June 7, 2012

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RE: Porcupine Vegetation and Road Management Project Environmental Assessment

Dear Mrs. Heywood and Porcupine ID Team,

Please consider these Porcupine Vegetation and Road Management Project Draft Environmental Assessment (EA) comments on behalf of EPIC-the Environmental Protection Information Center and the Klamath Siskiyou Wildlands Center. We would like to include by reference all previous comments submitted on the Porcupine project.

The Purpose and Need for the Porcupine Project is to improve forest health and growth, reduce fuels and to maintain aspen, meadows, natural openings and uplands within Riparian Reserves. The Preferred Alternative (3a) proposes to treat 3,965 acres, restore approximately 48 acres of meadow and natural opening, and 21 acres of aspen would be released. Whole tree yarding is proposed for all commercial timber sale units. All stumps over 14 inches are proposed to be treated with Sporax.

Alternative 3a (Preferred Alternative) proposes Standard Thinning on 3,252 acres which would thin from below to a target basal area of 120 $ft.^2$ per acre in Commercial Wood Product (CWP) areas and to 100 $ft.^2$ per acre in Wildlife Habitat Management (WHM) areas. Biomass thinning is proposed on 310 acres and Mature Stand Thin is proposed on 125 acres, which would thin from below to a target basal area of 160 $ft.^2$ per acre in CWP and to 120 $ft.^2$ per acre in WHM areas. Hazard Reduction thinning is proposed for 74 acres, Regeneration harvesting is proposed in "over-mature" lodgepole stands on 64 acres and Regeneration harvesting is proposed for 19 acres in Ponderosa Pine stands. Slashing includes lop and scatter on 500 acres and Machine Pile and Burn on 299 acres.

Underburning is proposed on 1,736 acres. Aspen Release is proposed on 21 acres and Meadow and Natural Openings on 34 acres.

Alternative 2a differs from the Proposed Action in that it does not include a fuelbreak, has one less meadow restoration unit, one less standard thin unit, two units have different silvicultural prescriptions and includes two additional fuel treatment prescriptions. The EA does not detail why this alternative was considered nor did it discuss what this alternative specifically addresses.

Alternative 7 has eliminated machine piling by replacing it with slashing.

The Environmental Assessment for the Porcupine Vegetation and Road Management project proposes the following road actions: construct 6 miles of new "temporary" road; decommission 3 miles of road upon completion of project; add 3 miles of existing unclassified roads to the National Forest Transportation System; reconstruct 2 miles of road from management level 2 to level 3 with cinder surface; close 8 miles of road; and maintain or chip-seal 93 miles of road. The project also proposes 129-132 new landings for construction equaling approximately 64 acres.

While our organizations support the treatment of plantations and small diameter thinning to reduce the risk of wildfire and increase forest health we remain strongly opposed to logging large fire resistant trees and regeneration harvesting which will increase fire risk and is not supported in science as to reducing disease within forest stands.

Regeneration Logging

Even age management will not contribute to stand health or a reduction in fuel hazard thus will not meet the purpose and need for the project. Regeneration logging (GTR) extracts large trees increasing fire danger by transforming forests into highly flammable fiber farm plantations. We, fire scientists included, all know and have documented the effects of clear cutting (GTR). Our organizations represent thousands of public citizens who do not want our forests to purposely be turned into brush fields at the expense of taxpayers. Removing canopy will in turn dry soils, exacerbate drought, increase light and wind and will cause flammable ground fuels to accumulate and increase the fire danger for generations.

Our organizations recognize and support the general shift towards "thinning from below" in conifer stands and recommend an alternative that includes this practice only. We concur that such an approach will better meet the purpose and need of sustainability, improving stand health and restoring forests to a state in which they are resistant to natural events. We remain opposed to even-age harvest mechanisms and suggest the Shasta-Trinity NF avoid the impacts and adverse fire behavior associated with plantation forestry.

This project can best meet its purpose and need by treating the Lodgepole and Ponderosa conifer stands with a thin from below harvest prescription which in the long term is safer and more sustainable.

Please note that the effects of even-age management and plantation forestry on fire behavior are well established. In a study of fire severity in northwest California, researchers found that tree plantations of any age were "more receptive to combustion" than other forests (Odion et al., 2004)[1]. It also suggested that once even-age tree plantations are established on a proportion of forest landscape, "the potential exists for a self-reinforcing cycle of catastrophic fires." Extensive networks of roads constructed to facilitate logging and planting also increase the risk of human-caused ignitions during hot, dry conditions.

Two fires in 2002 on the Umpqua National Forest were evaluated for their effect on the forest. Excerpts from the March 2003 Wildfire Effects Evaluation Project by the Umpqua N.F. make clear the impact of creating more tree plantations:

http://web.archive.org/web/20041118062947/http://www.fs.fed.us/r6/umpqua/publications/weep/weep.html

> "Plantations had a tendency to increase the rate of fire spread and increased the overall area of stand-replacement fire effects by spreading to neighboring stands." Page 4
>
> "Fire burned most plantations with high intensity and spread rapidly through the canopy of these young stands." Page 20.
>
> "Plantation mortality is disproportionately high compared to the total area that plantations occupied within the fire perimeter." Page 26-27.
>
> "Crown fire spreads readily through these young stands: rates of fire spread can be high, and significant areas or mortality can occur in and adjacent to these stands." Page 32.
>
> Finally, the report says that the fire behavior in forest that had not been converted to tree farms was normal. "The pattern of mortality in the unmanaged forest resembles historic stand-replacement patch size and shape." Page 64.

It is almost impossible to have a beneficial surface fire in a dense young plantation because the fuel is too close to the ground. If a low severity fire were to occur, under favorable weather conditions, in adjacent mature forest areas, fire suppression would almost certainly be required to prevent destruction of the plantation, even though the fire might otherwise be allowed to burn beneficially through the older stands. This is an often unaccounted for "cost" of regeneration harvest.

[1]Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the western Klamath Mountains, California. Conservation Biology 18(4): 927-936.

Please see the peer reviewed June 2007 publication in the Proceedings of the National Academy of Science Journal by Thompson, Spies and Ganio further detailing the impacts of plantation forestry on fire behavior in the Biscuit Fire of 2002. The authors found that:

- Fire severity was 16 to 61 percent higher in logged and planted areas, compared to those that had burned severely and were left alone in a fire 15 years earlier;

- Young forests in this region are susceptible to recurring severe fires. Compared to an older forest with branches high above the forest floor, young trees are very vulnerable, whether they are planted or naturally regenerated;

- Natural regeneration of forests, he said, appears to result in at least slightly – and sometimes significantly – less risk of severe future fires. This could be because the regenerating trees are patchier, have open gaps, more species diversity, or other factors. But the study showed that total consumption of tree crowns in a recurring fire situation is more severe in the managed stands than the natural ones, at least when there are one to two decades between fires.

The supporting Porcupine reports illustrate the desired future conditions for the management areas within the project area:

> Desired Condition
>
> The desired condition within the project area would be a fuels profile where fire would play a natural role in the ecosystem. Dead and down material will be present as described in the Land and Resources Management Plan and when a natural ignition occurred within the area it would be allowed to play its natural role in the ecosystem. Fuels would breakdown with the assistance of fire and cycle nutrients back into the soil in a form available to the vegetation. Fuels will be added to the surface as snags, limbs, etc. fall to the ground. Grasses and forbs will be present in the understory and healthy riparian vegetation will flourish in the meadows.

The EA and Fire and Fuels Report do not analyze how regeneration logging will affect fire behavior. If the desired condition is to allow fire to play its natural role than highly flammable plantation forestry should not be considered.

"Science-based literature (Peterson, et al. 2005) indicates the most appropriate fuel treatment strategy is often thinning (removing ladder fuels and decreasing crown density) followed by prescribed fire, piling and burning fuels, and mechanical treatments. These treatments would provide maximum protection from severe fires in the future." Fire and Fuels Report Pg. 6

The Fire/Fuels Report provides no specific analysis for each silvicultural prescription. The Fire/Fuels Report contains no specific information on how regeneration cutting in particular would affect fire behavior. Further the EA fails to prove how logging large dominant and co-dominant overstory trees will meet the purpose and need for the project. The EA does not discuss, analyze or provide any science supporting how regeneration logging would reduce disease in forest stands nor does it detail how ground based logging

may in fact perpetuate and spread disease.

The proposed GTR and <15% GTR logging is not defensible under any reading of the current peer-reviewed literature regarding fuels and fire behavior. Even age logging and the removal of large diameter pine trees is antithetical to the objectives of forest health. Plantation creation undermines the forest health and fuels treatment purpose and need for the project. The relative combustibility of structurally homogenous tree plantations supports a self-reinforcing "feedback" dynamic of high-severity fires, and the continued high-severity fires in roaded and planted portions of the landscape.

The spatial arrangement of fuels affects the continuity of fire. Studies indicate that mechanical treatment works best emphasizing extraction of smaller trees and shrubs and that by itself mechanical thinning does little to beneficially effect surface fuels and may also add to surface fuels.

Tree plantations are more susceptible to intense fire behavior and severe fire effects than unlogged mature forests, including burned forests. The increased susceptibility of plantations to severe fire is due to:

- Structural characteristics, such as fine and interlocking branch structures situated low to the ground, which facilitate high heat energy output by fire and rapid fire spread.

- Warm, windy and dry microclimates compared to what would exist in an unlogged burned forest that possessed more structural diversity, ground shading and barriers to lateral wind movement.

- Accumulations of large volumes of fine logging slash on the ground surface.

In addition to these direct and indirect effects on the fire environment, the cumulative effects of plantation establishment include the creation of more highly flammable even-aged stands on a landscape already vulnerable to large and severe fires. The number and distribution of even-age tree plantations resulting from industrial timber management has altered fire behavior and effects at both stand and landscape scales. The existence of sufficient young tree patches on a forest landscape creates the potential for "a self-reinforcing cycle of catastrophic fires." In summary, plantation establishment will reinforce a growing tendency toward high severity fire at a landscape scale.

The Forest Service has failed to address the vast body of literature indicating that artificial plantations increase, rather than decrease fire hazard.

Regeneration harvest is not likely to make forests more resilient to disturbance. Rather, by removing large patches of maturing forest with relatively fire resistant large trees with thick bark and high branches, and replacing these forests with dense stands of small trees with thin bark and with more small fuels close to the ground, regeneration logging will make these forests more susceptible to fire and other disturbances. "Large blocks of old-growth forests – rather than large contiguous blocks of young growth or highly simplified

forests – are the best scenario for reducing wildfire behavior." (Jerry Franklin, David Perry, Reed Noss, David Montgomery, Christopher Frissell. Simplified Forest Management To Achieve Watershed And Forest Health: A Critique. National Wildlife Federation.)

http://www.coastrange.org/documents/forestreport.pdf

Logging will likely make fire hazard worse instead of better because, (a) logging will move small/hazardous fuels from the canopy to the ground where those fuels are more available for combustion and thus more hazardous; (b) logging will open the canopy and make the microclimate hotter, dryer, and windier, which will reduce fuel moisture and increase flame length and rate of fire spread; and (c) logging will expose mineral soil and make available more light, water, nutrients, thus stimulating the germination and growth of future surface and ladder fuels. Also, logging will often require an expanded and improved road system, which will combine with the more open forest to invite more human uses such as firewood cutting and OHV trespass thus increasing the risk of fire ignitions.

