, such as channel morphology, hydrology, and nutrient cycling.
- Wood decay in forests of the Pacific Northwest has recently become a topic of renewed interest at national and global scales, regarding the role of terrestrial carbon storage in the reduction of atmospheric CO₂ (a greenhouse gas).
- New research over the past three decades has emphasized the significance of decaying wood to many fish and wildlife species, and to overall ecosystem function. The importance of decaying wood to ecosystem biodiversity, productivity, and sustainability is a keynote topic in two recent regional ecosystem assessments in Oregon and Washington. These, and other publications address both the specific roles of wood decay in ecosystem processes and functions, as well as ecological functions of wildlife species associated with wood decay.
- Interactions among wildlife, other organisms, and decaying wood substrates are essential to ecosystem processes and functions. In the process of meeting their needs, animals accomplish ecosystem work with respect to transformation of energy and cycling of nutrients in wood. For example, chipmunks and squirrels disperse mycorrhizal fungi which play key roles in nutrient cycling for tree growth; birds, bats, and shrews consume insects that decompose wood or feed on invertebrates and microbes; beavers and woodpeckers create habitats by modifying physical structures; arthropods build and aerate soil by decomposing wood material. Relations between wood decay and wildlife have been examined in several recent analyses.

- Managed forests, on average, have lower amounts of large down wood and snags than do natural forests.
- Emphasis on concepts of long-term productivity in this chapter reflects an underlying principle that habitat functions of decaying wood are inextricably linked to ecosystem processes. Careful attention to the whole ecosystem is a prerequisite to successful management of decaying wood for wildlife.

Wood Legacies in Managed Forests

John Hayes

Legacies are structures or components of ecosystems that exist prior to a disturbance and are “inherited” by the post-disturbance community. Legacies can provide important temporal connectivity within a stand, allowing organisms present in a pre-disturbance community to persist in an area following disturbance. In addition, legacy wood can provide structural elements and complexity in a stand that would otherwise require very long periods of time to develop. In managed forests, wood legacies, including large diameter trees, snags, and down wood, are ecologically important structures that play central roles in diverse ecosystem processes and functions, such as geomorphic processes, hydrology, nutrient cycling, and habitat for fish and wildlife. The ecological value of wood legacies has begun to gain widespread recognition only within the past two decades.^{122, 164}

As a result of a variety of operational, safety, and economic considerations, application of intensive forest management practices often results in removal of legacy structures from stands and minimal retention of future legacy structures. Growing replacement structures with similar characteristics (e.g., large diameter trees with large diameter branches, thick and deeply-furrowed bark, and complex crown structure) requires decades or longer. Moreover, unless special provisions are made, large diameter trees, snags, and logs with these

characteristics may never be produced in forests managed intensively on short- to moderate-length rotations. Habitat quality for species that depend upon or are closely associated with these structures can be seriously diminished with their loss from forest stands. The ecological importance of wood legacies combined with the difficulties of creating replacement structures provide convincing reasons to conserve legacy structures during management activities.

Managing wood legacies through time in managed forests is a multi-staged process. Existing structures that will serve as legacy structures in the post-disturbance environment should be identified prior to a disturbance event, such as logging. In some cases, it may be adequate to rely on the timber sale administrator or loggers to identify appropriate structures and implement the management strategy in the field. Since one intent of legacy structures is to provide various functions through time, it will often be valuable to either individually mark important legacy structures, or to document their location and purpose so that future managers can take the structures into account. Of equal importance, plans for recruitment of future legacy structures should be prepared to ensure that legacy structures will be available in future stands. Innovative silvicultural practices can be employed to create conditions favorable to development of future legacy structures.

- Of the biological agents of wood decay, insects and fungi are the principal players in coniferous forest ecosystems.
- Down wood, snags, and live trees with decay serve vital roles in meeting the life history needs of wildlife species in Oregon and Washington.
- Woodpeckers, sapsuckers, and nuthatches are highly specific in their selection of tree species for nesting and roosting, and this selectivity is attributed to the presence of decay fungi.

- To be useful to most cavity excavators, live trees usually must contain wood in a Class 2 stage of decomposition. For example, strong excavators, such as Williamson's sapsuckers, pileated woodpeckers, and black-backed woodpeckers, select trees with a sound exterior sapwood shell and decaying heartwood to excavate their nest cavities.
- Hollow trees larger than 20 inches (51 cm) in diameter at breast height (dbh) are the most valuable for denning, shelter, roosting, and hunting by a wide range of animals. Hollow chambers are used as dens by black bears, as night roosts by woodpeckers, and as dens, shelter, roosts, and hunting sites by a variety of animals, including flying squirrels, wood rats, bats, American marten, northern flickers and Vaux's swift.
- Hollow trees and down wood are formed from only a few tree species that can maintain bole structural integrity as the heartwood decays. Western redcedar is especially valuable in providing hollow trees because the decay-resistant sapwood remains structurally sound for centuries. In the Interior Columbia Basin, grand fir and western larch form the best hollow trees for wildlife uses.
- Broomed trees caused by mistletoe, rust, or needlecast fungi may remain alive for decades, and have attributes distinct from decay patches in live trees. Abundant forage is produced from mistletoe shoots and fruits. Regardless of the extent of decay, broom infections provide various habitat functions to wildlife depending on how and where they form along the bole. For example, mistletoe brooms form platforms used for nesting, roosting, and resting sites by owls, hawks, and song birds; roosting by grouse; and resting cover by squirrels, porcupines, and marten.
- The abundance of cavity-using species is directly related to the presence or absence of suitable cavity trees. Habitat suitability for cavity-users is influenced by the size (diameter and height), abundance, density, distribution, species, and decay characteristics of snags. In addition, the structural condition of surrounding vegetation determines foraging opportunities.
- Stumps provide a variety of wildlife habitats. Stumps with sloughing bark (Class 2) provide sites for bat roosts, and foraging sites for flickers, and downy, hairy and pileated woodpeckers. In openings, tall stumps with advanced decay (Class 3) provide nest sites for flickers, and subsequently for blue birds and other secondary cavity-nesters associated with openings. Squirrels and chipmunks also use stumps as lookouts and platforms for cone-shredding.
- Down Woody Material (logs). Down wood affords a diversity of habitat functions for wildlife, including foraging sites, hiding and thermal cover, denning, nesting, travel corridors, and vantage points for predator avoidance. Larger down wood (diameter and length) generally has more potential uses as wildlife habitat. Large diameter logs, especially hollow ones are used by vertebrates for hiding and denning structures. Bears forage for invertebrates in logs during summer and fall. Fishers use large logs to a limited degree as den sites.

