January 3, 2025

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Re: Comments East Rim WUI Vegetation Management Project

These comments are submitted on behalf of the Alliance for the Wild Rockies, Native Ecosystems Council, Sage Steppe Wild, and Yellowstone to Unitas Connection. We are providing these comments in outline form so the agency personnel can more efficiently address our points. After all, a thorough and objective analysis of the project impacts on ecosystems and society is the job of the agency, not the public. We have attached reference material to these comments for convenience or provided links for access online.

The Scoping Letter sets a comment deadline of January 6, 2025. This is a concern as it allowed only 20 days running through the Christmas and New Years' holidays. It is unfair to the public to issue such a huge project during these holidays and then announce there will be no environmental analysis. We are requesting that an official extension be provided, giving an additional 30 days for comments and that the process be changed to call for a full environmental analysis under NEPA in an EA or EIS.

The Scoping Letter states: *"The Forest Service has made a preliminary assessment that this proposal falls within categories of actions listed in Section 603 of the Healthy Forests Restoration Act (16 U.S.C. 6591b) which can be used for qualifying insect and disease or hazardous fuels* *reduction projects. This project will be categorically excluded from documentation in an environmental assessment or environmental impact statement because it fits the following category, pending extraordinary circumstance determinations. There are limitations on the use of this categorical exclusion, including that the project cannot exceed 3,000 acres, cannot establish new permanent roads, and should primarily be in wildland urban interface or public drinking water source area or if outside then within an area that contains very high wildfire hazard potential."*

The Council on Environmental Quality has provided guidance on the use of CEs.[1] *"…the agency must consider the specific circumstances associated with the proposed activity, to rule out any extraordinary circumstances that might give rise to significant environmental effects requiring further analysis and documentation in an EA or an EIS… Even if a proposed activity fits within the definition of a categorical exclusion and does not raise extraordinary circumstances, the CEQ Regulations make clear that an agency can, at its discretion, decide "to prepare an environmental assessment ... in order to assist agency planning and decisionmaking… ."*

The question of extraordinary circumstances is critical here. The CEQ guidance states that, *"the presence of a factor, such as a threatened or endangered species or a historic resource, could be an extraordinary circumstance… ."*

The project area contains critical habitat and a migration corridor for the threatened Canada lynx, and habitat for the threatened grizzly bear. Bald eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. In addition, the newly listed threatened Whitebark pine is present in the area. These are factors that demand this project be addressed through a full EA or EIS and be complete with a Biological Assessment and a Fish and Wildlife Service Biological Opinion under Section 7 of the ESA.

The project is also within Sublette County and the Sublette County Comprehensive Plan places high priority on protecting wildlife. An analysis under NEPA would provide the County with information it needs to evaluate the project in view of its Plan.

The Scoping Letter also states: *"Fuels reduction will be achieved through a variety of timber management activities and prescribed burning. The benefits of forest thinning and burning include improving landscape resilience to climate change and other disturbances by reducing*

[1] https://ceq.doe.gov/docs/ceq-regulations-and-guidance/NEPA_CE_Guidance_Nov232010.pdf

wildfire risk, decreasing fuel loading, improving forest stand health, and increasing the age class and species diversity of trees. All proposed activities will be consistent with the Forest Plan (USDA 1990, as amended)."

The Bridger Teton NF must demonstrate how the project is consistent with its Forest Plan and obligations under NFMA for special status species and MUSYA/NFMA for sustainability.

Since about 1935, the Forest Service has engaged in Fire Fighting and Fire Suppression. This is less than a century. According to the Forest Service[2], stand replacing fires occur in Rocky Mountain lodgepole pine between 100 – 300 years, Whitebark pine 150 – 300 years, Engleman spruce – subalpine fir between 100 – 400 years, in spruce-fir-Douglas fir between 35 to >200 years. In this regard, areas that have not been burned, logged, or treated are in various stages up to, and including old growth. So, fire suppression should not be considered a factor since these stands are moving along nature's trajectory, or succession.

Are treatments effective in preventing fires? Rhodes and Baker[3] note that, *"Fuel treatment effectiveness and non-treatment risks can be estimated from the probability of fire occurrence. Using extensive fire records for western US Forest Service lands, we estimate fuel treatments have a mean probability of 2.0-7.9% of encountering moderate- or high-severity fire during an assumed 20-year period of reduced fuels."*

Cohen[4] notes: *"Communities exposed to inevitable extreme wildfire conditions do not have to incur inevitable disastrous fire destruction. Research shows that the characteristics of a home and its immediate surroundings within 100 feet (30 meters) principally determine home ignitions. This area, called the home ignition zone (HIZ), defines wildland-urban (WU) fires as a home ignition problem and not a problem of controlling wildfires. Communities can readily reduce home ignitability within the HIZ to prevent WU fire disasters instead of increasing wildfire suppression that fails during extreme wildfire conditions."*

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[2] Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p. https://www.fs.usda.gov/rm/pubs/rmrs_gtr042_2.pdf

[3] Rhodes, J.J. and Baker, W.L. 2008. Fire Probability, Fuel Treatment Effectiveness and Ecological Tradeoffs in Western U.S. Public Forests. The Open Forest Science Journal, 2008. https://www.energyjustice.net/files/biomass/library/Rhodes-Baker.pdf

[4] Cohen, J. 2021. A More Effective Approach for Preventing Wildland-Urban Fire Disasters. In: Working from the Home Outward: Lessons from California for Federal Wildfire Policy. Environment Now. https://environmentnow.org/wp-content/uploads/2021/05/Home-Outward-report-2021-1.pdf

Calkin[5] notes: *"Collectively, disaster fires, such as those mentioned here, have been lumped into a category of wildland–urban interface fires. These problem fires were defined as an issue of wildfires that involved houses. In reality, they are urban fires initiated by wildfires. … until the WU fire problem statement is redefined to recognize the key role of structure ignition and focus on creating ignition-resistant communities, risk-reduction strategies will continue to be ineffective and insufficient."*

It is critical that the BTNF redefine the problem to one of addressing the hardening of homes and structures, clearing around structures and not logging and burning which have little chance of success and bear high economic costs.

In Attachment 1 to these comments, we provide a review of some of the factors that need to be considered. These include:

- Insect outbreaks are not a significant factor in wildfires as only a small percentage of fires intersected prior beetle outbreaks. Daily area burned in high – extreme fires was not related to beetle activity, but due to warm, dry, and windy conditions. A review of treatments for mountain pine beetle control found that they had little to no impact on mountain pine beetle. Controls that had not been logged or thinned had more trees killed by beetles but contained more residual mature trees than thinned stands.
- Fuel buildup is blamed for larger wildfires, but an analysis of 1500 fires in western forests found that "forests with higher levels of protection had lower severity fire even though they have highest levels of biomass and fuel loads.
- The Firefighters United for Safety, Ethics and Ecology summarize the issues around fires, logging, fuels treatments, carbon storage and climate change. They conclude that *"attempts to fire-proof the forest through landscape-scale logging or mechanized firefighting are essentially geoengineering schemes that would fundamentally alter forest ecosystems, ultimately put them at greater risk of destruction, and further accelerate global heating."*

It is the burden of the Forest Service to justify its claims for this project that its proposed treatments improve resilience and improve forest health. We don't recall seeing any analysis of these claims and their basis or comparison to the naturally evolved forest stand structure and ecology. It is also the burden of the Forest Service to justify its claims that this project will reduce fire risk and address the economics and

[5] Calkin, David E.; Barrett, Kimiko; Cohen, Jack D.; Finney, Mark A.; Pyne, Stephen J.; Quarles, Stephen L. 2023. Wildland-urban fire disasters aren't actually a wildfire problem. PNAS. 120(51): e2315797120.

practicality of repeating this process every two decades if that is even possible. It is also the responsibility of property owners to educate themselves and put in place measures to harden their structures against fire.