Again, the EA and Fire and Fuels Report do not take the hard look that NEPA requires because it simple lumped all treatments together and gave no specific information as to treatment prescriptions. Granted a vast majority of the project is thinning, however this does not relinquish the importance or need for detailed evaluation. Further, while there is science that supports thinning (specifically in plantations and small diameter stands) to reduce the impacts of insects and disease there is no scientific justification provided for regeneration logging in the name of "forest health".

Large-Diameter Trees Mitigate Potential Fire Risk And Hazard

While we recognize and encourage the thinning of ground fuels and ladder fuels, removing large-diameter trees from the forest canopy will not achieve reduction in fuel hazard, especially through canopy removal, skid roads, landing construction and tractor logging.

Large-diameter standing trees and down logs exhibit several features that tend to mitigate their potential fire risk and hazard. Depending on weather conditions and time of year, their presence on the landscape can serve to lower the risk of rapid, intense fire spreading to adjacent areas. In general, fires burning through heavy fuels such as large-diameter downed logs tend to burn slowly, and depending on their spatial arrangement and fuel moisture levels, large downed logs can actually dampen a fire's intensity and rate of spread.

Large-diameter heavy fuels have low surface area-to-volume (S/V) ratios, which tend to inhibit the amount of oxygen feeding combustion. This is why large-diameter fuels, such as the main stems of standing and downed trees, are not included in agency fire spread models such as BEHAVE. The BEHAVE model only incorporates live fuels up to 1-inch in diameter and dead fuels up to three inches in diameter because these small-diameter fine fuels have high S/V ratios, and thus fuel high fire intensities and rapid rates of spread. Fuels larger than three inches in diameter do not factor in on fire spread

calculations because they do not affect fire behavior until long after the fire front has passed.

Site-specific conditions like fuel moisture levels, which can differ according to stage of decay, season of the year, and prevailing weather conditions, can further enhance the relatively low flammability of large-diameter snags and logs. Downed logs can store large amounts of water, especially if the logs lay directly on the ground surface. Forest Service research on hot, dry forest sites in the Klamath-Siskiyou region revealed that even after prolonged drought and high intensity fire events, tremendous amounts of water can still be found in the interior of logs. Indeed, the centers of large logs can actually be cool and moist even when the outer shell of a log is on fire. Consequently, large logs can provide vital refugia or "fire shelters" that enable a number of wildlife species, as well as mycorrhizal fungi and other micro-flora and fauna essential to natural recovery, to survive fires.

Over a typical fire season, this interior stored water is released slowly over time in the form of water vapor. This water release (coupled with the shade that snags and downed logs provide) can raise the relative humidity of micro-sites, which in turn tends to decrease the rate of evapotranspiration of adjacent live vegetation, and retains higher fuel moisture levels in adjacent dead fine fuels. These microclimatic effects make local sites adjacent to large-diameter downed logs moister and "greener" compared to sites devoid of large downed logs. With significant amounts of stored interior water, large-diameter downed logs can function like "heat sinks" because so much heat energy is required for fire to evaporate the water, heat and ignite the woody biomass. In effect, large downed logs with sufficient stored water function like natural fire extinguishers that can retard fire intensity and rate of spread.

Large downed logs can also provide important shade structures that obstruct solar radiation and surface winds. These microclimate influences can result in lower ground surface temperatures and reduced surface wind speeds, which translate into higher live and dead fuel moisture levels compared to areas cleared of shade from standing or downed trees. Large downed logs can also reduce the speed and variability of surface winds, which inhibits extreme or erratic fire behavior. Thus, the ability of large downed logs to store water and provide shade from the sun and wind can function to lower the fire intensity and rate of spread on those specific sites.

We refer the agency to; "A Report to the President In Response to the Wildfires of 2000" September 8, 2000 by USDA FOREST SERVICE and DEPARTMENT OF THE INTERIOR. Find this report at: http://www.fireplan.gov/president.cfm.

The following is taken directly from PART III of the report, "Key Elements of the Administration's Wildland Fire Management Policy."

"The removal of large, merchantable trees from forests does not reduce fire risk and may, in fact, increase such risk. Fire ecologists note that large trees are "insurance for the future - they are critical to ecosystem resilience."

Targeting smaller trees and leaving both large trees and snags standing addresses the core of the fuels issue.

The Congressional Research Service (CRS) addressed the effect of logging on wildfires in an August 2000 report and found that the current wave of forest fires is not related to a decline in timber harvest on Federal lands. From a quantitative perspective, the CRS study indicates a very weak relationship between acres logged and the extent and severity of forest fires. To the contrary, in the most recent period (1980 through 1999) the data indicate that fewer acres burned in areas where logging activity was limited.

The CRS stated: "[T]imber harvesting removes the relatively large diameter wood that can be converted into wood products, but leaves behind the small material, especially twigs and needles. The concentration of these fine fuels on the forest floor increases the rate of spread of wildfires."

The EA did not analyze or disclose the factors that mitigate the flammability of large fuels. The EA did not analyze the full range of adverse effects on wildlife, vegetation, and natural recovery processes (such as elimination of refugia during future fire events) that would result from logging the large-diameter trees associated with the prescriptions in this project. The Porcupine watershed contains merely 1990 acres of old-growth or 1.4 percent of National Forest land within the watershed.

Retaining green trees as well as snags serve several important functions including snag recruitment, promoting multistoried canopies, and providing shade and suitable habitat for many organisms. Retaining trees of various sizes, ages, and species, in well-distributed patches as well as dispersed individuals, will promote species diversity. These trees may also act as refugia or centers of dispersal for many organisms including plants, fungi, lichens, small vertebrates, and arthropods. Patches of trees may provide protection for special microsites such as seeps, wetlands, or rocky outcrops.

Complex canopy structure and especially leaning boles are beneficial for some lichens. Trees that are asymmetrical provide a diversity of habitat substrates, and often have more lichen and moss epiphytes on large lateral limbs than symmetrical trees. Stand Structure is of vital importance. Trees that develop large crowns and/or limbs that provide structure, shade and nesting opportunities for wildlife should be retained.

The September 2006 post-disturbance literature review by Dr. Dominick A. DellaSala, Ph.D. for the National Center for Conservation Science & Policy, while mainly focused on salvage logging after fire is still pertinent to other natural disturbances such as disease and insects.

The executive summary for the review states:

Post-disturbance recovery, much like fire itself, has been the subject of intense debate and widespread misunderstanding regarding how and whether to treat regenerating

landscapes following large disturbance events. As HR4200 – the Forest Emergency Recovery and Research Act – heads to the Senate for debate, it is important that lawmakers and land managers consider the latest science in making informed decisions about the management of public lands following natural disturbances. **Numerous scientific studies have demonstrated that natural disturbances, even very large ones such as volcanic eruptions, wildfires, and severe windstorms, are critical to the health of terrestrial and aquatic ecosystems as they are characterized by unique biological communities and generate important structural elements that forests depend on for decades to centuries. The standing dead, dying, and downed trees (especially large ones) and surviving green and scorched ones transfer their critical functions from the predisturbed forest to the regenerating one. When post-disturbance "salvage logging" removes these important forest elements, it sets back recovery triggering ecosystem damages that may exceed the impact of the initial disturbance itself.** Based on a review of approximately 38 scientific studies on post-fire logging and additional government reports published to date, not a single study indicated that logging benefits ecosystems regenerating after natural disturbance. In fact, post-fire logging impedes regeneration when it compacts soils, removes "biological legacies" (e.g., large dead standing and downed trees), introduces or spreads invasive species, causes soil erosion when logs are dragged across steep slopes, and delivers sediment to streams from logging roads. With post-disturbance logging these impacts occur when forest recovery is most vulnerable to the effects of additional, especially anthropogenic disturbances, creating cumulative effects that exceed logging of undisturbed forests. Such effects can extend for a century or more, because of the removal of long-persisting and functioning wood legacies. These findings are especially relevant to public lands policy and management as post disturbance logging currently generates ~40 percent of the timber volume on Forest Service lands nation-wide (USFS Washington Office, timber volume spread sheets - Timber Management Staff, 2005 statistics). Therefore, the following conclusions were provided to assist decision makers regarding post-disturbance management decisions: (1) post-disturbance landscapes should be allowed to regenerate naturally as evidence from several locations (Biscuit fire (sw Oregon), Storrie and Starr fires (California Sierra's), Yellowstone 1988 fires, Mt. St. Helens eruption, New England hurricanes and insect infestations) indicates recovery can be surprisingly swift and many species that colonize disturbed areas are adapted to them, contributing to recovery in unique ways; (2) road building (even temporary roads) damages regenerative processes in terrestrial and aquatic ecosystems and should be avoided; (3) natural disturbances are characterized by unique biological legacies (large dead and dying trees) essential to regenerative processes – recovery is not possible in their absence; and (4) if salvage logging is to take place for economic reasons, large trees should be retained to protect their biological legacy functions and "no harvest zones" established on steep slopes with fragile soils, including areas of conservation and public health concern such as late-successional and old-growth forests, riparian areas, aquatic watersheds essential to drinking water municipalities, and roadless areas.

Why Mature Forests Must be Conserved

The Forest Service should protect mature forests because they are the best candidates to grow and develop into old-growth habitat in the shortest time frame.

1. There is a serious region-scale deficit in mature and old-growth forest habitat. Over time, the Northwest Forest Plan seeks to re-establish 3.44 million acres of mature and old-growth forest (http://www.fs.fed.us/land/fm/oldgrow/oldgrow.htm). But by continuing to log mature forests we are significantly delaying this recovery. If we are going to make a timely recovery from that deficit, and give struggling species a chance to survive the habitat bottleneck that we have created, mature forests must be protected so that they can become old-growth.
2. Cutting mature forests is not needed for ecological reasons. These forests are already exhibiting the characteristics that provide excellent habitat and they continue to develop and improve without human intervention.
3. The transition from mature forest to old growth is a process that takes time and varies depending on factors such as location and species and disturbance events. In a mature forest, all the building blocks are there to create old growth (e.g., large trees, machinery to accumulate biomass, mortality processes) and scientists agree that these forests need protection to help meet the current old-growth forest deficit.
4. The architects of the Northwest Forest Plan found that many of our best large intact forest landscapes are mature forests, not old-growth. Some large forest fires burned westside forests between 1840 and 1910 and many such areas were skipped over by the timber harvest planners because they were more intent on converting the very old forests to tree plantations. These former fire areas, now mature forests, offer some of our best hopes of recreating large blocks of intact older forest.
5. Mature forests provide essential habitat for the species we are most concerned with such as: spotted owl, marbled murrelet, Pacific salmon, and most of the ―survey and manage species.
6. Protecting mature and old-growth forest leads to a real ecological solution, while protecting only old-growth is merely a partial solution to an ecological problem that is bigger than just old-growth.
7. Cutting mature forest will remain controversial and socially unacceptable. If we seek to resolve conflict over management of older forests, protecting the old-growth, while leaving mature forests unprotected would be only half a solution and would lead to more conflict. Shifting to a sincere restoration paradigm gets everyone at the table working toward the same goal.
8. If mature forest is left unprotected, some members of the environmental community will distrust the agencies and oppose them on many fronts.
9. Leaving mature forests unprotected would leave substantial areas of roadless lands subject to future conflict. Many westside roadless areas may not qualify as old-growth, but still provide important values as roadless and mature forests.