- Lynx select dense patches of downed trees for denning. Jackstrawed piles of logs form a habitat matrix offering thermal cover, hiding cover, and hunting areas for species such as marten, mink, cougar, lynx, fishers, and small mammals (Figure 8). Smaller logs benefit amphibians, reptiles, and mammals that use wood as escape cover and shelter. Small mammals use logs extensively as runways (Figure 9). California red-backed voles use Class 2-3 down logs for cover, and feed on fungi (especially truffles) and lichens growing in close association with down wood.
- The moist environment beneath loose bark, bark piles and in termite channels of logs with advanced decay provides a protected area for foraging by salamanders. The cool, moist environment of rotten wood may be required for some species of salamanders to survive heat stress during summer. Decaying wood also provides habitat for invertebrates on which salamanders and other foraging vertebrates feed (e.g., collembolans, isopods, millipedes, mites, earthworms, ants, beetles, flies, spiders and snails). The folding-door spider constructs a silk tube within the cracks and crevices of wood with advanced decay.
- Habitat structures in upper layers of the forest floor (soil, litter, duff) result from processes involving organic material (litter, decaying roots, vertebrate and invertebrate carrion, and fecal matter) and a diverse community of organisms, including bacteria, fungi, algae, protozoa, nematodes, arthropods, earthworms, amphibians, reptiles, and small mammals. The complex trophic web supported by nutrient and moisture conditions within the litter and duff layers transforms plant material into a variety of degradation products, thereby storing and releasing nutrients within the ecosystem.
- Decaying wood forms many habitat structures in riparian forests. Accumulations of large wood on stream banks provide habitat for small mammals and birds that feed on stream biota, and provide structural diversity in streamside forests.
- The role of down wood in salmon habitat has received much attention over the past two decades. Large wood is a key component of salmonid habitat both as a structural element and as cover and refugia from high flows. Large wood serves key functions in channel morphology, as well as sediment and water routing. The importance of wood to salmon habitat varies from headwater to stream mouth. As stream order increases and gradient decreases in third- to fifth-order streams, down wood is a dominant channel-forming feature. Larger wood deflects water and increases hydraulic diversity, producing a range of pool conditions that serve as habitats for juvenile salmonids in summer. Diverse channel margins are a primary aspect of rearing habitat. Flow obstructions created by large wood provide foraging areas for young salmonid fry that are not yet able to swim in fast currents, and provide refugia to juvenile salmonids at high flow. In higher order streams, flow deflections created by large wood trap sediments and nutrients, and enhance the quality of gravels for spawning. Down wood is less of a channel-forming feature along large rivers, but defines meander cutoffs and provides cover and increased invertebrate productivity for juvenile salmonids.
- Processes that sustain the long-term productivity of ecosystems have become the centerpiece of new directives in ecosystem management and sustainable forestry. Given

the key role of decaying wood in long-term productivity of forest ecosystems in the Pacific Northwest, the topic should remain of keen interest to scientists and managers during the coming decade. Below, we highlight functions of decaying wood directly linked to long-term productivity, including influences on the frequency and severity of disturbances such as fire, disease, and insect outbreaks.

- **Nutrient Cycling and Soil Fertility.** Decaying wood has been likened to a savings account for nutrients and organic matter, and has also been described as a short-term sink, but a long-term source of nutrients in forest ecosystems.
- Nutrient cycling via foliage and fine litter has been well-described. Substantial amounts of nitrogen are returned to the soil from coarse wood inputs, yet even where annual rates of wood input are high, 4 to 15 times more nitrogen is returned to the forest floor from foliage than from large wood. This is a consequence of the higher nutrient concentrations and shorter turnover times of leaf litter compared to wood. The relative contribution of large wood to the total nutrient pool in an ecosystem depends to a large extent, on the size of other organic pools in the system.
- The slow rate of nutrient release from decomposing wood may serve to synchronize nutrient release with nutritional demands in forests, and also to minimize nutrient losses via leaching to the ground water. In addition to nitrogen bound chemically within wood, down wood reduces nutrient losses from ecosystems by intercepting nutrients in litterfall and throughfall. Favorable temperature and moisture conditions also makes large decaying wood sites of significant nitrogen inputs via N-fixation.
- Soil is the foundation of the forest ecosystem. Large wood is a major source of humus and soil organic matter that improves soil development.
- **Moisture Retention.** Water stored in large decomposing wood accelerates microbial decay rates by stabilizing temperature and preventing dessication during the summer.^{11, 160, 376} Moist conditions within the wood favor decay by attracting burrowing and tunneling mammals and invertebrates that improve aeration of wood, and by providing colonization substrate and moisture for mycorrhizae and other fungi. Moist nurse logs also provide excellent sites for seedling establishment and production of sporocarps. These processes increase retention and cycling of nutrients within ecosystems and contribute to higher biodiversity and biomass production.
- **Mycorrhizae.** Mycorrhiza, meaning fungus-root, is a symbiotic association of fungi with plant roots. The fungus improves nutrient and water availability to the host in exchange for energy derived from plant sugars. Mycorrhizae are necessary for the survival of numerous tree families, including pine, hemlock, spruce, true fir, Douglas-fir, larch, oak, and alder. Mycorrhizal associations are a source of nutrients to promote wood decay. By the time a log reaches more advanced stages of decomposition (Class 3) fungal colonization leads to the accumulation of nutrients in hyphae, rhizomorphs and sporocarps, especially for ectomycorrhizal fungi, where >90% of the fungal activity is associated with organic material. Ectomycorrhizal fungi decrease the ratio of carbon to

nitrogen in decomposing wood, and mediate nutrient availability to plants while improving nutrient retention by forest ecosystems.