We are concerned with outcomes of these events and the need for a thorough analysis of the results of past logging, wildfire, prescribed fire, thinning and other forest treatments. If you take a look at the maps in Figures 1 and 2, they show numerous past treatments, wildfires and timber harvests in the Big Piney, Pinedale Ranger Districts and the BTNF.

Table 1 approximates the acres affected. Events and areas are a tabulation of the individual treatment areas (polygons) as taken from publicly available Forest Service Geospatial Data: https://data.fs.usda.gov/geodata/ which we mapped with ArcGIS Pro. They have not been fully vetted as there is some duplication across the databases, and recent events do not appear. Note that the harvest events for Pinedale included the Union Pass FarmBill project of 64,941 acres which has not gone forward. We also obtained a vegetation layer from 2007 which shows large areas of clearcuts. Unfortunately, this file is difficult to use, and we were unable to determine the areas. The map in Figure 2 makes clear that large areas have been clearcut and those totals are not included in Table 1.

There must be an analysis of these past events so the public understands whether they have been monitored and what the monitoring shows the current forest stand structure to be compared to the structure prior to disturbance. Have past logging and treatments been burned by wildfire following those events? This needs full analysis over time since many projects go back to the 1970s.

Table 1. Summary of Disturbance for Big Piney and Pinedale Ranger Districts

Ranger District	Fire Events	Acres	Haz Fuel Events	Acres	Silvi-culture Events	Acres	Harvest Events	Acres
Pinedale	15	142,778	441	24884	4	308	682	76,315
Big Piney	8	176,474	497	95,157	37	811	853	13,167

We are concerned with the effects of this project on special status wildlife species and their status prior to, and after, the event. Our question is basically whether these have been monitored following the events and what those monitoring results show in comparison to the state of the forest prior to the event. We have included Figure 3 showing that the project lies within Canada lynx critical habitat. It also affects Rocky Mountain elk crucial range and parturition areas. Due to limited time, we cannot fully analyze the wildlife aspects of this project, but will lay out principal points below that need to be addressed. It is the Forest Service's job to do the analysis.

1. **Canada lynx**. As Figure 3 shows, this project lies within the 2014 designated Critical Habitat for lynx. It is also in a migration pathway through the East Rim area as documented by Squires[6]. This radio-collared lynx moved between the Wyoming and Wind River Ranges on multiple occasions. The lynx situation needs to be fully analyzed. Principal points include a Forest-wide and project-specific analysis :
    a. The effects of past wildfire, timber harvest, fuel treatments and other forest structural modification on lynx and snowshoe hare habitat and presence.
    b. The condition of lynx analysis units (LAUs)
    c. The effects of roads and recreation.
    d. Document the snowshoe hare habitats and population levels.
    e. Document all previous Canada lynx observations and tracking studies to delineate the habitats used by lynx.
    f. Compare habitats, past projects and wildfires, and this current proposal with criteria such as that developed by Kosterman[7], Holbrook[8,9]

2. **Grizzly Bear.** This past summer, a mother and three cubs spent time in the East Rim area and were photographed and reported to the Wyoming Game and Fish Department.
    a. Analyze grizzly bear foraging and security habitat for the project area and how that will be changed by the project.

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[6] Squires, J.R. and Oakleaf, R. 2005. Movements of a Male Canada Lynx Crossing the Greater Yellowstone Area, Including Highways. Northwest Science: 79(2&3):196 – 201. https://research.fs.usda.gov/treesearch/50212

[7] Kosterman MK, Squires JR, Holbrook JD, Pletscher DH, Hebblewhite M. Forest structure provides the income for reproductive success in a southern population of Canada lynx. Ecol Appl. 2018 Jun;28(4):1032-1043. doi: 10.1002/eap.1707. Epub 2018 May 7. PMID: 29457298.

[8] Holbrook, Joseph D.; Squires, John R.; Bollenbacher, Barry; Graham, Russ; Olson, Lucretia E.; Hanvey, Gary; Jackson, Scott; Lawrence, Rick L. 2018. Spatio-temporal responses of Canada lynx (Lynx canadensis) to silvicultural treatments in the Northern Rockies, U.S. Forest Ecology and Management. 422: 114-124. https://research.fs.usda.gov/treesearch/56421

[9] Holbrook, Joseph D.; Squires, John R.; Bollenbacher, Barry; Graham, Russ; Olson, Lucretia E.; Hanvey, Gary; Jackson, Scott; Lawrence, Rick L.; Savage, Shannon L. 2019. Management of forests and forest carnivores: Relating landscape mosaics to habitat quality of Canada lynx at their range periphery. Forest Ecology and Management. 437: 411-425. https://research.fs.usda.gov/treesearch/58924

b. Document observations across the Big Piney and Pinedale Ranger Districts and evaluate habitats connecting these for the ability of bears to move across the landscape.
c. Analyze road and trail effects and include non-system roads and trails.

3. **Bald Eagle.** Bald and Golden Eagles are observed in this area.
    a. Delineate preferred habitats for foraging and nesting
    b. Analyze the status of these habitats and how this project combined with other projects (past and foreseeable) affect this habitat.

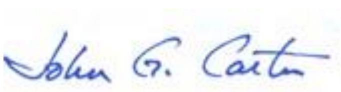
4. **Great Gray Owl.** The great gray owl is designated as a sensitive species for 11 of 16 National Forests in U.S. Forest Service Region 4, including the Bridger-Teton National Forest. The Wyoming Game and Fish Department classifies this species as a Species of Greatest Conservation Need (status unknown) in the 2010 State Wildlife Action Plan. Breeding populations are present in the project area and have been observed annually by local citizens. The Teton Raptor Center[10] has provided a report on these owls that pointed out the *"Owls may be at risk from both natural and anthropogenic disturbances such as wildfire, disease outbreak, drought, climate change, logging and development."*
    a. Conduct surveys for these (and other) owls.
    b. Analyze the effects of past wildfires, past and foreseeable projects in the Big Piney and Pinedale Ranger Districts, in combination with the proposed East Rim project on these owls and their habitats.
5. **Northern goshawk.** Northern goshawk is a sensitive species. Under NFMA it is to retain population viability.
    a. Analyze the population trend of goshawks in the Bridger-Teton NF.
    b. Map nest, post fledging and home ranges.
    c. Analyze the effects of past wildfires, past and foreseeable projects in the Big Piney and Pinedale Ranger Districts on goshawks and their habitat in combination with the proposed East Rim project.
6. **Management Indicator Species.** These include elk, mule deer, pronghorn, and moose. Figure 3 shows the proximity of the proposed project to elk crucial and parturition range.