10. Complicated environmental analysis will be required for logging mature forests compared to thinning plantations. Wildlife surveys will be needed. Environmental Impact Statements will more often be needed instead of abbreviated Environmental Assessments. Formal consultation under the Endangered Species Act will more often be triggered.
11. We do not need to log mature forest to provide jobs. Less than 2% of the jobs in Washington and Oregon are in the lumber and wood products sectors, and only a small fraction of those are on federal land and only a fraction of those are related to mature forest logging. Many more environmentally benign jobs are available in restoring roads, streams, thinning young plantations, and managing fire and recreation.
12. We do not need to log mature forest to prop up the economy. The NW economy has greatly diversified in the last decade. Our economy typically creates more new jobs every year than exist in the entire lumber and wood products sectors.
13. We do not need to log mature forest to prop up the timber industry. Less than 10% of the logging in Oregon, Washington and California in recent years has been on federal lands. Only a fraction of that is mature forest. Much more environmentally benign and socially acceptable timber can be derived from thinning young plantations or small diameter fuel reduction where it is appropriate.
14. Since managing these stands is not "needed" for any ecological reason or any economic or social reason, what would be the objective?
15. Standing in a mature forest, once gets the distinct feeling that ―this beautiful place should not be eliminated by logging.

In short, regeneration logging is contraindicated. All the new information points to the fact that we have more reasons to retain existing mature forests and fewer reasons to log them. See Heiken, Doug. 2009. The Case for Protecting Both Old Growth and Mature Forests, Version 1.8. Oregon Wild.
http://dl.dropbox.com/u/47741/Mature%20Forests%2C%20Heiken%2C%20v%201.8.pdf
Since mature forests need to be protected, the USFS needs to consider alternative ways of achieving objectives as outlined above.

Snags and Dead Wood

The definitions of old growth, mature and late successional forests in Johnson & Franklin (2009) are overly focused on the live tree component of forests. The report gives too little attention to dead wood features that are adversely affected by logging. The report‘s description of ―ecological forestry says that snags should be non-uniformly distributed but it fails to say that snags should also be abundant, and continuously recruited through time, which requires a significant pool of live trees. Regen harvest does not do this, and cannot be called ecological forestry.

Johnson & Franklin (2009) has a good discussion of the value of dead wood after natural disturbance. Unfortunately, the report does not adequately address the loss of dead wood

that results from regen harvest (and commercial thinning) in terms of reducing recruitment of ecologically important dead wood structures and functions.

Concerns with the removal of standing dead and down trees, collectively known as coarse wood, include the numerous ecological roles that it plays in forest ecosystems including roles as:

• Long-term sources of energy and nutrients;
• Aggregated sources of soil organic matter, which form important parts of soil matrices;
• Structural elements of the landscape that influence hydrologic and geomorphic processes within aquatic and terrestrial ecosystems;
• Significant modifiers of microclimatic regimes in the post-disturbance ecosystem; and, most profoundly
• Habitat for a large array of animals, including the majority of vertebrate and large numbers of invertebrate species.

Large snags and logs are generated by natural mortality processes in living forests that include mature and old trees, continually replenishing this important resource. Retention of large snags and logs are specifically relevant to Northern Spotted Owl since these structures provide the habitat that sustains most of the owl‘s forest- based prey species.

http://www.cof.orst.edu/cof/fs/PDFs/JohnsonRestoration_aug15_2009.pdf

All commercial logging —captures mortality and exports wood that would otherwise serve as snags and coarse woody debris. The forest landscape has a severe shortage of large snags as a result of a century of commercial logging (clearcutting, thinning, sanitation, salvage), fire suppression, road building, hazard tree removal, and firewood cutting. Further logging must mitigate for the shortage of dead wood, not make the existing shortage worse. This online slideshow shows the modeled effects of thinning on dead wood habitat, which are significant and long-term.

http://www.slideshare.net/dougoh/effects-of-logging-on-dead-wood-habitat

Regeneration logging will be worse than thinning, because there will be significant areas lacking adequate numbers of both snags and live trees needed to support future dead wood recruitment.

The untreated patches within the variable retention mosaic can only partially mitigate for the significant, long-term loss of snags in the clearcut areas. If these pilots are extended to the landscape, the untreated patches are not large enough to mitigate for the shortage of snags across the landscape on non-federal lands, old clearcuts on federal lands, missing hazard trees along the dense road network, the agencies‘ aggressive ongoing thinning program, etc.

Wildlife Habitat Management (WHM) Areas

While the EA mentions shrub re-growth in the WHM areas (758) when considering the direct and indirect effects of treatment activities on forest health, the fire and fuels analysis does not consider these WHM areas separately as to the effects of fire. The WHM areas are proposed for a reduced basal area in relation to the Standard Thin prescription. The EA states that the Wildlife Management Areas (WMA) would allow for the growth of shrubs and forage for early and mid-seral stage dependent species.

With a little thought and creativity one can see that there are many ways to increase early seral habitat without sacrificing mature, dominant or large co-dominant trees. Validation of the early seral habitat objective requires, among other things, asking if the current and projected amount of early seral habitat might be adequate to meet the needs of the opportunistic and generalist species that tend to occur in those areas.

Early seral wildlife species likely evolved to take advantage of early seral conditions when and where it could be found naturally in the shifting mosaic of seral conditions.

Natural disturbance processes continue to operate across the landscape, including fire, wind, ice storms, landslides, floods, volcanoes, native insects, native disease, etc. Each of these helps create various sized patches of early seral forests every year. Many predict that climate change will increase the frequency of these natural events, suggesting that any shortage of early seral conditions might just take care of itself. "Ecologically, increased distribution and frequency of disturbances may result in increased distribution and dominance of early successional ecosystems dominated by fire adapted species..." Lemieux, Christopher J., Daniel J. Scott, Rob G. Davis and Paul A. Gray. 2008. Changing Climate, Challenging Choices: Ontario Parks and Climate Change Adaptation. University of Waterloo, Department of Geography: Waterloo, Ontario

http://web.archive.org/web/20101023221023/http://www.fes.uwaterloo.ca/geography/faculty/danielscott/PDFFiles/NRCAN-Report-FINAL.pdf1

There is widespread recognition that early seral forest is produced in abundance on non-federal lands (through industrial clearcutting). Current industrial forest practices do not produce high quality or long-lasting early seral forest. It is also true, but not widely recognized that the absolute abundance of early seral forest on non-federal lands might partially mitigate for its lack of quality.

Early seral vegetation also exists along rock outcrops, meadows, as well as roadsides, landings, and other disturbed sites throughout the forest, including the vast amount of lava, open and early seral conditions in the project area. An honest assessment of the early seral shortage must account for the quantity, quality and functionality of all these early seral forest elements.

If there is indeed a shortage of complex early seral forest, we must evaluate a full range of alternative ways of increasing either the quantity and/or quality of such features. This

following symposium references those opportunities. (K. Norm Johnson, Debora L. Johnson. 2007. Policies to Encourage Diverse, Early Seral Forest in Oregon: What Might We Do?)

http://www.reo.gov/ecoshare/ccamp/good_forest_opening/powerpoints/Early%20seral%20talkrevfinal.ppt

Alternatives that have been suggested include:

(a) Reform forest practices on non-federal lands to retain more legacy structures and allow a longer period of conifer establishment and more vegetation diversity after harvest. Conversely, it may become harder to maintain existing late-seral ecosystems and species, so existing late- successional old-growth forests should be retained in order to avoid making the shortage of late seral forest worse.

(b) Rely on natural processes such as fire, wind, insects, etc. Since the public has been misinformed that natural forest mortality processes are undesirable, this approach would work best if we increase public tolerance for natural processes.

(c) Aggressive pre-commercial thinning in existing very young stands or failed plantations to extend the early seral stage.

(d) Create patches of heavily thinned, structure-rich gaps in variable density thinning projects in dense planted stands <80 years old, as suggested by numerous projects around the region.

All these alternative methods would allow meaningful restoration of early seral forest conditions without unnecessarily sacrificing mature forests. The EA does not analyze or disclose how the commercial thinning and proposed treatments would affect game species.

Northern Spotted Owl

Alternative 3a remains consistent with the BA in that no nesting/roosting habitat is proposed for treatment. The BA analyzed effects of thinning 375 acres of foraging habitat and 414 acres of capable habitat (BA, page 20). Under Alternative 3a, 244 acres of foraging habitat and 310 acres of capable habitat would be thinned.

"Ecological health (especially as it pertains to viable wildlife habitats) of both dry and moist forest types in eastern Washington often depends on sufficient presence of older trees, snags, and DWD (with less emphasis on DWD in dry forest types). . . retention of old trees, snags and logs is vital in achieving environmental objectives such as wildlife habitats, old forest conservation, and carbon sequestration." WA DNR, Management Directive, *Retention and Perpetuation of Legacy Trees, Snags and Downed Wood (Eastside)* (May 2009). True, this is not eastern WA, but the retention principle still applies.

While our organizations are supportive of following the recommendations in the NSO Recovery Plan, as the current EA proposes, we hope the District will seriously consider retaining what little remnants of the large tree component that remains on the landscape, particularly in regeneration and mature forest stand units.

Sensitive Species

Shasta-Trinity Standards and Guidelines 4-30, "**Survey and** evaluate habitat for TE&S species **at the project level** in coordination with the USFWS."

The purpose of the Forest Plan is to provide for multiple use and sustained yield of goods and services within the context of protecting ecosystems for diversity of habitats (terrestrial and aquatic) *and viability for all species*. FEIS Shasta-Trinity LRMP at I-2.

The Sensitive Species Program was developed to meet obligations under the ESA, the NFMA and Forest Service national policy direction as stated in the FSM Section 2670, and the USDA Regulation 9500-4. The Sensitive Species Program was meant to be a proactive approach to conserving species to prevent a trend toward listing under the ESA and assist in providing for a diversity of plant and animal communities.

"Forest-wide management direction for sensitive species (Forest Plan p. 4.5 and 4.30) includes the following:

- Manage habitat for sensitive plants and animals in a manner that will prevent any species from becoming a candidate for threatened and endangered status.
- **Survey and** evaluate habitat for [threatened, endangered and] sensitive species at the project level in coordination with the U.S. Fish and Wildlife Service (FWS).2
- Maintain and/or enhance *habitat* for [threatened, endangered and] sensitive species consistent with individual species recovery plans.
- Survey and evaluate *habitat* for [threatened, endangered and] sensitive species at the project level in coordination with the FWS.2" BE Pg. 1

Pacific Fisher

"While furbearer surveys have not been conducted specifically in the project assessment area, several survey efforts have occurred southwest of the project area." BE 55

The fact that no project surveys have been completed for this species is contrary to the direction in the LRMP. The BE does provide a number a studies/surveys that have found fishers

For the Pacific Fisher as well as the NSO and goshawk, it is imperative that the FS maintains a 60 percent canopy closure and retains all mature and late successional character (20 in. dbh) trees for resting and shelter. From the Zeilinski study in the BE, canopy closure at rest sites was 60 percent or greater, and the trees were often larger than 24 in. dbh.

On April 8, 2004, the U.S. Fish and Wildlife Service ("FWS") issued a decision finding that the listing of the Pacific fisher is warranted under the Endangered Species Act due to its imperiled status, but deferring action due to workload constraints (a "warranted but precluded" decision). FWS concluded in 2004 that the West Coast population of the fisher (the "distinct population segment" or "DPS") warrants listing under the Endangered Species Act. 69 Fed. Reg. 18769 (April 8, 2004). According to the FWS, "preliminary analyses indicate West Coast fisher populations ... may be at significant risk of extinction." Id. at 18789. The FWS cites logging as one of the primary causes of fisher decline across the U.S. Id. at 18778.