- The energy derived from falling or flowing water is the driving force behind erosion processes in Pacific Northwest forests. By covering soil surfaces and dissipating energy in flowing and splashing water, logs and other forms of coarse wood significantly reduce erosion. Large trees lying along contours reduce erosion by forming a barrier to creeping and raveling soils, especially on steep terrain. Material deposited on the upslope side of fallen logs absorbs moisture and creates favorable substrates for plants that stabilize soil and reduce runoff.
- **Stand Regeneration and Ecosystem Succession.** Decomposing wood serves as a superior seed bed for some plants because of accumulated nutrients and water, accelerated soil development, reduced erosion, and lower competition from mosses and herbs. In the Pacific Northwest, decaying wood influences forest succession by serving as nursery sites for shade-tolerant species such as western hemlock, the climax species in moist Douglas-fir habitat. Wood that covers the forest floor also modifies plant establishment by inhibiting plant growth, and by altering physical, microclimatic, and biological properties of the underlying soil. For example, elevated levels of nitrogen fixation in *Ceanothus velutinus* and red alder have been reported under old logs.
- **Streams and Riparian Forests.** Long-term productivity in streams and riparian areas is closely linked to nutrient inputs, to attributes of channel morphology, and to flow dynamics created by decaying wood. Small wood contributes to nutrient dynamics within streams and provides substrates to support biological activity by microorganisms, as well as invertebrates and other aquatic organisms. Much of the organic matter processed by the aquatic community originates in riparian forests and is stored as logs.
- Large wood is the principal factor determining the productivity of aquatic habitats in low- and mid-order forested streams. Large wood stabilizes small streams by dissipating energy, protecting streambanks, regulating the distribution and temporal stability of fast-water erosional areas and slow-water depositional sites, shaping channel morphology by routing sediment and water, and by providing substrate for biological activity. The influence of large wood on energy dissipation in streams influences virtually all aspects of ecological processes in aquatic environments, and is responsible for much of the habitat diversity in stream and riparian ecosystems. The stair-step gradients produced by wood in small stream basins supports higher productivity and greater habitat diversity than that found in even-gradient streams lacking wood structure.
- The input rates and average piece size of dead wood generally increase with stand age, although the amount of decaying wood can follow a U-shaped pattern if young forests inherit large amounts of decaying wood and live trees from preceding stands.³⁴⁶
- Insects and pathogens play a key role in maintaining diverse and productive forests by creating habitat and stimulating nutrient cycling.

- Intensive forest management activities that have decreased the density of large snags in early forest successional stages (sapling/pole and small tree stages) may have had adverse impacts on the 61 associated wildlife species (Figure 12). Similarly, the lesser amount of large down wood in early forest successional stages may not provide as well for the 24 associated wildlife species. Such results suggest the continuing need for specific management guidelines to provide large standing and down dead wood in all successional stages.
- These silvicultural practices clearly altered the abundance and recruitment of large down wood and snags in managed forests of the Pacific Northwest, including:
 1. Lower abundance of large diameter snags and down wood legacies in managed forests (and streams); e.g. lack of the U-shaped pattern; higher accumulation of smaller-diameter fuels in eastside forests.
 2. Reduced recruitment and retention of large trees to provide future legacies.
 3. Shorter mean residence time for down wood (i.e. faster decomposition as a function of reduced log diameter).
 4. Altered species composition of forests (westside: more Douglas-fir, less western red cedar; eastside: less pine, more true fir species).
- Several major lessons have been learned in the period 1979-1999 that have tested critical assumptions of these earlier management advisory models:
 - Calculations of numbers of snags required by woodpeckers based on assessing their biological potential. (that is, summing numbers of snags used per pair, accounting for unused snags, and extrapolating snag numbers based on population density) is a flawed technique. Empirical studies are suggesting that snag numbers in areas used and selected by some wildlife species are far higher than those calculated by this technique.
 - Setting a goal of 40% of habitat capability for primary excavators, mainly woodpeckers, is likely to be insufficient for maintaining viable populations.
 - Numbers and sizes (dbh) of snags used and selected by secondary cavity-nesters often exceed those of primary cavity excavators.
 - Clumping of snags and down wood may be a natural pattern, and clumps may be selected by some species, so that providing only even distributions may be insufficient to meet all species needs.
 - Other forms of decaying wood, including hollow trees, natural tree cavities, peeling bark, and dead parts of live trees, as well as fungi and mistletoe associated with wood decay, all provide resources for wildlife, and should be considered along with snags and down wood in management guidelines.
 - The ecological roles played by wildlife associated with decaying wood extend well beyond those structures per se, and can be significant factors influencing community diversity and ecosystem processes.
- Furthermore, although the analysis of inventory data presents data on dead wood abundance, management actions at the local level may best be focused on the ecological processes that lead to development of these forest structures rather than on the abundance of structures themselves. Management decisions also may require information on the

spatial distribution (landscape pattern) of dead wood, which cannot be estimated from sample-based inventories.