[10] Bedrosian, B., Gura, K, Mendelsohn, B., Patla, S. 2015. Teton Raptor Center and Wyoming Game and Fish Department. https://tetonraptorcenter.org/wp-content/uploads/2022/05/10_2013-2015_GGOW_Project_Report.pdf

a. Analyze the crucial, parturition, seasonal ranges for these species and determine the effects of past wildfires, past and foreseeable projects on their habitats and migration paths.
b. As part of this define and analyze security habitat for these species.

7. **Migratory Birds.** *"Many species of migratory birds are of international concern due to naturally small ranges, loss of habitat, observed population declines, and other factors. The BTNF recognizes the ecological and economic importance of birds, and approaches to bird conservation at several levels by implementing: 1) Forest Plan objectives, standards and guidelines, 2) a Forest-wide bird monitoring program, and 3) site-specific mitigation and effects analyses for identified species of concern."* [11]
    a. Analyze the population trends of these birds across the Bridger-Teton National Forest.
    b. Analyze the effects of past wildfires, past and foreseeable projects in the Big Piney and Pinedale Ranger Districts, in combination with the proposed East Rim project.

Respectfully,



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[11] Bridger-Teton National Forest. 2017. Upper Green River Area Rangeland Project Final Environmental Impact Statement. Pinedale Ranger District. P463.

Maps

Figure 1 Wildfire, Haz Fuel, Silviculture, and Harvest Big Piney and Pinedale Ranger Districts