The FWS ultimately concluded that: "Federal, State, and private land management activities may affect key elements of fisher habitat; reduction of any of these key habitat elements could pose a risk to the fisher. Current regulations provide insufficient certainty that conservation efforts will be implemented or that they will be effective in reducing the level of threat to the fisher. We, therefore, believe that the existing regulatory mechanisms are not sufficient to protect the DPS as a whole from habitat pressures." Id. at 18792.

The USFWS warranted but precluded findings contain a detailed review on the conservation status of the fisher, including a comprehensive analysis of threats to the continued existence of the species. 69 Fed. Reg. 18770, 18770 (April 8, 2004). For example, FWS noted that, "**habitat loss and fragmentation appear to be significant threats to the fisher**. Forested habitat in the Pacific coast region decreased by about 8.5 million acres between 1953 and 1997." Id. at 18780. "Forest cover in the Pacific coast is projected to continue to decrease through 2050, with timberland area projected to be about 6 percent smaller in 2050 than in 1997." Id. "Thus fisher habitat is projected to decline in Washington, Oregon, and California in the foreseeable future."

The FWS status review also discloses that "[v]egetation management activities such as timber harvest and fuels reduction treatments . . . can destroy, alter, or fragment forest habitat suitable for fishers." Id. at 18778. "A number of studies have shown that the fisher avoids areas with little forest cover or significant human disturbance and conversely prefers large areas of contiguous interior forest." Id. at 18773. "The fisher's need for overhead cover is very well documented. Many researchers report that fishers select stands with continuous canopy cover to provide security cover from predators." Id. "Fishers probably avoid open areas because in winter open areas have deeper, less supportive snow which inhibits travel, and because they are more vulnerable to potential predators without forest cover." Id. "Furthermore, preferred prey species may be more abundant or vulnerable in areas with higher canopy closure." Id.

In the annual Candidate Notice of Review, issued by the FWS each year, the FWS reiterated the concerns highlighted in the fisher's warranted but precluded determination, noting that "extant fisher populations are small and isolated from one another" and that "[m]ajor threats that fragment or remove key elements of fisher habitat include various forest vegetation management practices such as timber harvests…." 71 Fed. Reg. 53777 (Sept. 12, 2006).

The LRMP Table 5-1 at page 5-18 documents the STNF monitoring requirement for Furbearers, including fisher and marten. It states the forest will determine population and habitat trends within designated fisher and pine marten habitat; monitor furbearer network for occurrence and amount of appropriate habitat attributes and/or special components; field review of project planning using habitat capability models; there is to be a minimum random sample of suitable habitats involved in individual project analyses at the compartment, management area, and/or Ranger District level; measurement and reporting is to occur annually; the expected precision and reliability should be "high"; and the variability in standard which would require further evaluation and/or corrective action is when > 10 % of habitats examined have more than 10% deficit in selected key attributes.

The EA does not meet these criteria. In addition, annual monitoring reports are not being produced and published. The STNF has published few monitoring reports and rarely mentions furbearers.

The determination for the Pacific fisher is "may impact individuals but is not likely to result in loss of viability." The fisher is currently listed as a sensitive species, warranted but precluded at this time from listing as threatened/endangered under the ESA. The rationale provided for this 'determination' is invalid because the STNF does not conclusively know how many fishers or martens are in the Porcupine analysis area or project area because no surveys have been completed for the project.

If the presence of the fisher is limited by the predominance of low quality habitat within the project area, the further degradation of the suitable fisher habitat will only magnify the likelihood that the fisher will never utilize the habitat.

The STNF has obligations under the LRMP, NFMA and the Forest Service Manual to take actions that benefit sensitive species and prevent them from further listing under the ESA. The Porcupine project has not been designed to take into consideration the needs of this species.

FSM 2670.22 - Sensitive Species

1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.

2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

3. Develop and implement management objectives for populations and/or habitat of sensitive species.

There is also a Fisher/Marten Habitat Capability Model on page G-4/G-11 of the LRMP. This direction was not considered in the Porcupine project.

Since the STNF fails to survey and monitor the Fisher annually or on a project level as required in the LRMP we don't know exactly how populations are doing. We do know that degrading even moderate quality habitat will do nothing to help in the recovery of these species. In fact these actions could very well lead to the loss of individuals that would further threaten the over all populations.

Northern Goshawk

The Porcupine project will reduce canopy cover, simplify vertical structure, and reduce some extent of snags and logs – all preferred habitat of the goshawk.

The determination for this species is also "may impact individual goshawks but would not cause a trend towards federal listing or loss of viability." The Northern goshawk is not expanding its range on the STNF nor is it increasing its population – goals established in the LRMP as well as FSM direction. We reiterate our concerns that the Porcupine project is contrary to LRMP and FSM direction for sensitive species.

The Wildlife Biological Evaluation (BE) prepared in support of the EA does not adequately take into consideration the cumulative effects of the proposed actions on Northern Goshawk foraging habitat. Considering the extensive habitat removal that has occurred around the project area to date, the wildlife analysis for the goshawk, should account for the limited habitat availability in the region. The treatment on national forest land has resulted in a loss of contiguous, suitable habitat. The EA fails to provide an appropriate landscape analysis of cumulative effects. The impacts of the Porcupine project must be considered in the context of broad landscape habitat connectivity.

A recent peer-reviewed survey of Goshawk habitat use suggests that current management of the bird's habitat may be inadequate to provide for its persistence in viable populations. Greenwald et al, *A review of northern goshawk habitat selection in the home range and implications for forest management in the western United States*. Wildlife Society Bulletin 2005, 33(1): 120-129.

We would like to reiterate a 60-80 percent canopy closure is vital for the goshawk and keeps out competitors.

> Goshawks nest in a variety of habitat types-from willow stands to massive old growth forests of the Pacific Northwest; however, goshawks in northern California prefer mature and old-growth conifer forests that have relatively dense canopy closures, have usually little understory, and are in close proximity to riparian corridors.

In all of these relevant studies below goshawks do prefer canopy greater than 50% and these studies also show the importance of monitoring as many of the nest sites studied were newly discovered and not historical. The District must follow LRMP guidelines and monitor for Goshawk in the project area not just historical sites in order to know current population trends.

DESIMONE STUDY

Desimone, S.M. 1997. Occupancy rates and habitat relationships of northern goshawks in historic nesting areas in Oregon. M.S. Thesis, Oregon State University, Corvallis, OR.

Goshawks in eastern Oregon occupied historic territories 29% of the time and recently discovered/occupied territories 79% of the time. Sixty percent of recently discovered/occupied nest sites were in old, closed canopied forests (>15 trees/ha >=53 cm (21") dbh, >50% canopy cover), 26% were in mid-aged, closed forest (23-53 cm dbh, <15 trees/ha >53 cm (21") , >50% canopy closure). The 15 historic nest sites which continued to be occupied had significantly more mid-aged, closed forest and old, closed forests than the 31 historic nest sites which were unoccupied. This relationship was significant within 12, 24, 52, 120, and 170 ha circles surrounding goshawk territory centers.

Nest success of occupied/historical sites (70%) and young per nest (1.5) was comparable to recently discovered/historical sites (77% and 1.39).

The occupancy rate of recently discovered territories (79%) was similar to rates of recently discovered territories in AZ, NM, CA, UT and OR (range= 66%-74%) that had a low level of habitat disturbance. The occupancy rate of historic territories, however, was only 29%. All of the unoccupied/historic territories had logging within the 52 ha nest site: "this strongly suggests that the low detection rate…was largely the result of habitat alteration; i.e. the conversion of Late Closed and Mid-aged Closed forest conditions to mainly Very Early seral stage of Early Open canopy forest conditions within the 52 ha alternate nest cluster."

As of 1994, only 2-8% of the Freemont National Forest is in late successional pine types (page 55, Henjum et al. 1994:5). Using historic goshawk nests, late closed forests decreased 50% since the 1970s, mid-aged closed forest 20%-40%,. Very early forest increase 400% to 1,000%, early open forest increased as well (Table 11, figure 5).

Good discussion of accipiter reoccupancy rates (p. 56).

Tree harvest prescriptions that create large areas with sparse cover (e.g. Very Early, Early Open, Mid Open, Late Open) are potentially detrimental to goshawk occupancy, especially if the percent of open canopy (<50% CC) forest is >33.7% (mean) at the 52 ha scale or >43.8% (mean) of the total area of the 170 PFA (Table 12)."

"Analysis of the Fremont vegetative cover types suggests that any habitat manipulation resulting in substantial reduction of mature, closed-canopy forests, which is subsequently replaced by early successional or more open young forest, would reduce the suitability of an area as a potential nest site (McCarthy et al. 1989)…My analysis suggests that more severe alterations (regeneration clearcuts, partial removal of stands resulting in <50% canopy closure, and moderately high to severe alteration) may be better predictors of goshawks not nesting in areas where nest site potential has significantly deteriorated and become non-suitable for nesting."

"I suggest a 52 ha (130 acres) no-harvest zone within the alternate nest cluster and discourage further cutting of large, late and old structure trees (>53 cm) within the PFA to preserve stand integrity, maintain closed canopies, maintain connectivity to alternate nests stands,

and optimize conditions for breeding goshawk pairs to persist. The delineated 52 ha should include at least 2 alternate nest stands in addition to the existing nest stand and should have similar suitable structural conditions as the known nest area. Nest stands should be delineated to include the most late-successional, closed-canopy forest structure surrounding the nest trees as possible (a minimum of 30% of the 12 ha nest stand [this study]). Outside the 52 ha nest cluster, the remainder of the 170 ha PFA should retain all existing Mid-age and Late vegetation structure possible. I recommend that <20% of the PFA should be in Very Early and Early Open vegetative cover types." Ed: This also suggests that occupancy rates of recently discovered territories is not an indicator of changes in total occupancy rates or population densities.

Within the 52 ha scale, occupied/historic nest sites had 49% total old closed and mid-aged closed forest, while unoccupied/historic nest sites had 19% total old closed and mid-aged closed forest. The current relationship between forest structure and occupancy matches the historic relationship: all historic nest sites averaged 51% total old closed and mid-aged closed forest when last known to be occupied prior to the study. At the 12 ha level, occupied/historic nest sites had 400% more old closed forest than unoccupied/historic nest sites.

The Freemont National Forest (Oregon) summarized the recommendations of Desimone (1997) as such:

"These studies represent the best information available...[Desimone] confirmed the importance of late closed and mid-age closed forests as indicators of quality habitat within the 52 ha scale on historic nest sites where goshawks were still present in 1994...suggesting that little or no habitat alteration within aggregate nest stands is important to ensure persistence of nesting pairs."

MCGRATH STUDY

McGrath, M.T. 1997. Northern goshawk habitat analysis in managed forest landscapes.M.S., Oregon State University, Corvallis, OR.

82 active nest and 95 random sites were analyzed in eastern Oregon and Washington.

Nest sites (1 ha) typically occurred on the lower 1/3 or bottom of a north facing slope. They had higher basal areas, larger trees, higher canopy closure, and greater live stem density compared to random sites. Mean age was statistically greater than average (by 11 years) and mean distance to human disturbance was less (by 8 m) than random sites, but were not likely biologically detectable to goshawks.

Nest stands (10 ha) were in mid-old forests with canopy >=50%.

Theoretical PFAs excluding the nest stand (10-83 ha) were negatively correlated with early forest conditions.