- If detailed data on the current and historical range of natural conditions is lacking (which is likely), it may be preferable to substitute functional target values for specific wildlife species. For example, to provide maximum habitat elements for specific cavity-nesting species, a designated quantity and distribution of snags
- Effective management of decaying wood must do more than simply provide for inputs of dead trees. Rather, management should strive to provide for diversity of tree species and size classes, in various stages of decay and in different locations and orientations within the stand and landscape.
- Green trees function as a refugium of biodiversity in forests. For example, many species of invertebrate fauna in soil, stem, and canopy habitats of old-growth forests do not disperse well, and thus, do not readily recolonize clear-cut areas. The same concept holds for many mycorrhizae-forming fungal species. Added benefits of green tree retention include moderated microclimates of the cutover area, which may increase seedling survival, reduce additional losses of biodiversity on stressed sites, and facilitate movement of organisms through cutover patches of the landscape.
- In situations where forest management objectives extend beyond wood production to broader biological and human values, intensive forestry practices by themselves may inadequately maintain or restore biodiversity, especially in early and late successional forest development phases. Species, processes, and values associated with older stages of stand development (transition and shifting gap stages) are likely impaired or absent from intensively managed stands. Species and processes associated with the early establishment phase also have shorter duration than may occur naturally. This does not mean that intensive forest management practices are incompatible with multiple forest objectives at a landscape scale, but rather that species and processes associated with early and late stages of forest development should be assessed over large areas such as landscapes, subregions, and regions.
- Management for certain species must consider habitat requirements at different spatial and temporal scales. It may then be possible to modify silvicultural practices at the stand scale to meet multiple objectives at landscape and larger scales. The landscape perspective also is pertinent to managing riparian systems, where the role of wood decay in riparian environments varies according to the type and geography of the associated water body.
- The decline of species associated with late-successional forest structures, as well as the prolonged time needed to produce wood legacies, suggests that it is both ecologically and economically advantageous to retain legacy structures across harvest cycles wherever possible, rather than attempt to restore structures that have been depleted. This is especially obvious for slow-growing tree species and very large wood structures.

Retention of old- growth structural legacies has been identified as critical to conservation of biodiversity between large reserves and conservation areas.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues we raised in our EA comments on this subject.

HABITAT FRAGMENTATION AND CONNECTIVITY

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 86 – 88.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues we raised in our EA comments on this subject.

WILDLIFE POPULATION TREND MONITORING

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 88 – 89.

Remedy: Select the No Action Alternative. Otherwise, prepare an EIS that addresses the analytical and scientific issues we raised in our EA comments on this subject.

ELK AND OTHER BIG GAME SPECIES

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 89 – 91, and are incorporated herein.

The EA goes from claiming no logging would occur in elk security areas (original version) to not saying that at all (more recent version); also from disclosing there are 1,394 security acres (original version) to 1,365 security acres (more recent). There is no analysis of the implications of reduced elk security.

Forest Plan guideline FW-GDL-WL-13 states, “Management activities in elk management units should **maintain existing levels of elk security** (see glossary). Where possible, management activities in high and medium priority elk management units (determined in cooperation with Idaho Department of Fish and Game; see FW-DC-WL-17) should improve elk security.” (Emphasis added.)

And the EA and Wildlife Report completely fail to address Forest Plan guideline FW-GDL-WL-14: “Management activities should avoid or minimize disturbance to native ungulates during the birthing/parturition period.”

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies identified in our EA comments and in above discussions.

GRIZZLY BEAR

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 91 – 92, and are incorporated herein.

The FS claims the grizzly bear “is not known or suspected on the St. Joe Ranger District.” (12/2019 Wildlife Report.) We incorporate the documents, “Brebner Flat reply brief filed 10.13.20”, “ECOS online-grizzly bear occurrence” and “Species Profile for Grizzly bear (*Ursus arctos horribilis*)” which explain why the above statement and the FS’s “no effect” determination are wrong, and contrary to law. The EA and DN violate NEPA and the ESA.

Remedy: Select the No Action alternative. Alternatively, undertake formal consultation with the U.S. Fish and Wildlife Service based on the reality of the project area being occupied habitat. Also, prepare an EIS that addresses the legal, scientific and analytical deficiencies in our previous comments and in above discussions.

FISHER

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 92 – 94, and are incorporated herein.

The Idaho Department of Fish and Game acknowledges verified sightings of fisher in both Shoshone and Kootenai County (<https://idfg.idaho.gov/species/taxa/18029>).

The IPNF (USDA Forest Service, 1999a) states: “Hudson Bay trapping records indicate that furbearers, including these two species, were trapped in the area, particularly in the northern portion of the Coeur d’Alenes. It would be reasonable to infer the numbers of animals were greater than what occurs currently given the number of records within the last 10 years in the Geographic Assessment area.” Also, “Extensive alteration of forest structure as a result of natural and human-caused disturbances (i.e. reduction in canopy closure, snags, old growth, and down woody material) has altered the habitat value for fisher and marten.” (Id.) Also, “Analysis of the fisher reflects changes in habitat for the marten, since their habitat needs are similar.” (Id.)

The IPNF has recognized the impacts of past management actions on the Forest have been in fact significant: “Based on past reductions of suitable habitat and security, the cumulative effects would be considered high.” (USDA Forest Service, 1999a) This conclusion was reached even though action alternatives analyzed “would result in a minor reduction of security and suitable fisher habitat.” (Id.)

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies identified in our EA comments and in above discussions.

PINE MARTEN

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 94 – 95, and are incorporated herein.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies in our comments on the EA.

NORTHERN GOSHAWK

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 95 – 96, and are incorporated herein.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies in our comments on the EA.

PILEATED WOODPECKER

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 96 – 98, and are incorporated herein.

The word “pileated” does not appear in the EA, it does not appear in the Wildlife Report. In 1983 the IPNF said the pileated woodpecker finds optimum habitat in old growth on the IPNF. The IPNF stood by those words apparently until 2015, and then they never provided any explanation as to why pileated woodpeckers' reliance on old-growth habitat had become irrelevant.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies in our comments on the EA.

WOLVERINE

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 98 – 101, and are incorporated herein.

The Idaho Department of Fish and Game acknowledges verified sightings of wolverine in both Shoshone and Kootenai County (<https://idfg.idaho.gov/species/taxa/17557>).