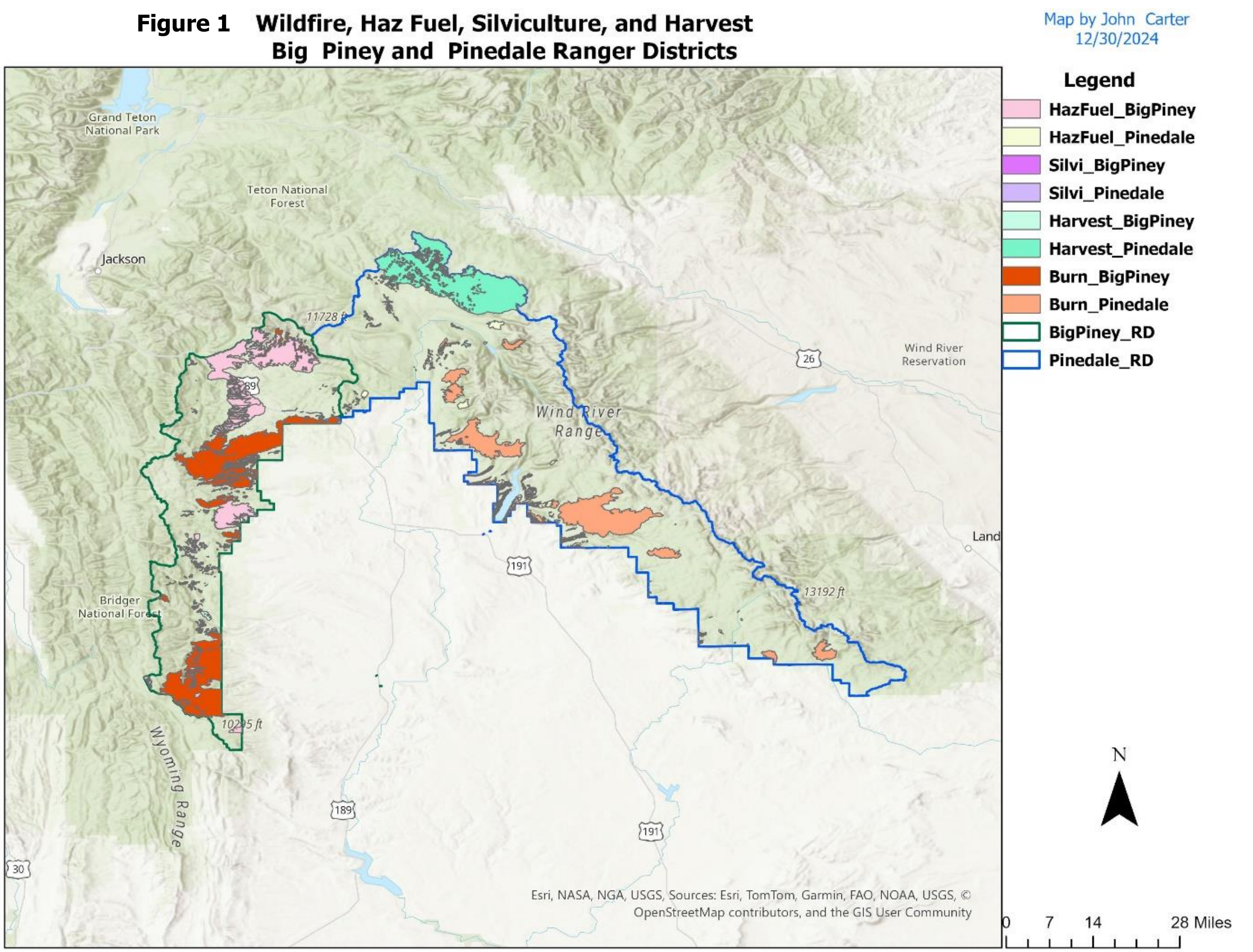


Figure 2 Clearcuts and Timber Harvest
Big Piney and Pinedale Ranger Districts

Map by John Carter
1//1/2025

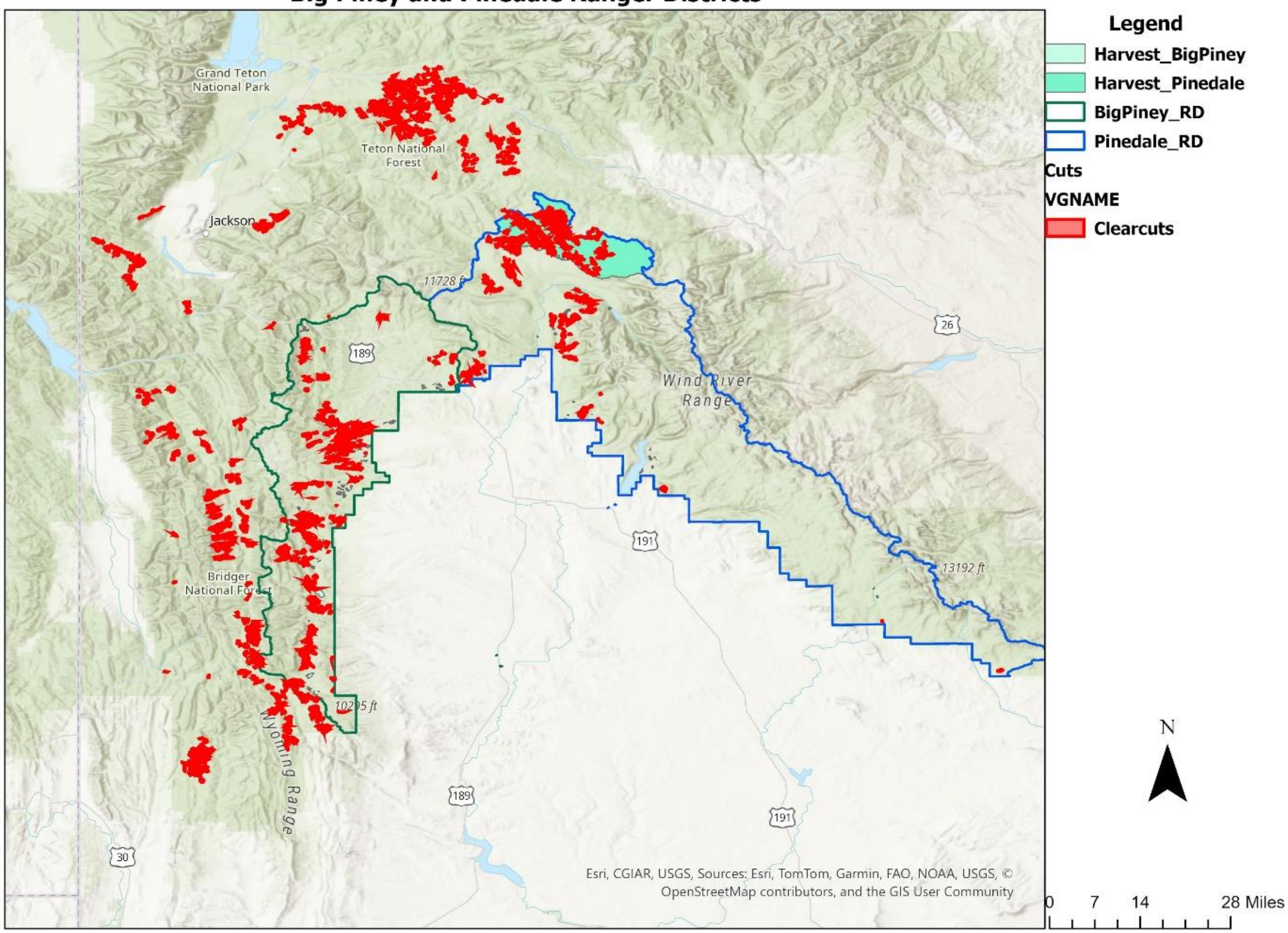
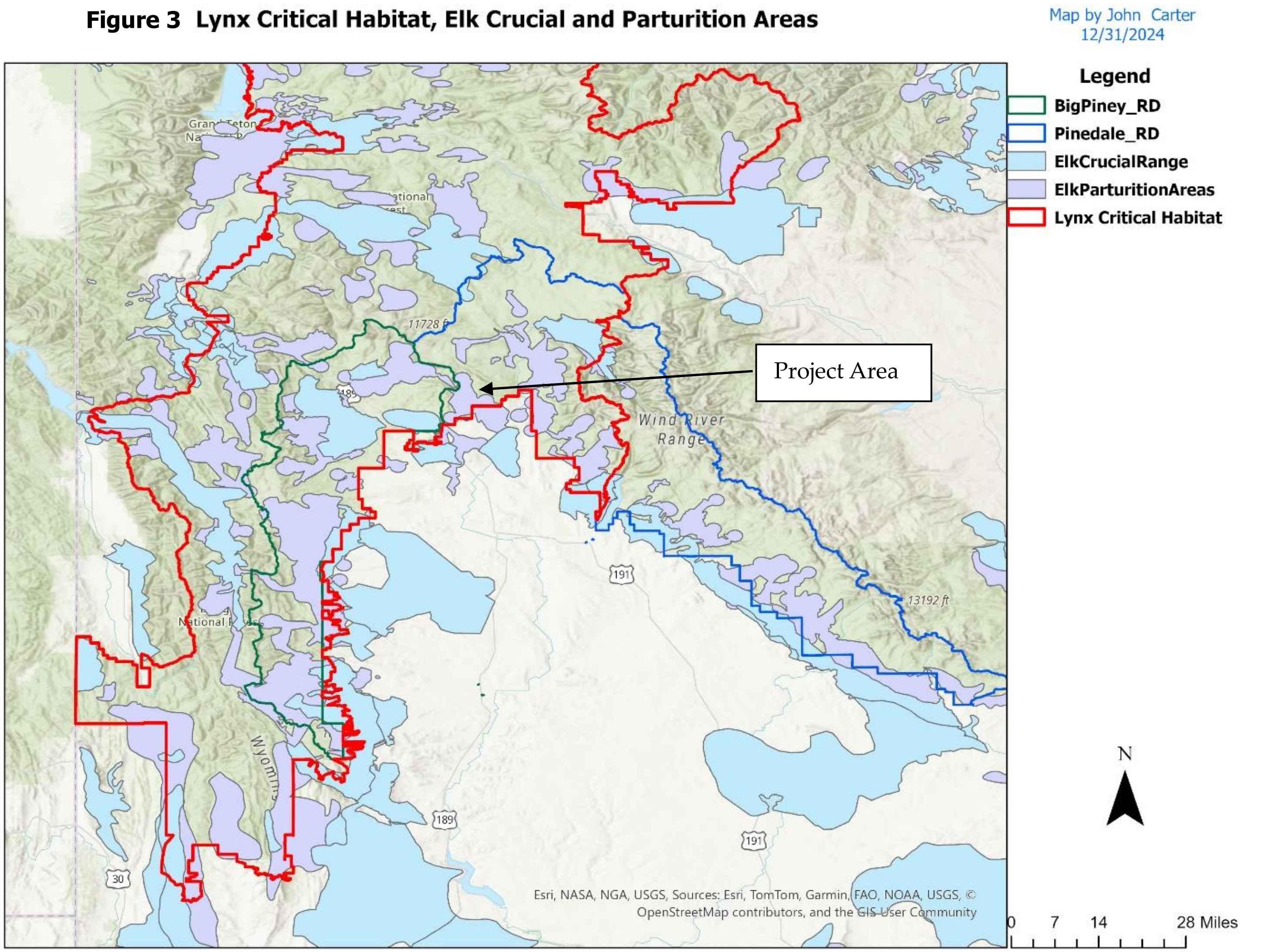