PFAs (170 ha) were not different from random sites.

NORTON STUDY

Norton, B.E..1994.Characteristics of northern goshawk (Accipiter gentilis atricapillus) nest sites within the Siskiyou Mountains of northern California and southern Oregon. Rogue River National Forest, Medford, OR.

All five known goshawk nests on the Applegate Ranger District of the Rogue River National Forest (OR) were in old growth or mature stands though such forests make up only 39.37% of the district. The nests, however, were found during timber harvest surveys rather than by random or systematic surveys.

Mean canopy closure, as measured by spherical densiometer, of four active nest stands was 88% (range = 75-97). Mean nest stand size was 851.4 acres, while the average mature/old growth stand on the district is 118.6 acres.

Nests were in Douglas-fir, ponderosa pine, and madrone. Mean nest tree DBH was 81.84 cm (32.22 in.) (range = 50.80 - 124.46 cm). Two of four nests were in mistletoe clumps.

Average nest height was 18 m (59 ft) (range = 12 - 24 m). All nests were within the lower 1/3 of the canopy.

Nest sites were on "relatively moderate" slopes for the areas (average 36%, range = 27-58%) with north and east aspect.

Mean distance to riparian area was 436 m (range = 180 - 660).

Mean distance to road was 1,198 m (range = 180 - 3,300).

Understories were "open" but not quantified.

Ponderosa pine and Douglas-fir were the dominant overstory trees.

ALLISON STUDY

Allison, B.A. 1996. A landscape characterization of nesting goshawk habitat in northern California using remote sensing and GIS. M.S. Thesis, Southern Illinois University at Edwardsville, Edwardsville, IL.

100% of 16 nests systematically found in two survey areas (13,360 and 14,250 ha) were in mature-old forest stands on north facing slopes. Most were between 1,700 and 1,900 m in elevation and on <20% slopes

The amount, size of patches, edge density, and edge contrast of light density and dense mature-old forest was significantly greater in goshawk nest stands and within 800 m (= 500 acres = .5 mile radius) of nests than in control plots. Larger amounts of old growth within 800 m may be more important on less mesic sites.

80 ha (200 acres) of light density and dense mature-old forest should be maintained within 800 m of goshawk nests. Lodgepole stands and meadows should be maintained. Protection of meadows

and riparian areas is also important for adequate prey populations, and the homogenous distribution of different vegetation types and seral stages should also be maintained to provide high contrast edge for foraging.

BLOOM ET AL.

Bloom, P.H., G.R. Stewart and B.J. Walton. 1986. The status of the northern goshawk in California, 1981-1983. California Fish and Game Department, Sacramento, CA.

Statewide, five to ten territories are being destroyed yearly due to logging. Between 1981 and 1983, six territories on National Forest lands were lost to logging. Some inactive territories had extensive logging in them.

Goshawks are doing poorly in the Northern Coast Ranges-Klamath Mountains and on the east side of the Sierra Nevada.

The Forest Service should increase protected nest stands from 10-32 ha (25-80 acres) to a minimum of 50 ha (125 acres), and increase the total number of protected territories. "In our judgement, this still places territories at risk and only selective cutting should be permitted adjacent to this area." "protecting only a nest stand probably is not adequate to maintain a productive territory."

If prey densities are high, logging is light, and forest buffers are left around nest stands, then 25-80 acre nest stand may be adequate.

FOWLER

Fowler, C. 1988. Habitat capability model for the northern goshawk. USDA Forest Service Region 5, Tahoe National Forest, Nevada City, Nevada. 21 pp.

Minimum nest stand should be 50 ha (124 acres). "Stands less than 50 ha will reduce protection from disturbance and increase the possibility of inactivity and abandonment."

"Where management for the current population is desired, establish at least four territories per township across suitable habitat" (3.5 to 10 miles between territories).

"Integrating goshawk habitat with pileated woodpecker and spotted owl management areas "should be done with caution or avoided because of the potential for goshawk predation on these species."

"Preponderance" lands within goshawk territories should have overstories trees averaging 25-30" dbh exceeding 60% canopy closure. The nest core should not by isolated by logging.

Maintain meadows and streams. Edges increase prey diversity, but are probably not a limiting factor.

SAUNDERS

Saunders, L.B. 1982. Essential nesting habitat of the goshawk (Accipiter gentilis) on the Shasta-Trinity National Forest, McCloud District. M.S. Thesis, California State University, Chico, CA.

7,436 ha of potentially suitable habitat was surveyed for goshawks on the McCloud District of the Shasta-Trinity National Forest. Seven newly discovered and 6 historical nest areas were analyzed.

Mean nest stand canopy closure was 77% (range = 53-92). The majority of nest stands had less than 25% ground cover and 200-300 stems per acre.

Nest sites were similar to nest stands, but had a greater density of large trees and generally higher canopy closure (mean = 81%). Stem density varied with 41% of sites having <200 stems/acre.

Distance to water was highly variable (15-1,700 m, 44-5,576 ft). 75% of nests were at least 100 m from water.

58% of nest were on slopes. 48% were on the lower third or toe of a slope. Five on flat ground, which is very prevalent on the McCloud District.

All nest were in the lower portion of the canopy.

SCHWEICH

Schweich, M. 1997. Results of five years of goshawk monitoring on the Modoc National Forest. Modoc National Forest.

Habitat within the 600 PFA on 52 territories with "high quality" surveys over five years (1992-1996) were compared with nesting success. Of the 15 territories with less than 180 acres of "quality habitat" only 8 produced at least one fledgling in five years. Of the 18 territories with 180-348 acres of quality habitat, 16 produced at least one fledgling in five years. Of the 19 territories with more than 348 acres of quality habitat, 17 were successful at least one in five years.

The territories with less than 180 acres of quality habitat had a mean reproductive success rate of 27% while the latter two were 41% and 43% respectively.

WOODBRIDGE AND DETRICH

Woodbridge, B. and P. Detrich. 1994. Territory occupancy and habitat patch size of northern goshawks in the southern Cascades of California. Studies in Avian Biology 16:83-87.

Territories typically contained 3-9 nest trees. The mean number used was 2.6 (range = 1-5). Forty-four percent of nest trees were also used in the previous year. Forty-nine percent of nest trees were used at least twice in five years.

Distribution of alternate nests was variable. Most were clumped within 2-3 adjacent stands, some were up to 2.1 km away. The mean distance was 273 m. Longer movement may not have been detected.

Territories typically contained 1-5 nest stands, ranging from 4.1 to 115 ha in size. 85% of nest stands were less than .7 km apart.

Individual nest stands were occupied in 46% of years. Stands <10 ha were "occasionally" occupied, while stands >20 ha were occupied in a "high proportion" of years.

Clusters of nest stands ranged from 10.5 to 114 ha in size. Most nest stand clusters were clearly distinct of nest stand clusters in neighboring territories, 18% (5) territories, however, had widely dispersed clusters with less distinct territory boundaries.

The mean occupancy rate of nest stand clusters was 74%. Occupancy of clusters <20 ha was <50%, 40 ha was 75-80%, and >61 ha was nearly 100%. "...patch size may be an important factor determining quality of nesting habitat."

Long-term monitoring did demonstrate a distinction between post-fledging family areas and alternate nest stand.

87% of 84 nesting attempts were successful (i.e. produced a fledgling).

Average productivity was 1.93 young per attempt. There was no relationship between stand size cluster and productivity. The mean number of young per occupied territory was relatively uniform. Nest success and productivity were likely overestimated.

In 23 "traditional" territories where occupancy was predictable, nest clusters were distinct. In the 5 "ephemeral" territories where occupancy was sporadic, nest stands were widely spaced. They were highly fragmented areas of lodgepole and mixed-pine with extensive bark beetle mortality. High prey densities or vulnerabilities may have attracted goshawks to nest in these areas with little mature forest.

Historic logging has caused the study area to contain scatted patches of mature forest within a matrix of thinned and regenerating stands, yet it contains relatively dense goshawk populations. "Goshawk territories, however, were associated with the larger remaining patches of mature forest, and territory occupancy was positively correlated with the size of nesting habitat patches."

The McCloud Ecosystem Analysis identifies loss of old growth as a contributing impact of goshawk decline:

> Reasons for declines in the local goshawk population are unclear. Timber harvest, cattle grazing and road density (nest disturbance) appear to be factors. Cumulative effects are important, with loss of old growth forest habitat the major cause of decline.
> …
> Goshawk populations are in a similar situation to the NSO's, limited by lack of habitat and harassed by human activities. 21, 62.

Pallid & Townsend's Big-eared Bats

The determination for bats is "may impact individual bats but would not cause a trend towards federal listing or a loss of viability." Surveys for these two species have not been conducted in the project assessment area contrary to LRMP direction.

Management Indicator Species and Game Species

Category 2 Assemblages (MIS Report Pg 5)-

"Late Seral: Late seral assemblage is present in and adjacent to the project area, but does not occur in project units. Few scattered large trees occur in some units, but the stands are primarily dominated by smaller trees. The few large trees in these early and mid seral stage units will not be removed during treatments. This assemblage would not be directly or indirectly affected by the project; therefore, there will be no impact on Forest level habitat trends. This assemblage will not be affected by project implementation and will not be further analyzed in this report."

"Mature stand thinning is proposed in three units (83 ac) of dense, late-successional mixed-conifer stands. Conditions range from two to three-storied stands consisting of large diameter, relic (150yr+) PP/SP overstory trees with a dense, predominant WF mid- and understory. Recent beetle activity in the PP component has been observed. Basal area ranges from 150 to 340 sq ft/acre and average canopy cover is 55%. Stands would be thinned from below (4"minimum dbh) to a target basal area of approximately 160 sq ft/ acre. Objectives in both the hazard reduction and mature stand thin units are the same as standard and biomass thinning, but also include maintaining late-successional, structurally diverse, multi-storied characteristics. These units represent the higher quality foraging habitat in the project area, and some portions are approaching nesting/roosting conditions." "For all stands, the dominant, codominant, and intermediate trees are the priority for retention until desired basal area is met; with a species preference for sugar pine and ponderosa pine." BA Pg. 4

"Mature stand thinning is proposed in dense, late-successional mixed-conifer stands Stands are two to three-layered with large diameter, relic (150 plus year-old) PP and SP overstory trees with a dense, predominant WF mid-and understory. Recent beetle activity in the ponderosa pine component has been observed. Basal area ranges from 150 to 340 square feet/acre and average canopy cover is 55 percent. Stands would be thinned from below (4-inch minimum dbh) to a target basal area of approximately 160 square feet/acre. These units represent the higher quality late-successional habitat in the project area.

The thinning prescriptions and fuels treatments in the mature stand thin units that contain the greater proportion of late-successional habitat, and are considered suitable habitat for late-successional species, are designed to protect and maintain this existing, limited habitat and increase stand resilience." BE Pg.10

The EA does not consider the 19 acres of late succsessional ponderosa pine regeneration harvest units and fails to disclose how much mature forest structure would be removed in the mature forest stands. Further the EA and supporting reports are void of any discussion of how harvesting would affect game species mentioned in the LRMP specific to the management areas in the project.

Sierra Nevada Red Fox

The native Sierra Nevada red fox (Vulpes vulpes necator) (SNRF) was listed as threatened under the California Endangered Species Act (CESA) by the California Fish and Game Commission in 1980 and is listed as a Sensitive species by the Pacific Southwest Research Station, Region 5. A five-year status report for red fox in 1987 recommended that the threatened status be retained due to lack of new information on the species and increasing threats including logging activities, grazing, and human disturbance.