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies in our comments on the EA.

FRINGED MYOTIS, LONG-EARED MYOTIS, LONG-LEGGED MYOTIS, TOWNSEND’S BIG-EARED BAT

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at p. 101, and are incorporated herein.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies in our comments on the EA.

BLACK-BACKED WOODPECKER

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 101 – 105, and are incorporated herein.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical deficiencies in our comments on the EA.

CANADA LYNX

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 105 – 108, and are incorporated herein.

The IPNF’s Camp Robin Wildlife Report states that “Lynx presence has been historically reported **throughout the Idaho Panhandle...**” (Emphasis added). Yet the EA assumes, without analysis, that the Homestead project area never had lynx.

The Idaho Department of Fish and Game acknowledges verified sightings of Canada lynx in both Shoshone and Kootenai County (<https://idfg.idaho.gov/species/taxa/16860>).

Remedy: Select the No Action alternative. Alternatively, undergo formal consultation with the U.S. Fish & Wildlife Service and prepare an EIS that addresses the legal, scientific and analytical deficiencies in our comments on the EA.

WESTERN (BOREAL) TOAD

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 108 – 109, and are incorporated herein.

Bartelt and Peterson, 1994 noted the amount of time that western (boreal) toads spend away from water in one subject group:

After breeding, most Stamp Meadows toads left the pond to forage, and after the pond dried, all toads were restricted to using terrestrial habitats. They used a variety of habitats

and spend most of the season away from water. Because of this, selecting particular habitats may have been important for providing these toads with their temperature and moisture needs, as well as with their food requirements.

Bartelt and Peterson, 1994 also tentatively concluded, based on the physiological needs of this amphibian, that logging open areas forest eliminate its suitability as habitat: “Although toads selected a combination of open and shaded habitats, extremely open habitats (e.g., clearcuts) may have been avoided by toads. These habitats may be too hot and dry of these wet-skinned ectotherms.”

The FS has no scientifically-based viability strategy for this Sensitive species, no metrics for describing the quantity and quality of habitat need to assure viability, and no way of quantifying cumulative effects. USDA Forest Service, 2011c states:

According to historical records, the western (boreal) toad ... was widely distributed and very common in Montana and other western states, but the species may have undergone severe population decreases in the past 25 years (Currim 1996).

The FS doesn’t really know why western toad populations have declined so drastically, except that it is associated with activities such as those approved by the Homestead DN: “Timber harvest, increased vehicle use, road maintenance, and road construction may kill individual adult and juvenile boreal toads using upland habitats.” (USDA Forest Service, 2011c at 3-304.)

The Lolo NF’s Sunrise Fire Salvage EA states, “The critical factor in whether toads can exploit open habitats appears to be the presence of adequate retreat sites [refugia] where toads can escape predators and maintain water balance (Guscio et al. (2007).” The EA doesn’t consider this science.

The FS provides no assurances that a viable population of boreal toads exists now in the IPNF, and fails to provide a proper cumulative effects analysis on boreal toad viability. The EA violates NEPA and NFMA.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the legal, scientific and analytical issues discussed above and in our comments on the EA.

TRAVEL MANAGEMENT

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 109 – 117, and are incorporated herein.

Our comments pointed out that the EA fails to analyze the water quality and fish habitat impacts of the IPNF’s inadequate road maintenance budget, and we also urged the FS to conduct a genuine minimum road system initiative. The latest version of the EA in Appendix B reveals there would be almost 15 miles of new road added to the national forest road system, as apposed to less than 3 miles in the original EA. Heading in the wrong direction, with no identified sources of funding is the agency way.

This is also inexplicable in the context of the most recent version of the EA proposing (albeit based on uncertain funding) to decommission about **eight more miles** of undetermined roads than the original EA. Can someone do the math here, considering newly added system roads and road decommissioning? Where did these 15 + 8 miles of previously unacknowledged roads come from? The updated EA also proposes to maintain **six fewer miles** of road.

Remedy: 1. Disclose the following information concerning the project area:

- The deferred road maintenance backlog
- The annual road maintenance funding needs
- The annual road maintenance budget
- The capital improvement needs for existing roads
- The road density in the project area
- The number of miles of project area roads that fail to meet BMP standards or design standards
- If adequate maintenance funding will exist for the post-project road network, and disclose how deferred maintenance costs might increase or decrease post-project.

2. Choose the No Action Alternative. Alternatively, prepare an EIS for this project which is tiered to a science-based forestwide Travel Analysis Process so that it is fully consistent with the Travel Management Regulations and related directives. Prepare an EIS that incorporates the revised forest-wide TAP and includes alternatives that implement the minimum road system.

FIRE ECOLOGY

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 117 – 175, and are incorporated herein.

News articles in the printed media recognize the ecological benefits of wildland fires and better forest policy (See the folder entitled "News Articles"). Also see "Land Use Planning More Effective Than Logging to Reduce Wildfire Risk".

Baker, 2017 discusses the limitations of tree-ring and fire scar studies, noting biases that result in significant underestimates of average between-fire intervals on landscapes in western U.S. dry forests³. He notes:

Past reconstructions of low-severity fire in dry forests, using tree-rings, focused on long records of dated fire years in small plots, and most were not intended to accurately estimate key rate parameters of low-severity fire needed to restore and manage low-severity fire across large landscapes. These small-plot reconstructions have known inaccuracies and biases if inappropriately used for this purpose

³ "Dry forests in the western USA cover 25.5 million ha and include dry pine forests, dominated by ponderosa pine (*Pinus ponderosa*) or other dry pines, and dry mixed-conifer forests that also have firs (*Abies concolor*, *A. grandis*, *Pseudotsuga menziesii*) and other trees."

Baker, 2017 determined that roughly only 14% of historical dry forests in the western U.S. had average between-fire intervals of less than 25 years. This 14% was “concentrated in Arizona and New Mexico (and) were scattered across parts of all other states.”