Figure 3 Lynx Critical Habitat, Elk Crucial and Parturition Areas



Attachment 1

Forests and Carbon Storage

Forests currently capture and store approximately 25% of global anthropogenic carbon emissions. Forests in the lower 48 states sequester 460 ± 48 Teragrams (Tg) of carbon per year, while losses from disturbance average 191 ± 10 Tg carbon per year. Carbon loss in the southern US was 105 ± 6 Tg with 92% from harvest and 5% from wind damage. Carbon loss in the western US was 44 ± 3 Tg with 66% due to harvest, 15% from fire, and 13% from insect damage. Carbon loss in the northern US was 41 ± 2 Tg with 86% from harvest, 9% from insect damage, and 3% from land conversion. Taken together, these disturbances reduced the estimated potential carbon sink of US forests by 42%.[1] Life cycle analyses of fuel reduction treatments including removal of woody biomass, combustion of fuel in logging machinery, transport, burning of slash, milling energy use, and other factors lead to the conclusion that over the long term, carbon losses from treatment projects may exceed those from wildfire because most of the carbon mass remains on site unburned during fire. The authors further noted that, "Studies at large spatial and temporal scales suggest that there is a low likelihood of high-severity wildfire events interacting with treated forests, negating any expected benefit from fuels reduction."[2]

A USDA study estimated soil organic carbon in relatively undisturbed secondary forests in the Rocky Mountain Region is 71,571 lbs/acre. Estimated carbon in dead organic matter above the mineral soil horizon in lodgepole pine forest in the Rocky Mountain Region is 13,411 lb/acre. Average storage of carbon by Forest ecosystem component for the Rocky Mountain Region is 148,190 lb/acre for Idaho with trees (60,961 lb/acre), soil (64,417 lb/acre), forest floor (21,735 lb/acre) and understory (1,077 lb/acre). Annual average carbon accumulation in live trees for Idaho is 1,112 lb/acre/year.[3] The Proceedings of the American Society of Mining and Reclamation reported that, "Soil organic matter (OM) is drastically reduced by various processes (erosion, leaching, decomposition, dilution through soil horizon mixing etc.) typically associated with topsoil salvage prior to surface mining activities. Of these processes, loss of physical protection of OM through the breaking up of soil aggregation can result in up to 65% of soil carbon (C) reductions."[4] This has implications for timber harvest, or other activities that disturb and disrupt the soil.

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[1] Harris, N.L., Hagen, S.C., Saatchi, S.S. et al. Attribution of net carbon change by disturbance type across forest lands of the conterminous United States. Carbon Balance Manage 11, 24 (2016). https://doi.org/10.1186/s13021-016-0066-5

[2] Restaino, J.C. and D.L. Peterson. 2013. Wildfire and fuel treatments effects on forest carbon dynamics in the western United States. Forest Ecology and Management 303:46-60.

[3] Birdsey, R. A. Carbon Storage and Accumulation in United States Forest Ecosystems. USDA Forest Service General Technical Report WO-59.

[4] Wick et al. 2008. Soil aggregate and aggregate associated carbon recovery in short-term stockpiles. Proceedings America Society of Mining and Reclamation, 2008 pp 1389-1412. DOI: 10.21000/JASMR08011389

Both fuel treatments and wildfire remove carbon from forests. In mature ponderosa pine forests, for example, protecting one unit of carbon from wildfire combustion came at a cost of removing three units of carbon with treatments. "The reason for this is simple: the efficacy of fuel reduction treatments in reducing future wildfire emissions comes in large part by removing or combusting surface fuels ahead of time. Furthermore, because removing fine canopy fuels (i.e. leaves and twigs) practically necessitates removing the branches and boles to which they are attached, conventional fuel-reduction treatments usually remove more carbon from a forest stand than would a wildfire burning in an untreated stand." The analysis showed that thinning and other fuel treatments to reduce high-severity fire, although considered to keep carbon sequestered, do not do so. High carbon losses came from treatments while only small losses were associated with high-severity fire. These were similar to the losses with low-severity fire that treatments are meant to encourage.[5]

Wildfire and Species Effects

More species (48% of the community) reached peak abundance at moderate-high-severity-fire locations than at low-severity fire (8%), silvicultural management (16%), or undisturbed (13%) locations. Total community abundance was highest in undisturbed dense forests as well as in the first few years after silvicultural management and lowest in the first few years after moderate-high-severity fire, then abundance in all types of disturbed habitats was similar by 10 years after disturbance. Even though the total community abundance was relatively low in moderate-high-severity-fire habitats, species diversity was the highest. Moderate-high-severity fire supported a unique portion of the avian community, while low-severity fire and silvicultural management were relatively similar.[6]

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[5] Campbell, J.L., Harmon, M.E., and S.R. Mitchell. 2012. Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions? Frontiers in Ecology and Environment 10(2):83-90. doi:10.1890/110057.

[6] Roberts, L.J.; Burnett, R.; Fogg, A. Fire and Mechanical Forest Management Treatments Support Different Portions of the Bird Community in Fire-Suppressed Forests. Forests 2021, 12, 150. https://doi.org/10.3390/f12020150

Clearcuts in the Helena NF (upper) and Gallatin NF (lower) result in habitat fragmentation and loss of carbon storage. Photos by George Wuerthner.

Thinning projects in the Deschutes NF result in soil disturbance, loss of habitat and loss of carbon storage. Photos by George Wuerthner.

Old growth mixed conifer forests in the Caribou NF have habitat structure, healthy and diverse understory habitat and provide maximum carbon storage.

Photos by John Carter

Wildfire and Insect Outbreaks

An analysis of 2766 large wildfires that burned in the west during the 2003 - 2012 period was carried out to determine the influence of mountain pine beetle outbreaks on fire behavior and area burned. Approximately 12% of these fires intersected prior beetle outbreaks and burned in those areas for only about 4 days. Daily area burned for high-extreme fire behavior in large fires burning for long periods in landscapes affected by mountain pine beetles was not related to beetle activity, but was due to warm, dry and windy conditions.[7] A study of the effects of spruce beetle on fire activity in Colorado found no effect of pre-fire beetle activity on fire severity. Both bark beetle outbreaks and wildfires have increased due to climate variability while topography, weather conditions and pre-outbreak basal area exerted a stronger effect on fire severity.[8] Review of treatments (tree harvest and prescribed burning, among other actions) for mountain pine beetle control found that overall, they had little to no impact on mountain pine beetle. Controls that had not been logged or thinned had more trees killed by beetles, but in the end, contained more residual mature trees than did thinned stands.[9]

Fire Suppression and Fuel Buildup

Fire suppression and the associated fuel buildup is often blamed for the larger wildfires in recent years. The solution proposed nearly always is for more logging and thinning, or fuel treatments. But this does not apply to most fires and plant communities in the West. For example, about half the 20,000,000 acres burned in California in 2020 were in chapparal or grassland, not forests, while about 35% were in conifer forests. There is also a difference in fire intervals depending on whether the forest is a dry conifer forest. These make up only about 4% of forest types in western Montana and northern Idaho and are subject to more frequent fire return intervals on the order of decades. The higher elevation conifer forests have much longer fire return intervals of 200 - 300 years. Large fires are the result of drought, high temperatures, low humidity and wind.[10] An analysis of 1500 fires affecting Ponderosa and Jeffrey Pine and mixed conifer western forests found that "forests with higher levels of protection had lower