Little work has been conducted on SNRF in California since the late seventies. The most recent study to date was conducted by a doctorate student at UC Berkeley that initiated an intensive field project in 1999 in the Lassen Peak region of northern California. Perrine's population estimate (attached to these comments) for the Lassen Peak region was very small, perhaps no more than10-15 individuals. This estimate could be higher given the potential for foxes occurring in areas that have not been surveyed yet.

Sierra Nevada red fox likely never occurred in large numbers. From 1940 to 1959 only 135 pelts were taken throughout the state. The statewide harvest declined to 2 per year long before the state banned red fox trapping in 1974. Grinnell (1937)(Attached to these comments) described the distribution of the red fox as occupying "high elevations throughout the Sierra Nevada from Tulare County to Sierra County, and the vicinities around Mt. Lassen and Mt. Shasta. In Grinnell's Lassen Peak transect work, he described the Lassen Peak distribution of red fox based off of trapping records. The western extent where foxes were trapped in the Lassen Peak region included south of Battle Creek Canyon to Cold Creek Butte (3 miles west of Mineral). The eastern extent where red foxes were trapped included the ridges surrounding Eagle Lake. Foxes were not found east of Eagle Lake (Grinnell 1930).

The current range and distribution of red fox is unknown. The only known current population is around the vicinity of Lassen Peak, with periodic sightings by inexperienced observers throughout its historic range. The Lassen Peak study (Perrine 2005) found that red fox distribution changed seasonally with movement in the winter at lower elevations down to 4,700 feet. In the summer, the foxes used higher elevations usually over 6,000 feet.

How has the Shasta-Trinity National Forest, particularly the Shasta- McCloud Management Unit participated with the USFWS in the protection of this rare species, given that the McCloud area is within SNRF range. Have surveys or sightings been documented?

Soils

Soils are the foundation of terrestrial life. Forest productivity is directly tied to soil conditions. Soil takes thousands of years to develop and is not 'renewable' on a human time scale. Soil is an ecosystem in itself that must be healthy in order to provide for healthy forests, grasslands, and aquatic systems. Actions impacting such complex systems are prone to unintended consequences. Given the life-support role soils play, special care and prudence are essential.

The National Forest Management Act (NFMA) prohibits "irreversible damage" to soils as well as "substantial and permanent impairment of productivity of land". Loss of soil (erosion) and displacement clearly cause "irreversible damage" and "permanent impairment of productivity of land". Loss of coarse woody debris causes soil damage that can last a century or more. Soil compaction negatively impacts soil productivity, overland flow, erosion, stream sedimentation, and late season flows. Soil compaction from logging can persist 50 – 80 years.[2] (ICBEMP, Assessment of Ecosystem Components, 1997) Avoiding soil damage is the only option; full restoration of soil damage is not generally possible. Compacted soils are not completely mechanically restorable. Mechanized decompaction is only partially effective at decompacting and can compound problems by mixing rock and mineral soil with topsoil resulting in long term reduced productivity. Replacing eroded or displaced soil is problematic. Artificial coarse woody debris replacement is not practical over large areas such as burned clearcuts. Timber harvest practices including road building, log skidding and slash disposal have caused most of the soil damage on forestlands.

Nutrient recycling is a critical function of soils that historically has been damaged by treatments that negatively affect the amounts, types, and distribution of organic matter retained on site. [3](Graham, R. T., 1990) Many years of piling and windrowing of slash using dozer blades has removed not only the litter plus duff layers but also the thin layer of organic rich mineral soil (A horizon) from large acreages of forested lands. [4](McBride, personal communication) Guidelines for retaining adequate coarse woody debris should be developed based on the site potential and be within the historic range of variability for the fire regime of the site. Coarse woody debris needs to be maintained at natural levels in the interface zone, with exception granted immediately around structures and residences. [5](Harvey, 1987).

[2] Intermountain Research Station, General Technical Report INT-225, USDA- Forest Service.

[3] Graham, R.T., A.E. Harvey, D.S. Page-Dumrose, and M.F. Jurgensen. 1990. Importance of soil organic matter in the development of interior Douglas-fir. In: Interior Douglas- fir; the species and its management- Symposium Proceedings, Feb 27- Mar 1, 1990, Spokane, WA, USA. Compiled and Ed. By D.M. Baumgartner and J.E. Lotan.; Publ. 1991, Washington State Univ., Pullman, WA.

[4] McBride, Ken, Bitterroot NF monitoring reports 1988 – 2000.
R-1 Soilmon Task group Report, 2000.

[5] Harvey, A.E., M.F. Jurgensen, M.J. Larsen, and R.T. Graham. 1987. Decaying organic materials and soil quality in the Inland Northwest: a management opportunity.

The process of nutrient cycling on the forest lands is primarily effected through fire; this recycling is key to forest and grassland ecosystem health. Therefore, the use of fire when treating vegetation should be in accordance with the natural fire regime for the site, and organic matter left on site should be within the natural historic range of variability for the site type. [6](Fischer, W. C., 1987)

Mycorrhizal fungi are an essential component of productive soil. [7](Amaranthus, M. P., 1996) Most regeneration failures may be due to problems with mycorrhizae. Monitoring mycorrhizae needs to be part of soil condition assessments. Mycorrhizae are very temperature sensitive, so soil temperatures need to be monitored. Monitoring of detrimental soil disturbances needs to include: compaction, displacement, rutting, severe burning, erosion, loss of surface organic matter (especially coarse woody debris), soil mass movement, soil temperature, and damage to micro-biological components of soil (especially mycorrhizal fungi).

Given that monitoring has demonstrated an extensive legacy of soil damage, it is time to include that information in watershed health assessments. There needs to be an inventory of where these highly damaged soils occur and the extent to which they are damaged. The Forest Plan needs to quantify the acreages by watershed and do cumulative effects analysis, including the road systems to understand the full impact management has had on watershed health.

Transportation/Roads

"The following road actions are responsive to needs identified in the project-level Road Analysis Process (RAP). Decommissioning activities would occur on four roads/segments (total of 3 miles) that are not within or adjacent to suitable NSO habitat. These roads are in the southern portion of the project area, and are primarily associated with meadow restoration activities. Three miles of existing unauthorized routes (seven routes) would be added to the transportation system as they have been identified for existing and anticipated future resource management needs. There are two miles of existing roads identified for reconstruction. Reconstruction does not involve new cut and fill, road construction or road relocation; it generally includes, but it not limited to, filling in ruts/gullies to reshape (outslope/crown) the road, substantial re-grading and/or surfacing with rock or cinders, and heavy brushing. Roads identified for maintenance (56 mi) consist of existing native or aggregate surface roads that will be graded, brushed, and/or rocked as needed."

The S-T RAP recommends decreasing the maintenance level of 41N23, 42N03 and 41N19, however the EA proposes to add 41N23 A&B to the road system and to maintain 41N23, 42N03 and 41N19.

[6] Fischer, W.C. and A.F. Bradley. 1987. Fire ecology of Western Montana forest habitat types. USDA-Forest Service; Intermountain Research Station, General Technical Report INT-223.

[7] Amaranthus, M.P., D. Page-Dumrose, A.E. Harvey, E. Cazares, and L.F. Bednar. 1996. Soil compaction and organic matter affect conifer seedling nonmycorrhizal and ectomycorrhizal root tip abundance and diversity. Pacific Northwest Research Station; Research Paper PNW-494. USDA- Forest Service.

An additional 37 miles of Maintenance Level 3 and 4 roads (highway legal vehicles) are proposed for chip-seal surfacing. Eight miles of road/segments are proposed for closure through berm, barricade or other closure method." BA Pg. 7

The decommissioned roads are in the southern portion of the project area and are primarily related to meadow restoration activities in riparian areas. Reconstruction will take place on a single 2-mile stretch of FS Road 41N23, or Mud Well Road, which will serve as a primary haul road by connecting Mayfield Road (FA 03) with Powder Hill Road (FA49). There will be a slight increase in traffic on the reconstructed road as a result of increased access abilities for public and management activities.

56 miles of existing maintenance roads consisting of native or aggregate surface will be graded, brushed, and/or rocked as needed. An additional 37 miles of Maintenance Level 3 and 4 roads (a 20 mile section of Hwy 49, a 4 mile section from Hwy 15 to Hwy 49, and an 8 mile section on Hwy 3) for use by highway legal vehicles are proposed for chip-seal surfacing. The Transportation Resource Report indicates that these 37 miles are currently chip-sealed and will be resurfaced. A total of 8 miles of road will undergo closure through earthern berm or barricade, with considerations of cost and effectiveness, upon completion of the project.

Existing Conditions:

The Porcupine project area contains approximately 155 miles of NFTS roads and 40 miles of unauthorized roads, with an approximate total open road density of 2.3 mi/sq. mi. The Powder Hill Road (FA49), currently Maintenance Level 3, provides thru access to the Modoc National Forest and Medicine Lake 15 miles north of the project area. (Transportation Resource Report, 8).

LRMP Management Direction:

"Dedicate no more than 15 percent of the land harvested by even-aged systems and no more than 20 percent of the land harvested by even-aged systems to non-productive purposes such as roads, trails, landings, etc." (LRMP

"Evaluate opportunities to enhance elk populations and habitat." (LRMP 4-78).

"Reduce road density and rejuvenate browse to enhance big game species habitat." (LRMP 4-82).

Temporary Roads, Landings, and Reconstruction:

In order to work within the units, the Forest would construct approximately six miles of temporary road. The temporary roads will have a width of approximately 12 feet, and would not involve cut and fill or surfacing. Following their usage, the roads will be scarified/tilled to a depth of 6 to 18" to de-compact the soil, recountoured to natural slope and seeded for erosion control. Landings and skid trails within 200' of landings will also be scarified and seeded. The reason given for constructing temporary roads is that some

units are large and roads are needed to reduce the long skidding distance. In some units, roads will be constructed for scenic corridor management.

The specific locations for the temporary roads have not been identified, as their construction is contingent on an agreement with the implementation purchaser. Estimates for temporary road placement were provided in email correspondence with Cindy Diaz on May 31 and are provided below:

Porcupine Temporary Road Estimates		
Treatment Unit	**Miles***	**Purpose**
39-57	0.20	Skidding distance limitations
39-50	0.20	Skidding distance limitations
39-63	0.10	No roaded access
39-68	0.10	Skidding distance limitations
43-20	0.50	Skidding distance limitations
44-60	0.60	Skidding distance limitations
47-102	0.20	Terrain /Achieve skidding distance limitations
47-103	0.30	Skidding distance limitations
47-104	0.50	Skidding distance limitations
48-200	0.25	Skidding distance limitations
48-201	0.10	Scenic corridor management
48-210	0.50	Skidding distance limitations
48-216	0.10	Scenic corridor management
48-217/218	0.25	Skidding distance limitations
48-221/222/223	1.00	limited access/ Skidding distance limitations
Remaining Units	1.00	Up to 100'-200' per unit to access landings not directly adjacent to a road.
Total	**5.9**	

Estimating one landing for every 30 acres treated, and an average 0.5-acre landing size, the total estimated landing need is 66 acres. Although there are existing landings in the area, there is no current estimate of existing landings. The BA estimates up to 6 acres of foraging habitat could be removed when constructing new landings.