Kelly and Hodges 2020 found:

- Salvage-logged areas were not used by snowshoe hares... and squirrels were not present in post-fire salvage-logged habitat.
- The large scale and intensity of post-fire salvage logging removes important regenerating post-fire habitat and has detrimental impacts on these important prey species, likely leading to consequences for avian and mammalian predators.

Hutto et al., 2008 make several important points:

- (T)ree-ring studies ...can inform us about recent fire history from within only those forest types that typically experience relatively frequent, low-severity fire. Thus, tree-based studies are necessarily biased toward surface fires that scar, but do not kill, trees (Whitlock 2004). Because a disproportionately large number of historical studies are conducted in forests that support low-severity fire regimes, we may have unwittingly painted a biased broader perspective of what constitutes the dominant fire regime in the majority of conifer forests of North America. In the western United States, for example, the vast majority of forest types lie outside the ponderosa pine (*Pinus ponderosa*) vegetation type (about 85% of forested land within the contiguous western United States, according to the LANDFIRE database) and are dominated by mixed- and high-severity fires rather than low-severity fires (see also Agee [1993:Figure 1.4] and Arno and Fiedler [2005:Table 3.1]). This fact is not widely appreciated...
- (T)wo lines of evidence suggest that it is the more severe fires that are needed to create conditions most suitable for this fire specialist: (1) not only is the black-backed woodpecker restricted to burned forests, but its distribution within burned forests is also relatively restricted to the more severely burned conditions (Kotliar et al. 2002, Smucker et al. 2005, Russell et al. 2007, Hutto 2008); (2) black-backed woodpecker nest sites occur in locations that harbor significantly larger and more numerous trees than occur around randomly selected sites within a burn (Saab and Dudley 1998, Kotliar et al. 2002, Russell et al. 2007). Such nesting locations would be difficult to find in forests maintained as low-density, open, park-like stands due to frequent, low-severity fire.
- If we rely entirely on tree-ring and other historical approaches without considering the needs of fire-dependent plants and animals to determine what constitutes a natural fire regime, we run the risk of producing forest conditions that lead to decreases in, rather than the maintenance of, populations of native fire-dependent species. ... Living plants and animals carry adaptations that indicate the kind of environment within which they do well, and it would behoove us to pay close attention to what plants and animals are telling us about fire regimes. Once a fire-dependent species demonstrates that a particular kind

of fire is necessary for its persistence or success, that information should be used to help guide management and restoration decisions.

- Because different bird species respond positively to different fire severities within the low- to mid-elevation forest zones (Smucker et al. 2005), maintaining all fire severities within a mixed-severity fire regime in those vegetation types is an important fire management practice.
- (D)espite recent calls for developing restoration guidelines that are compatible with the evolutionary history of fire-dominated systems (Moore et al. 1999, Mitchell et al. 2006), restoration practices are not generally driven by a solid understanding of the evolutionary history of indigenous species. Instead, management practices tend to be focused on the use of mechanical treatments either to enhance wood production or to modify forest structure in a way that will reduce fire severity in the future (Fall et al. 2004, Loehle 2004, Arno and Fiedler 2005, Mason et al. 2006). The negative consequence of concentrating on altering fire behavior to the exclusion of ecological considerations is sometimes evidenced by bird community changes that are clearly unfavorable to the more fire-dependent species (Allen et al. 2006, Maron and Kennedy 2007). Forest restoration efforts should be based on a sound understanding of the ecological role of fire as an integral process; we need to develop the methods required to restore the full range of fire severities that plants and animals inform us were historically and evolutionarily associated with any given forest type (Johnson et al. 2003, DellaSala et al. 2004, Pierce et al. 2004, Fischer et al. 2006). ... The ecology of selected species (in the present case, fire-dependent species) should be used to understand and embrace the natural processes that prehistorically produced conditions necessary for their maintenance, and not be used to devise artificial means to circumvent those natural processes.

Meddens, et al., 2018 discuss fire refugia, not considered in IPNF project or programmatic planning:

- Fire is a global disturbance process that interacts with landscape pattern to create mosaics of ecosystem effects, including patches that remain both unburned and only minimally affected by low-intensity burning. These patches are increasingly of interest to ecologists and are often referred to as fire refugia (Kolden et al. 2012, Robinson et al. 2013, Krawchuk et al. 2016).
- The term *fire refugia* has various definitions (e.g., Gill 1975, Camp et al. 1997, Mackey et al. 2002, Krawchuk et al. 2016), all of which focus on the idea of locations disturbed less frequently or less severely by wildfire relative to the surrounding vegetation matrix. Fire refugia provide habitat for individuals or populations in which they can survive fire, in which they can persist in the postfire environment, and from which they can disperse into the higher-severity burned landscape (Robinson et al. 2013). In this way, fire refugia can function similarly to islands in a biogeographic context, particularly in severely burned areas, recognizing that the matrix of burned areas still provides some habitat to many taxa. Mosaics of fire effects spanning the full range of burn severity—including refugial patches—influence succession, ecosystem processes, and the distribution of

biological legacies (Franklin et al. 2000, Turner 2010, Johnstone et al. 2016). Locations in which biota survive fire have been shown to strongly influence postfire recovery and ecosystem dynamics (e.g., Haire and McGarigal 2010, Robinson et al. 2013, Stevens-Rumann et al. 2017). Uniquely, however, fire refugia are not purely ecological or biophysical phenomena; they are also a socioecological construct—for example, because of human manipulation of vegetative fuels and fire suppression activities that can both facilitate and impede their formation.