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[7] Hart, Sarah J.; Preston, Daniel L. 2020. Fire weather drives daily area burned and observations of fire behavior in mountain pine beetle affected landscapes. Environmental Research Letters 15(5):054007.
[8] Robert A Andrus, Thomas T Veblen, Brian J Harvey, Sarah J Hart. 2016. Fire severity unaffected by spruce beetle outbreak in spruce-fir forests in southwestern Colorado. Ecol Appl;26(3):700-11. Doi: 10.1890/15-1121.
[9] Six, D.L., Biber,E., and Long, E. 2014. Management for mountain pine beetle outbreak suppression: Does relevant science support current policy? Forests 5:103-133. doi:10.3390/f5010103
[10] Wuerthner, G. 2021. Fire Suppression Hyperbole. The Wildlife News, March 1, 2021. https://www.thewildlifenews.com/2021/03/01/fire-suppression-hyperbole/

severity fire even though they are considered to have the highest levels of biomass and fuel loads.[11]

Summaries of Issues Around Fire

The Firefighters United for Safety, Ethics and Ecology have summarized the issues surrounding fires, logging, fuels treatments, carbon storage and climate change. Some of their points are that: (1) most forests are fire-adapted and renewed by fire; (2) more acres burned in the past than today; (3) logging targets commercially valuable trees for harvest and these trees have the least influence on fire spread; (4) logging does not address fuels such as small diameter ladder and surface fuels; (5) past logging has made the forest more flammable than the original forest cover; (6) firefighting efforts are irrelevant against large or high-intensity fires burning under severe conditions; (7) firefighters are most effective in suppressing small, low-intensity fires that should not be suppressed; (8) only 15% of total carbon from a tree is preserved in wood products while most enters the atmosphere from logging and milling and these losses are greater than from wildfires; (9) most carbon is stored in large tree boles or soils and most severe wildfires do not completely consume large tree boles or deep layers of organic soils; (10) areas closest to communities have the legacy of logging and fire exclusion and these areas pose the greatest fire risk and fuel hazards. They conclude that "attempts to fire-proof the forest through landscape-scale logging or mechanized firefighting are essentially geoengineering schemes that would fundamentally alter forest ecosystems, ultimately put them at greater risk of destruction, and further accelerate global heating."[12]

A recent book has addressed the value of large trees using Oregon Eastside Forests as an example.[13] The values of large trees include: (1) forest raptors, woodpeckers, songbirds, bats, and other small mammals depend on large trees to nest, forage, overwinter, roost, and den; (2) large trees provide shelter and microclimates for countless invertebrates, epiphytes, herpetofauna, and rare plants; (3) large trees in riparian areas provide stream-side shading and, when they fall into streams, hiding cover for aquatic species; (4) large trees store the accumulation of decades to centuries of atmospheric carbon helping to reduce adverse consequences of global overheating; (5) large trees are essential to nutrient cycling, soil stabilization, and below-ground processes that develop as they mature; (6) large trees remain in short supply due to a legacy of logging; (7) when logged, large trees release most (up to two-thirds) of their stored carbon to the atmosphere (contributing to global overheating) and their emitted carbon takes decades to centuries to recover, if ever. A current article also reviews the

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[11] Bradley, C.M., Hanson, C.T., and DellaSala, D.A. 2016. Does increased forest protection correspond to higher fire severity in frequent fire forests in the western United States? Ecosphere 7(10)/e01492. https://doi.org/10.1002/ecs2.1492

[12] Ingalsbee, T. 2020. Incendiary rhetoric: climate change, wildfire, and ecological fire management. Firefighters United for Safety, Ethics & Ecology. 24 p. https://fusee.org/fusee/incendiary-rhetoric

[13] DellaSala, D.A. and Baker, W.L. 2020. Large Trees: Oregon's Bio-Cultural Legacy Essential to Wildlife, Clean Water, and Carbon Storage. https://oregonwild.org/sites/default/files/pdf-files/Large%20Trees%20Report%20resize.pdf

value of large trees for carbon storage and notes that live and dead trees and forest soil hold the equivalent of 80% of all the carbon currently in Earth's atmosphere.[14] They point out that in mature and old forests in Oregon: "Big trees, with trunks more than 21 inches in diameter, make up just 3% of these forests but store 42% of the above-ground carbon. Globally, a 2018 study found that the largest-diameter 1% of trees hold half of all the carbon stored in the world's forests." This validates the need to protect and restore mature and old-growth forests for their value in carbon storage.

Another article regarding fire in California addressed these and similar points, citing supporting science.[15] Some of these are that: (1) there is not an unnatural excess of fires in forests today, in fact, there is less than in the past; (2) current fires are mostly low to moderate intensity in western US forests; (3) those forests that have remained without fire the longest have mostly low to moderate intensity fire; (4) high intensity fires do not destroy wildlife habitat, but create "snag forest" which is comparable to old growth forest in terms of native biodiversity and wildlife abundance; (5) human-caused climate change increases temperatures and influences wildland fire; (6) today's forests are not unnaturally dense and overgrown, there are more small trees and fewer medium and large trees, less overall biomass and therefore less carbon stored; (7) recent large fires are not unusual and occurred prior to modern fire suppression; (8) drought and native bark beetles do not make forests unhealthy. During drought, bark beetles selectively kill the weakest and least climate adapted trees leaving the better adapted ones to survive and reproduce, while bird and small mammal species increase in numbers because snags provide excellent wildlife habitat; (9) logging reduces the cooling shade of forest canopy, creating hotter and drier conditions and leaves behind "kindling-like slash debris, and spreads combustible weeds; (10) Field studies of large fires find only about 11% of forest carbon is consumed and only 3% of the carbon is from trees. Vigorous post-fire regrowth absorbs huge amounts of CO2 from the atmosphere, resulting in an overall net decrease in atmospheric carbon a decade after fire; and (11) landscape scale prescribed burning would cause at least a ten-fold increase in smoke emissions relative to current fire levels; (12) prescribed burns do not stop wildland fire when it occurs but can alter intensity, while the short-term benefit lasts only about 10 - 20 years so would have to be repeated every 10- 20 years.

In a review[16] of wildland fuel treatments in the interior forests of the US, the following points were made:

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[14] Law, B. and Moomaw, W. 2021. Curb climate change the easy way: Don't cut down big trees. Phys.Org April 7, 2021. https://phys.org/news/2021-04-curb-climate-easy-dont-big.html

[15] Hanson, C. 2019. Common Myths about Forests and Fire. In: A New Direction for California Wildfire Policy - Working from the Home Outward. Leonardo DeCaprio Foundation.

[16] Reinhardt, E.D., Keane, R.E., Calkin, D.E., and J.D. Cohen. 2008. Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States. Forest Ecology and Management. 256:1997-2006. https://app.box.com/s/loj3dqgz37akelxs18thq0qpkplmk533

(1) "Treating fuels to reduce fire occurrence, fire size, or amount of burned area is ultimately both futile and counter-productive" because most acreage burned is under extreme conditions which make suppression ineffective. If, due to treatments, moderate intensity fires are suppressed this leads to most acres burning under extreme conditions. Reducing burned area would not be desirable as large fires were common prior to European settlement and many western plant species are adapted to large, severe wildfires. Large fires generally have many areas lightly to moderately burned. Any fire "could offer a unique opportunity to restore fire to historically fire-dominated landscapes and thereby reduce fuels and subsequent effects."