The project area Watershed Assessment documents a need to reduce road density in the Porcupine Watershed. In particular, "Wildlife populations may be suppressed by excessive road density, particularly game animals such as elk, bear, and deer."[8]
Road density will decrease under the project action due to closed and decommissioned roads, from existing 2.48 total road density (includes open & closed system roads and unauthorized routes) to 2.44 under the project. Creating a total of six miles of new "temporary" forest roads does not meet the recommendations of the WA and will almost certainly, by any reasonable standard, be detrimental to the health of the watershed in the long term.

Forest roads are proven to be fatal for wildlife, a fact made abundantly clear in the Forest Service's own May 2001 document "Forest Roads: A Synthesis of Scientific Information."[8] In regard to terrestrial vertebrates, the report identifies three impact mechanisms: "direct effects, such as habitat loss and fragmentation; road use effects, such as traffic causing vertebrate avoidance or road kill; and additional facilitation effects, such as overhunting or overtrapping, which can increase with road access." Moreover, roads have effects including: (1) mortality from road construction, (2) mortality from collisions with vehicles, (3) modification of animal behavior, (4) alteration of the physical environment, (5) alteration of the chemical environment, (6) spread of exotics, and (7) increased use of area by humans.[9]

The EA fails to rigorously analyze the impact of temporary road construction, road reconstruction, and road upgrades on soil and wildlife, particularly big game such as deer and elk. The detrimental effects of high road density on terrestrial vertebrates include underutilization of habitat due to segmentation, difficulty migrating across roads, increase in poaching, and accumulation of toxic chemicals in animals living in close proximity to roads. Elk have been shown to ignore large areas near roads open to traffic, with elk avoidance increasing with increasing rate of traffic.

The project documents must show a rigorous analysis of all reasonably foreseeable indirect impacts of project activities. The EA and supporting reports do not show a good faith effort to present the 'hard look' at the environmental impacts of temporary roads required by NEPA.

A better alternative would seek out engineering and silvicultural options that would allow for treatment to take place in individual units without the construction of new roads. The Forest ought to try and take the recommendations of the WA and reduce road density in this area by reconsidering the road management actions associated with this project. Although some of the road actions are clearly necessary for safety and forest management, we at EPIC firmly believe these six miles of temporary road are not needed and will in fact greatly damage the forest ecosystem.

Soil Compaction on Closed Roads:

A major concern associated with roads is the compaction of the soil. According to a meta-analysis of the ecological impacts of roads:

"Long-term use of roads leads to soil compaction, even after use is discontinued. Soil density on closed forest roads continues to increase, particularly during winter months.

[8] "Forest Service Roads: A Synthesis of Scientific Information," 2001. ed. Hermann Gucinski, Michael J. Furniss, Robert R. Ziemer, and Martha H. Brookes.

[9] Trombulak, S.C. and C.A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1): 18-30.

Increased soil density can persist for decades; Logging skid trails in northeastern California over 40 years old have soil that is 20% more compacted than soil in nearby areas that have not been used as trails."[10]

We appreciate the efforts cited throughout the EA to minimize the impacts of temporary road management activities on soil compaction. For instance, we commend the plan to decommission 8 miles of road within riparian areas as an essential element of riparian and meadow restoration. However, there is a stark difference between obliterating a road and putting a road aside.

Under the Forest Service's regulations, logging must be carried out "in a manner consistent with the protection of soil." 16 U.S.C. § 1604(g)(3)(F)(v); 36 C.F.R. § 219.27(c)(6). It must also ensure that "soil…will not be irreversibly damaged." 16 U.S.C. § 1604(g)(3)(E)(i). In addition, NFMA requires "conservation of soil and water", and "not allow significant or permanent impairment of the productivity of the land." Finally, "management prescriptions that involve vegetative manipulation of tree cover for any purpose shall—[a]void permanent impairment of site productivity and ensure conservation of soil and water resources."

Finally, "conservation of soil and water resources involves the analysis, protection, enhancement, treatment, and evaluation of soil and water resources and their responses under management and shall be guided by instructions in official technical handbooks. 30 C.F.R. § 219.27(f). Congress intended that conservation of soil be a high priority amongst environmental agencies.

The Forest needs to provide information analyzing the soil impacts of roads that are being changed from road management level 2 to road management level 1. Roughly 8 miles of roads, as listed in Table Appendix B-2, are proposed for closure by erecting guardrail barricades, constructing earthen berms or using natural materials to restrict access. These downgraded (closed) roads will continue to have an impact on soil compaction, especially in light of a period of use of up to 10 years. The EA does not analyze the effect of road closure on soil compaction either as an indirect impact or as a cumulative impact.

Despite science that shows the long-term detrimental impacts of soil compaction as a result of roads, and the presence of roads within the project area, the EA claims that "there are no known or measurable indirect effects to soil productivity due to accelerated erosion or loss of organic matter as a consequence of any action associated with this Project." (Porcupine EA Pg. 125) Part of the issue is the analysis methodology. The spatial boundary for soil analysis excludes roads. As a result, "system roads are not considered part of the soil resource." Decommissioning a road removes it from the system and returns it to productivity, while adding a road to the system removes the soil from productivity.

[10] Trombulak, S.C. and C.A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1): 18-30, 22.

Yet, the rehabilitation of road-miles will not be accomplished simply by gating, berming, or otherwise blocking the entrance to a road permanently or temporarily, or seasonally closing roads, but will require obliteration, recontouring, and revegetating. Rather than just blocking off roads, the process of restoring watersheds must start by truly decommissioning roads altogether.

The Forest fails to take the 'hard look' at the impacts of road activity as required by NEPA. Road closure is a project action that has potentially significant impacts to the ecosystem due to long-term soil compaction. The Forest needs to consider the impact of road closures on soil compaction as an indirect impact associated with the action of changing the road maintenance level from 2 to 1 and as a part of the cumulative impacts of all road actions.

Cumulative Impacts of All Road Actions:

Section 1508.7 of the CEQ guidelines on NEPA offers the following definition:

"Cumulative impact" is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

In reference to the totality of road management activities in the project, the supporting documents to the EA conclude:

"There are no anticipated long term negative cumulative effects to the transportation system from the Porcupine Vegetation and Road Management Project. The proposed road management activities under the action alternatives are designed to reduce open road density and increase the efficiency of the transportation system." (Transportation Resource Report, Pg. 10)

Yet, cumulatively, impacts from six miles of temporary road construction, 66 acres of landing construction, 2 miles of road reconstruction, 8 miles of soil-compacted road closures, and 37 miles of chip seal resurfacing on top of maintaining existing roads, must be analyzed comprehensively from a forest-wide landscape and watershed perspective. Even if impacts related to each stand-alone action are determined not significant, this does not preclude the existence of adverse cumulative impacts. Together, these road actions produce stressors that have an interactive, synergistic, net effect on soil, wildlife, and other environmental resources within the project area.

In particular, the decision maker needs to be certain that present environmental documents meet NEPA requirements for analysis of cumulative impacts by properly identifying other projects in the area that are reasonably foreseeable. While a project does not have to analyze impacts that are "speculative," it should consider those impacts "sufficiently likely to occur, that a person of ordinary prudence would take it into account

in making a decision." *Sierra Club v. Marsh*, 976 F.2d 763, 767 (1stCir. 1992)(Sierra Club IV). To further clarify, "An environmental impact is considered 'too speculative' for inclusion in an EIS if it cannot be described at the time the EIS is drafted with sufficient specificity to make its consideration useful to a reasonable decision maker." *Dubois v. U.S. Dept. of Agriculture*, 102 F.3d 1273, 1286 (1st Cir. 1996).

Socio-Economics

"There will be 3,818 acres of treatment done in the project under alternative 2a. Of these acres there will be products removed in log and chip form on all but 14 of those acres. Both types of wood products will be delivered to local mills where they will either be developed into other products and shipped out to retail markets or used to help generate electricity to help run the mill facilities. An LRMP objective is that matrix lands on the forest would provide a sustained yield of timber and other wood products to help support the economic structure of local communities and to supply regional and national needs.34 Timber harvest is a direct beneficial effect for Alternative 2a." Silvicultural Report Pg. 10

Employment and Income

Under "Employment and Income" and "Cumulative Effects", page 162, the EA listed arguments for the proposed project. These topics address possible economic outcomes, including an increased demand for labor, job creation, and subsequent secondary effects for the local market. It is necessary to consider the importance of resource-based jobs, especially within rural communities because any "increase production of a natural resource, would likely change the total level of jobs and income." (Pg. 158). The proposed project is scheduled to have four years of planned activities. This timeline is not a justifiable length for sustainable or long-term employment. When looking at the industry over time, the employment in California's wood and paper products industry has declined by 25% between 1990 and 2007, according to a study conducted by the [11] Forest Service in March 2012 (Pg. 41). It is not logical to rely on such a declining industry to provide for a significant proportion of jobs and therefore capital within a community. Even per capita, natural resource based jobs only account for 6.6% of all jobs within Siskiyou County, and only 1.8% in Shasta County. (Pg. 160). The EA claims, "the Proposed Action would introduce new employment and income to the study area that would not occur under the no-action alternative" (Pg. 162). Unfortunately the EA did not include any information regarding the extent of employment needed to complete this project. In fact, the level of work done in the area is likely to be completed by the local timber industries themselves without the need to hire new employees and therefore would not create "new" employment. After four years, once the project is finished, there could be a discrepancy between the temporary jobs and the actual market.

[11]Todd A. Morgan, Jason P. Brandt, Kathleen E. Songster, Charles E. Keegan III, and Glenn A. Christensen "California Forest Products Industry and Timber Harvest, 2006" US Forest Service Report. March 2012

On the other hand, the no-action alternative does have the opportunity to increase population within Shasta and Siskiyou counties through amenity led growth, especially for retirees. Preservation of the natural environmental system is pertinent for the aesthetic viability of the area. The road building, logging and hauling of timber would provide a disturbance to this demographic of citizens within these two counties.

Economic Viability

The Present Net Value (PNV) determines whether a project is economically justifiable and "provides a better measure of the overall level of benefits and costs as it reports the difference between benefits and costs at the aggregate level". (EA Pg. 157-158) These are the total costs subtracted from total benefits. All of the PNV ratios are deep into the negatives, -52,109.62, -2,080, and -51,831.38 for alternatives 2a, 3a and 7 respectively. This clearly assumes that the proposed project, for all of the alternatives would cost the government more money than it would generate. The other method for measuring economic viability of the project is the expected benefits to cost ratio. Alternative 2a and 7 has a ratio of .99, which assumes that this project will cost more capital then its expected benefits. The benefit-cost ratio of Alternative 3a is 1.00 assumes that the amount of economic benefits are equal to that of the costs associated with the project. As noted in the EA, Alternative 3a may have the highest benefit to cost ratio compared with the other alternatives, "but does not necessarily have the greatest value of benefits at the aggregate level." (EA Pg. 157).

Both of these methods clearly assume that the proposed project, for all of the alternatives would cost the government more money than it would generate. According to USASpending.gov 2.8 Billion dollars annually is spent on the forest service in California alone. These funds are often from government subsidies and supplied by taxpayers. In accumulation with the previous arguments against the project for social, environmental, habitat and forest health reasons, we can clearly conclude that it is not in the best interest of the California governmental budget, citizens, nor environmental reasons to proceed with the detrimental affects of regeneration logging, logging mature trees and increasing the road maintenance backlog by building and adding more roads to the transportation system.