- Fire refugia are defined and characterized variably in the literature. Other terms used to describe them include *unburned islands*, *habitat refugia*, *remnants*, *residual vegetation*, *fire shadows*, *skips*, *stringers*, *refuges*, *islands*, *biological legacies*, and *late-successional forest*.
- Climate-change refugia have been defined as “areas relatively buffered from contemporary climate change that allow for habitat stability and species persistence over time” (Morelli et al. 2016). However, climate refugia identified for conservation and management purposes require that these areas also be buffered from severe disturbance events if they are to function as holdouts within a changing environment. Accordingly, fire refugia are a necessary complement to climate change refugia in fire-prone landscapes.
- To meet regulatory mandates to preserve such species under global change, however, habitat requirements must be embedded in more comprehensive landscape processes that facilitate specific ecosystem functions, particularly when multiple management objectives must be met.
- Over multiple fire-return intervals, fire refugia that last through only a single fire event are defined in the present article as *ephemeral*, whereas refugia that survive through multiple fires are defined as *persistent* refugia.
- (P)ersistent fire refugia are those that remained intact through multiple fire events (including reburns; Prichard et al. 2017), and this persistence suggests that they are more likely to be predictably associated with stable landscape features.
- Persistent fire refugia may also be more vulnerable to losses associated with anthropogenic climate change and changing fire regimes (Kolden et al. 2017), because the climatic conditions that previously sustained persistent refugia may give way to conditions that support and facilitate fire spread into a previously persistent patch. This novel introduction or reintroduction of fire would have considerable implications for ecosystems that have been dependent on such refugia.
- Remnant vegetation following fire provides functional habitat and other crucial ecological functions days to months after fire. Refugia can supply food resources (Schwilk and Keeley 1998, Henriques et al. 2000) that are otherwise consumed by fire in the surrounding landscape, provide cover or protection from predators, or reduce influences from exposure to abiotic stressors (e.g., wind and solar radiation). Competition

within refugia may increase from before to after a fire, because of decreases in available resources in the surrounding burned landscape (Banks et al. 2012). In addition, these refugia can function as buffers against erosion and landslides that can occur following fires (Shakesby and Doerr 2006), mediating detrimental habitat loss.

- There is a crucial need to prioritize fire refugia for conservation and management under global change. The fire refugia taxonomic dichotomies presented in the present article provide a framework to consider conservation values and potential trends in fire refugia characteristics. Understanding the distribution, abundance, composition, and function of fire refugia may help in prioritizing land management activities on the basis of the concepts of resistance and resilience to fire and of the vulnerability to further disturbances. This prioritization will likely require a comprehensive understanding of both the spatial and the temporal predictors of refugia, integrated with conservation needs and policy limitations.
- Because fire activity is projected to increase under future climate scenarios, fire refugia will likely be important to preserving ecosystem resiliency for a variety of taxa (tables S1 and S2). Therefore, future management actions should focus on identifying, maintaining, or promoting fire refugia within landscapes holistically. For example, the actual locations of ephemeral fire refugia may be less important than their aggregate area and their spatial configuration. On the other hand, understanding the location and environmental determinants of predictable, persistent, and semipersistent fire refugia may be vital for increasing the resilience of both natural and human-occupied landscapes (Smith et al. 2016).
- (O)ne management strategy that would have clear positive outcomes for conserving fire refugia could be reducing the use of backfires and burnouts (or “blackout burning”) as wildfire suppression tactics where feasible. During large fire events, firefighters routinely use firing operations to consume available fuel ahead of an advancing fire front; as the flaming front passes or reaches containment lines, they subsequently burn out any remnant green vegetation (i.e., fire refugia) to reduce the potential for flare-ups and ember-ignited spot fires across the containment line. Although this operation tactic is highly effective for protecting crucial infrastructure and resources, it may not be necessary to achieve containment on fires that are remote or being managed to meet natural resource objectives.

Camp, et al., 1997 add, “Locating probable sites of historical fire refugia across a landscape will assist managers in determining an appropriate level of late-successional connectivity. Connectivity is a term that describes the connectedness or spatially continuity of a patch type (Merriam, 1984). It has been stated that, without connectivity, disjunct patches may not function as habitat (Harris, 1985; Noss and Harris, 1986).”

Remedy: Choose the No Action Alternative. Supplement the Forest Plan EIS to take a hard look at the cumulative effects of fire suppression policies. Prepare an EIS for this project if the FS still wants to pursue it, which addresses the scientific perspectives on fire we present above and in our EA comments.

INVENTORIED ROADLESS AREAS AND OTHER UNROADED AREAS

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 175 – 177, and are incorporated herein.

Some units (e.g. 28, 29) are within a Roadless Expanse, and the FS provides no analysis of the issue, which is inconsistent with the Region 1 policy found in USDA Forest Service, 2010e.

Anderson, et al., 2012 analyze watershed health according to the FS's Watershed Condition Framework and found:

The Watershed Condition Framework data identifies 54 percent of all NFS land in properly functioning watersheds, 43 percent in watersheds functioning at risk, and just 3 percent in impaired watersheds. However, these proportions are not evenly distributed across the three land designation categories.

Designated Wilderness areas are most frequently spatially coincident with healthy watershed conditions. Eighty percent of the land within designated Wilderness is located in properly functioning watersheds, while 18 percent is in at-risk watersheds and just 1 percent is in impaired watersheds. Watershed conditions in Inventoried Roadless Areas are not as healthy as in designated Wilderness, but almost two-thirds of their area is still in properly functioning condition. Sixty-four percent of the IRA acreage is in properly functioning watersheds, 34 percent is in at-risk watersheds, and 2 percent is in impaired watersheds. Finally, other Forest Service lands – which make up slightly more than half of the National Forest System – tend to have the least healthy watershed conditions. While 38 percent of the managed landscape is in properly functioning watersheds, most of the roaded lands are in watersheds that are either functioning-at-risk (58 percent) or impaired (5 percent).