(2) Reducing fuel hazard is not the same as ecosystem restoration. Treatments such as mastication and thinning may leave stand conditions that do not mimic historical conditions. Mastication breaks, chips, grinds canopy and surface woody material into a "compressed fuel bed" while thinning that removes fire-adapted species and leaves shade tolerant species do not mimic historical conditions. "Fire itself can best establish dynamic landscape mosaics that maintain ecological integrity."

(3) Thinning for fire hazard reduction should concentrate on the smaller understory trees to "reduce vertical continuity between surface fuels and the forest canopy." Thinning can increase surface fire behavior, for example, it increases surface wind speed and results in solar radiation and drying of the forest floor creating drier surface fuels.

(4) Fuel treatments are transient. Prescribed fire creates tree mortality with snag fall contributing to fuel loads, tree crowns expand to fill voids, trees continue to drop litter. Trees cut for harvest or killed by fire contribute limbs to the forest floor, increasing fuel loadings. Up to seven treatments may be needed to "return the area to acceptable conditions that mimic some historical range."

(5) Fire was historically more complex and everchanging than commonly believed and cannot be mimicked by prescribed burning. The low-severity model that is being pushed as "restoration" is no longer widely accepted by scientists. Prescribed fires do not have the variability of past wildfires, and thus can cannot mimic them.

(6) Commercial Thinning and Prescribed out of season burning have negative ecological impacts. Out of season burning coincides with nesting season for birds. Smoke may drive them from their nest, possibly even kill nestlings, etc. Ground nesters will be most impacted.

(7) The probability that a fire will encounter a fuel treatment of any kind is low.

Another review questions current policy and whether it is based on science. Lack of monitoring of post treatment effects leaves questions as to the efficacy of treatments. "While the use of timber harvests is generally accepted as an effective approach to controlling bark beetles during outbreaks, there has been a dearth of monitoring to assess outcomes, and failures are often not reported. Additionally, few studies have focused on how these treatments affect forest structure and function over the long term, or our forests' ability to adapt to climate change. Despite this, there is a widespread belief in the policy arena that timber harvesting is an effective and necessary tool to address beetle infestations. That belief has led to numerous proposals for, and enactment of, significant changes in federal environmental laws to encourage more timber harvests for beetle control."[17]

Analysis of fire severity patterns in western ponderosa pine and mixed conifer forests showed that " that the traditional reference conditions of low-severity fire regimes are inaccurate for most forests of western North America. Instead, most forests appear to have been characterized by mixed-severity fire that included ecologically significant amounts of weather-driven, high-severity fire." "Biota in these forests are also dependent on the resources made available by higher-severity fire. Diverse forests in different stages of succession, with a high proportion in relatively young stages, occurred prior to fire exclusion. Over the past century, successional diversity created by fire decreased. Our findings suggest that ecological management goals that incorporate successional diversity created by fire may support characteristic biodiversity, whereas current attempts to 'restore'' forests to open, low-severity fire conditions may not align with historical reference conditions in most ponderosa pine and mixed-conifer forests of western North America."[18]

Analysis of fuel treatments and fire occurrence in the western US Forest Service managed lands determined that fuel treatments have a probability of 2.0 - 7.9% of encountering moderate or high-severity fire in a 20-year period of reduced fuels (estimated time frame for return of fuels to prior levels or the "window of effective fuel reduction").[19]

In an Open Letter to Decision Makers Concerning Wildfires in the West, 215 scientists and Forest advocates expressed their concerns about ongoing proposals to expand logging on public land in response to recent increases in wildfire in the West.[20] They called for science-based solutions to maintain biologically diverse fire-dependent ecosystems while reducing risks to communities and firefighters. Today, less acres burn than in the past, but since the 1980s, the fire season has become longer and the number of wildfires has increased, while temperatures have risen and snowpack decreased, and the fire season has increased from five to seven months. This is attributed in part to climate change. They make several points about forest

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[17] Six, D.L., Biber, E., and E.L. Esposito. 2014. Management for mountain pine beetle outbreak suppression: does relevant science support current policy?. Forests 5(1):103-133. DOI: 10.3390/f5010103. https://app.box.com/s/4y9y70lbqyza4xnn56a9764abhyr92h8

[18] Odion DC, Hanson CT, Arsenault A, Baker WL, DellaSala DA, et al. (2014) Examining Historical and Current Mixed-Severity Fire Regimes in Ponderosa Pine and Mixed-Conifer Forests of Western North America. PLoS ONE 9(2): e87852. doi:10.1371/journal.pone.0087852.

[19]Rhodes, J.J. and Baker, W.L. 2008. Fire probability, fuel treatment effectiveness and ecological tradeoffs in western U.S. public forests. The Open Forest Science Journal 1: 1-7. https://app.box.com/s/s3dqfmgcxizw0pkrva56ott43qphhjya

[20] Geos Institute. 2018. Open Letter to Decision Makers Concerning Wildfires in the West. Geos Institute, Ashland, Oregon. https://wildfiretoday.com/2018/09/22/217-scientists-sign-letter-opposing-logging-as-a-response-to-wildfires/

management, including; (1) thinning is ineffective in extreme fire weather; (2) post-disturbance salvage logging reduces forest resilience and can increase fire hazards; (3) wilderness and other protected areas are not especially fire prone; (4) fires burned more severely in previously logged areas, while in wilderness, parks and roadless areas, they burned "in natural fire mosaic patterns of low, moderate, and high severity" which maintained resilient forests.

Road Densities and Effects

Big Game security areas are defined as an area of cover over 0.5 miles from an open motorized route and over 250 acres.[21] These areas are important for limiting disturbance and hunting vulnerability to big game animals, but also provide benefits to other animals as well. Higher road densities correspond to lower security for wildlife.

There have been numerous publications on the benefits of roadless areas and the negative effects of roads regarding noise pollution and wildlife. Roads increasingly provide vehicle access into more and more remote areas, forcing sensitive species to be eliminated or greatly reduced especially when the cumulative impacts from livestock, oil, gas and mineral exploration and development are included. Roads and groomed trails provide increased access that can be used in summer and winter to damage environmental resources and displace or disrupt wildlife. Motorized vehicles, OHV/ATVs and snowmobiles, with their ability to travel large distances cross-country, often have negative environmental impacts whether the trail is open, closed, or user created. The ecological effects of roads and/or mechanized use include erosion, air and water pollution, spread of invasive weeds, avoidance of road or machine-affected areas by wildlife, and habitat fragmentation.[22, 23]

Roads, human activity, and noise fragment habitats by breaking large areas into smaller areas. These smaller areas no longer retain their original functions and begin losing the ability to

[21] USDA Forest Service. 2003. Final Environmental Impact Statement for the Caribou National Forest Revised Forest Plan. Volume IV.

[22] T. W. Clark, P. C. Paquet, and A. P. Curlee. 1996. Large Carnivore Conservation in the Rocky Mountains of the United States and Canada," Conservation Biology 10: 936–939.

[23] Trombulak, S. C. & C. A. Frissell. 2000. The ecological effects of roads on terrestrial and aquatic communities: a review. Conservation Biology 14:18-30

support many species, especially those that are wide-ranging.[24, 25, 26, 27] Roads have been shown to have thresholds of density above which species begin to decline or be eliminated. This has been reported to generally be 1 mile per square mile, with effects to some large mammals such as bears at a road density of 0.5 miles/square mile.[28, 29] The importance of roadless areas was documented for both small (1,000-5,000 acres) and large (>5,000 acres) roadless areas under consideration in the Clinton Roadless Area Draft Environmental Impact Statement (DEIS).[30] A press release at the same time noted that this roadless area rule would protect 58.5 million acres, or nearly one-third of America's national forests.[31] That DEIS contained an alternative 4 that would "Prohibit road construction, reconstruction and all timber harvest within unroaded portions of Inventoried Roadless Areas".

Researchers, including those with the Forest Service, have documented the benefits of roadless areas and the negative effects of roads and OHV/ATVs on wildlife.[32] [33] Twenty-five percent of elk exhibited a flight response to ATVs that were 1 km or 0.6 miles away.[34] Elk select summer

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[24] D. A. Saunders, R. J. Hobbs, and C. R. Margules. 1991."Biological Consequences of Ecosystem Fragmentation: A Review," Conservation Biology 5 (1991): 18-32.

[25] Hitt, N.P. and C.A. Frissell. 1999. Wilderness in a landscape context: a quantitative approach to ranking Aquatic Diversity Areas in western Montana. Presented at the Wilderness Science Conference, Missoula, MT, May 23-27, 1999.

[26] J. R. Strittholt and D. A. DellaSala, Importance of Roadless Areas in Biodiversity Conservation in Forested Ecosystems: A Case Study-Klamath-Siskiyou Ecoregion, U.S.A. 2001. Conservation Biology 15 (6): 1742-1754.

[27] G. E. Heilman, Jr., J. R. Strittholt, N. C. Slosser, and D. A. DellaSala. 2002. Forest Fragmentation of the Conterminous United States: Assessing Forest Intactness Through Road Density and Spatial Characteristics. Bioscience 52 (5): 411-422.

[28] R. P. Thiel. 1985. Relationship Between Road Densities and Wolf Habitat Suitability in Wisconsin. American Midland Naturalist 113: 404-407.

[29] L. D. Mech, S. H. Fritts, G. L. Radde, and W. J. Paul. 1988. Wolf Distribution and Road Density in Minnesota. Wildlife Society Bulletin 16: 85-87.

[30] USDA Forest Service. 2000. Forest Service Roadless Area Conservation Draft Environmental Impact Statement. Volume 1. Washington Office. 504p.

[31] The White House. 2001. President Clinton: Strong Action to Preserve America's Forests. January 5,2001 press release. https://clintonwhitehouse5.archives.gov/WH/new/html/Fri_Jan_5_151122_2001.html Accessed April 2, 2021.

[32] Gilbert, Barrie K. 2003. Motorized Access on Montana's Rocky Mountain Front. A Synthesis of Scientific Literature and Recommendations for use in Revision of the Travel Plan for the Rocky Mountain Division.

[33] Canfield, J.D., L.J. Lyon, J.M. Hillis, and M.J. Thomposn. 1999. Ungulates. Pages 6.1-6.25 in G. J oslin and H. Youmans, coordinators. Effects of recreation on . Rocky Mountain Wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society. 307pp.

[34] Wisdom, M. J., H. K. Preisler, N. J. Cimon, B. K. Johnson. 2004. Effects of Off-Road Recreation on Mule Deer and Elk. Transactions of the North American Wildlife and Natural Resource Conference 69: in press.

range with low road densities and abandon summer range early when in areas easily accessible to motorized use.[35] [36]

Off Road Vehicles and Carbon Emissions

Off road vehicles such as ATVs, dirt bikes, UTVs and snowmobiles are used in our National Forests and public lands. The impacts of these machines include noise, damage to soils and vegetation, accelerated erosion, and displacement of wildlife.[37] An analysis[38] of the carbon footprint of off-road vehicles in California determined that:

(1) Off-road vehicles in California currently emit more than 230,000 metric tons — or 5000 million pounds — of carbon dioxide into the atmosphere each year. This is equivalent to the emissions created by burning 500,000 barrels of oil. The 26 million gallons of gasoline consumed by off-road vehicles each year in California is equivalent to the amount of gasoline used by 1.5 million car trips from San Francisco to Los Angeles.

(2) Off-road vehicles emit considerably more pollution than automobiles. According to the California Air Resources Board, off-road motorcycles and all-terrain vehicles produce 118 times as much smog-forming pollutants as do modern automobiles on a per-mile basis.

(3) Emissions from current off-road vehicle use statewide are equivalent to the carbon dioxide emissions from 42,000 passenger vehicles driven for an entire year or the electricity used to power 30,500 homes for one year.

Another study[39] provides data on the amount of fossil fuel being consumed by snowmobiles in Montana, from which one can calculate the carbon footprint. The study found that resident snowmobilers burn 3.3 million gallons of gas in their snowmobiles each year and a similar amount of fuel to transport themselves and their snowmobiles to and from their destination. Non-residents annually burn one million gallons of gas in snowmobiles and about twice that in related transportation. That adds up to 9.6 million gallons of fuel consumed in the pursuit of snowmobiling each year in Montana alone. Multiply that by 20 pounds of carbon dioxide

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https://www.researchgate.net/publication/228447373_Effects_of_Off-Road_Recreation_on_Mule_Deer_and_Elk.

[35] Stubblefield C.H., Vierling Kt.T., and MA. Rumble. 2006. Landscape-Scale Attributes of Elk Centers of Activity in the Central Black Hills of South Dakota. Journal of Wildlife Management. 70(4): 1060—1069.

[36] Grigg, J. 2006. Gradients of predation risk affect distribution and migration of a large herbivore. Master Thesis, Montana State University, Bozeman.

[37] Wuerthner, G. 2007. Thrillcraft. Foundations for Deep Ecology. 312p.

[38] Kassar, C. and P. Spitler, 2008. Fuel to Burn: The Climate and Public Health Implications of Off-road Vehicle Pollution in California. A Center for Biological Diversity report, May 2008.

[39] Sylvester, James T., 2014. Montana Recreational Off-Highway Vehicles Fuel-Use and Spending Patterns 2013. Prepared for Montana State Parks by Bureau of Business and Economic Research, University of Montana. July 2014.

per gallon of gas (diesel pickups spew 22 pounds per gallon) and snowmobiling releases 192 million pounds (96 thousand tons) of climate-warming CO2 per year into the atmosphere.

These are only two states, but these examples provide an indication of the large contribution of these machines to greenhouse gases if extrapolated for the Nation as a whole. Reducing road density and the area of National Forests and public lands open to their use could have the effect of reducing these emissions.