(T)he relationship between forested wild lands and watershed health is well documented in the scientific literature. For example, the Forest Service's Interior Columbia River Basin Ecosystem Assessment (1996) found a positive relationship between unroaded areas and "strongholds" of high-quality habitat for salmon, steelhead, bull trout, and other key salmonid species. An evaluation of the role of Wilderness areas in conserving aquatic biological integrity in western Montana concluded that "the importance of wilderness in aquatic conservation is extraordinary" (Hitt and Frissell 2000). In contrast to Wilderness and roadless areas, "the roaded, intensively managed landscapes of the other national forest lands have been closely correlated with heavily sediment-laden streams and dramatic changes in flow regimes" (DellaSala et al. 2011). The Forest Service's environmental impact statement for the Roadless Rule explains that the presence of roads has a major influence on stream and watershed conditions: "Without the disturbances caused by roads and the activities that they enable, stream channel characteristics are less likely to be adversely altered compared with stream channel conditions in roaded areas" (USDA Forest Service 2000).

Remedy: Select the no-action alternative. Otherwise, prepare an EIS for the project, and evaluate the location of roadless area boundaries and analyze and disclose impacts on entire Roadless Expanse.

MONITORING

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 178 – 180, and are incorporated herein.

The EA failed to adequately analyze cumulative effects of past, ongoing, and reasonably foreseeable actions. As discussed in other sections of this objection, the problem is evident in the analyses of most resources supposedly analyzed in the EA.

Following the January 2015 Record of Decision adopting the Revised Forest Plan, in 2016 the FS carried out an “administrative” change of its forest plan monitoring, altering the monitoring program outlined in the 2015 Revised Forest Plan without undertaking a NEPA process. This violated both NEPA and NFMA. The process did not conform to 2012 Planning Rule requirements.

The Revised Forest Plan states:

An interdisciplinary team will develop a **biennial** Monitoring Evaluation Report which will summarize the results of completed monitoring, evaluate the data, consider relevant information from broad-scale or other monitoring efforts, and make recommendations to the responsible official. The monitoring evaluation report will indicate whether or not a change to the Forest Plan, management activities, or the monitoring program, or a new assessment, may be warranted based on the new information. The monitoring evaluation report is used to inform adaptive management of the Plan area. The Monitoring Evaluation Report will be made available to the public. (Emphasis added.)

Five years after adoption of the Revised Forest Plan, the FS has yet to issue a single “biennial” monitoring and evaluation reports.

Roger Sedjo, member of the Committee of Scientists, expresses his concerns in Appendix A of their 1999 Report about the discrepancy between forest plans and Congressional allocations, leading to issues not considered in forest plans such as the IPNF's:

(A)s currently structured there are essentially two independent planning processes in operation for the management of the National Forest System: forest planning as called for in the legislation; and the Congressional budgeting process, which budgets on a project basis. The major problem is that there are essentially two independent planning processes occurring simultaneously: one involving the creation of individual forest plans and a second that involves congressionally authorized appropriations for the Forest Service. Congressional funding for the Forest Service is on the basis of programs, rather than plans, which bear little or no relation to the forest plans generated by the planning process. There

is little evidence that forest plans have been seriously considered in recent years when the budget is being formulated. Also, the total budget appropriated by the Congress is typically less than what is required to finance forest plans. Furthermore, the Forest Service is limited in its ability to reallocate funds within the budget to activities not specifically designated. Thus, the budget process commonly provides fewer resources than anticipated by the forest plan and often also negates the “balance” across activities that have carefully been crafted into forest plans. Balance is a requisite part of any meaningful plan. Finally, as noted by the GAO Report (1997), fundamental problems abound in the implementation of the planning process as an effective decision making instrument. Plans without corresponding budgets cannot be implemented. Thus forest plans are poorly and weakly implemented at best. Major reforms need to be implemented to coordinate and unify the budget process.

Any FS claims to be implementing “adaptive management” are not credible as long as the FS’s chronic political problems include inadequate funding for monitoring.

Our previous comments requested, “Please provide an analysis of how well those past FS projects met the goals, objectives, desired conditions, etc. stated in the corresponding NEPA documents, and how well the projects conformed to forest plan standards and guidelines.” It’s a sensible, reasonable request so to be able to understand the cumulative effects of management, but the FS would rather wear blinders in terms of its performance with past projects.

Remedy: Select the no-action alternative. Otherwise, prepare an EIS for the project, based upon genuine monitoring as we discuss above.

SCIENTIFIC INTEGRITY

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 180 – 184, and are incorporated herein.

Remedy: Select the No Action Alternative. Otherwise, undertake the Science Consistency Review process for the Forest Plan, and prepare an EIS that addresses the analytical and scientific issues identified in our EA comments.

ALTERNATIVES

Objectors’ March 9, 2020 comments on the EA raised this issue in detail at pp. 184 – 186, and are incorporated herein.

Remedy: Select the No Action Alternative. Alternately, prepare an EIS with a full range of alternatives.

ECONOMIC ANALYSIS

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 186 – 187, and are incorporated herein.

With perpetual fire suppression under FS management of the project area virtually assured according to the Forest Plan and Homestead EA, proposed management activities would occur periodically, because they would be needed to maintain vegetation in the FS's version of a "safer" condition. The EA fails to provide a full and detailed accounting of the costs to those who would pay for this never-ending "fuels" manipulation cycle—the American public. It is also in the FS's best interest to know what sort of long-term financial commitments it is making. The EA fails to disclose the inherent uncertainties of perpetually funding these activities, and the implications of their being left undone.

The FS must design a detailed long-term program for maintaining the allegedly safer conditions, including how areas will be treated in the future following proposed treatments, or how areas not needing treatment now will be treated as the need arises. And submit it for public comment/review. The public at large and private landowners must know what the scale of the long-term efforts must be, including the amount of funding necessary, and the likelihood based on realistic funding scenarios for such a program to be adequately and timely funded.

SCENERY

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 187 – 188, and are incorporated herein.

COLLABORATION

Objectors' March 9, 2020 comments on the EA raised this issue in detail at pp. 188 – 189, and are incorporated herein.

FURTHER REMEDY

Provide the remedy requested AWR's Objection to the Forest Plan.

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