In [12] 2007 the GAO conducted a report of the forest service,

> For years, we, along with other organizations, have questioned the Service's ability to track the amount it spends on timber sales, as well as the Service's ability to use these data to make management decisions about its operations. Fore example, for fiscal years 1992 through 1997, the Department of Agriculture's Office of Inspector General reported that the Forest Service's accounting data – including data associated with timber sales – were not reliable. We reported a similar finding in 2001.

[12] GAO. "Forest Service Could Improve Efficiency of Field-Level Timber Sales Management by Maintaining More Detailed Data." Report to Congressional Requesters. June 2007

> Further, in 2003 and again in 2006, we reported that the Service does not maintain data on the actual cost of individual work activities, including timber sales, and as a result cannot assess the extent to which these activities yielded accomplishments commensurate with the dollars spent on them. (Pg. 2)

In the EA Economic Analysis nowhere does it account for the amount of money that it takes in the preparation of NEPA planning. This is a vast whole that is missing from the economic analysis. The cost of NEPA should be included so that the public and the decision maker know what the actual costs of timber sales are.

Sporax

The SERA Risk Assessment 2006 document was produced for the USFS and does not contain a risk assessment for insects and acknowledges that no exposure assessment was done for nontarget soil microorganisms, including Mycorrhizal communities claiming a lack of toxicity data. For terrestrial species if you look at the tables provided in Appendixes 1- 5 you will see that boron causes deformed larvae and eggs in frog and salamander eggs, multiple experiments were non statistical, embryonic mortality in fish, declines in plant development, damaged spermatozoa cells in chickens, hatchability of chicken eggs significantly decreased, body weight of quails decreased, rats after 1 hour of

exposure to boron had ocular discharge and hypoactivity, in rabbits severe eye irritation, including corneal opacity, conjunctival redness, chemosis and discharge, red lungs, irregular breathing, acute dermal toxicity, anorexia, diarrhea, decreased ovulation, examinations in rats showed lack of viable sperm and grossly atrophied testes, increased malformed fetuses in rabbits with fetal weight significantly reduced and skeletal malformations, vaginal bleeding from pregnancy loss and the list goes on. The EA fails to take the hard look that NEPA requires when it comes to effects of toxic chemicals on soils, plants and wildlife species.

Borax (sodium tetraborate decahydrate) is a fungicide that is being liberally applied by the US Forest Service (USFS) throughout our public forestlands to prevent the spread of Heterobasidion annosum (formerly known as Fomes Annosus), a root rot disease. It also has insecticide and herbicide properties. Human health concerns include: it is an extreme eye irritant; can cause inhalation irritation; is easily absorbed through broken skin; can be lethal when digested; and it may be a reproductive toxin. Borax acts as a nonselective herbicide that can persist unchanged in the soils for at least a year. It can leach rapidly during heavy rains. Borax is lethal to plants, including endangered and threatened species. Studies show it may not be as effective as believed. Many annosus root disease prevention alternatives exist. These include limiting pre-commercial thinning activities; removing and burning infected stumps; seasonal cutting to avoid reproductive basidiospores; pre and post cut prescribed burns, and applying the competitive fungus Phlebiopsis gigantea to stumps as a biocontrol agent. Currently the USFS is failing to

evaluate non-borax annosus prevention alternatives and in most cases failing to conduct project specific environmental effects analysis. This is of concern because the Forest Service is applying large quantities of borax during 'forest health' projects in our public forestlands.

Borax is generally considered not to be one of the most toxic or dangerous pesticides used in our forests. It is accepted by most that human health hazards and environmental effects should be low when the product is used properly and simple precautions are taken. Sometimes borax products can be our friends. Borax related compounds are used as a least toxic method of dealing with pests. Borax can also be used as a fertilizer and a cleaning agent (Columbia Electronic Encyclopedia 2005). Yet concerns do exist, that must receive further attention. The question here is one of quantity and appropriateness, as the Forest Service may be applying large quantities of boron salt compounds throughout our public forestlands, usually without evaluating alternatives, and sometimes neglecting to consider potential human and environmental effects. Borax is toxic in large doses. Naturally occurring borax is mined out of Death Valley in California (Columbia Electronic Encyclopedia 2005). Borax does not naturally occur in forests and we wonder what impacts and potential risks its introduction may be inducing.

From 1997 to 2003 over 68,500 pounds, an average of almost 10,000 pounds per year, of borax was applied in California's forests (California Department of Pesticide Regulation Pesticide Use Reports). In the most recent California Department of Pesticide Regulation (CDPR) Pesticide Use Reports the largest amounts of borax applied in 2003 were in Lassen and Sierra Counties where it was reported that 3,335 and 2,894 pounds, respectively, were applied. With "thinning" cuts and fuels reduction projects increasing drastically over the last couple of years in our national forestlands due to the Healthy Forest legislation, borax use is on the rise across the state.

Mode of action: Borax is a contact, preventative fungicide that inhibits the growth of fungi by preventing the production of spores on freshly cut stumps (USDA Forest Service, Borax Pesticide Fact Sheet 1995). As an herbicide, it causes desiccation and interrupts photosynthesis in plants. As an insecticide, the dry powder is abrasive to insects' exoskeleton, and acts as a stomach poison (IPM of Alaska 2002).

Target pests: Borax is used to control the fungus Heterobasidion annosum (formerly known as Fomes Annosus), which can cause root rot mortality or damage. The fungus often infects cut conifer stumps following thinning or cutting operations, and the disease can spread from infected stumps to other trees nearby (USFS 1995). Borax is also registered for use as an insecticide and herbicide (CDPR Pesticide Products Database and US EPA, R.E.D. Facts 1993).

Studies have prompted concern that borax is a human reproductive toxin (USFS 1995). A borax feeding study resulted in blood and metabolism disorders, and effects to the testes, endocrine system, brain weight, and size ratios among various organs and glands (US EPA 1993). High dose levels of borax have been found to cause testicular effects and decrease body weights during chronic oncogenicity studies. During reproductive and

developmental toxicity studies, maternal liver and kidney effects, decreased weight gain, and decreased fetal body weights were observed. At the highest dose levels, no offspring were produced in two of the studies as well as prenatal morality observed (US EPA 1993). After three generations were fed 1.03% borax, chronic toxicity was detected, as reproductive organs for both sexes were affected and fertility was reduced (USFS 1995). The US Forest Service (1995) reports that studies indicate chronic exposure to borax may cause reproductive damage and infertility. In the US EPA's Toxicological Review of Boron and Compounds (2004) the developing fetus of mammals is considered one of the most sensitive targets. The other most sensitive target is the testes of males, and adverse effects include testicular degeneration (US EPA 2004; USFS 2003, Evaluation of Human and Ecological Risk For Borax Stump Treatments).

Borax has been placed in Toxicity Category I for acute eye irritation effects (US EPA 1993, USFS 1995). Borax is rapidly absorbed through damaged skin (USFS 1995). The US EPA warns of the potential for dermal and inhalation exposure among applicators and people reentering treated areas (US EPA 1993). The Sporax material safety data sheet states that inhalation may cause slight nasal irritation (Wilbur-Ellis). The US Forest Service (1995) admits that there is insufficient information available to determine the potential for adverse health effects for humans from contacting or consuming borax treated vegetation, water or animals.

The Worker Protection Standard (WPS) for Agricultural Pesticides (40 CFR 156 and 170) established an interim restricted-entry interval (REI) of 12 hours for boric acid and its sodium salts. However, the US EPA sides with the chemical manufacturer and reports "there is no reasonable expectation that these pesticide uses may constitute a hazard or risk to people involved in, or near to, handling or application activities. Proper care and adhering to label directions and precautions should reduce exposure and any associated risk" (US EPA 1993).

The most common borax product used in forests, Sporax, has a signal word of danger and the label describes the hazards to humans and domestic animals as follows: "DANGER. Corrosive. Causes irreversible eye damage. Harmful if swallowed. Do not get in eyes or on clothing" (Wilbur-Ellis, Sporax label).

The green consumer website reports "Potentially lethal doses from borax ingestion are one teaspoon for infants, two for children, and five for adults. The most significant toxicity concerns for borax center around ingestion poisoning and its reproductive toxicity through ingestion…the California US EPA is currently evaluating it [borax] for possible consideration as a reproductive toxin under Proposition 65." As of this report borax is not listed on the Proposition 65 list.

The Sporax material safety data sheet warns, "Do not ingest. Wash thoroughly before eating, drinking or smoking" (Wilbur-Ellis).

Borax is generally active in soils and it remains unchanged in the soil for one year or more. High rainfall conditions can cause borax to leach rapidly and soil microorganisms

do not break it down (USFS 1995). However the Supplemental EA claims that there is no potential for affecting soils. This fails NEPA standards.

Borax is partially soluble in water (USFS 1995). The US Forest Service (1995) warns not to apply directly to water, or to areas where surface water is present and not to contaminate water when disposing of equipment washwaters or rinsate. While boron salts have been observed to occur naturally in most unpolluted waterways, some areas have boron occurring in concentrations shown to be toxic to plants (US EPA 1993).

Borax may be toxic to many essential soil microorganisms at high levels (USFS 1995) and thus may adversely affect nutrient cycling functions within the ecosystem. This could mean major long-term changes in forest Borax's primary breakdown product in soils is boron. While boron is an essential nutrient for plants, high levels of borax will kill vegetation and thus it can be used as a nonselective herbicide (USFS 1995). The Forest Service reports that in high concentrations borax is "lethal to plants." It is also know to bio-accumulate in plants (Phelps et al. undated). The Sporax label reinforces this concern as it states, "Borax carelessly spilled or applied to cropland or growing plants – including trees or shrubs – may kill or seriously retard plant growth" (Wilbur-Ellis).

The Forest Service's borax fact sheet (1995) warns "Borax may be a hazard to endangered plant species if it is applied to areas where they live" when applied as a forest fungicide on stumps. Also borax's noncrop herbicidal use may harm endangered or threatened plants. Therefore the US EPA is requiring three phytotoxicity studies (regarding seed germination, seedling emergence and vegetative vigor) to assess these risks (US EPA 1993).

Borax is used as an insecticide and "relatively high concentrations of boron compounds are toxic to insects, even when used in forests (USFS 1995). What kinds of impacts are all these borax applications in our forests having on beneficial insects and overall ecosystem health?

We wonder what kind of impacts borax is having on invasive plants and noxious weeds? Could borax be providing an additional disturbance and clearing space for weed proliferation? Is borax application providing a more friendly soil medium for exotics than native plant species?

The US Forest Service has for many years touted borax as highly effective and the only solution for preventing the spread of Heterobasidion annosum and annosus root rot disease. While the Forest Service has been liberally applying borax throughout our public forestlands, there is some question as to whether or not it is as effective as believed (or even needed).

In a study review of research on annosus root rot disease, US Forest Service Region 5 scientist R.S. Smith Jr. reported, "there is continuing concern that annosus can infect stumps via the roots rather than just through the stump surface, and that borax treatment may not be fully successful in preventing the disease" (1989).

An even more interesting study was done by Region 5 Forest Service scientists, which reviewed the efficacy of borax stump treatment in protecting trees from annosus root disease. The authors reported "borax may be ineffective because it washes off stumps and that high stump densities in pre-commercial thinnings make it difficult to apply. Evaluation done twenty years after pre-commercial thinning revealed that plots with borax." Although the Smokey project is not entirely pre-commercial, the evidence still applies.

The claim that the application of borax will prevent further infection of stumps by is a lofty uncertain promise and the EA fails to analyze the possibility of ground disturbance on the spread of the disease.

US Forest Service acknowledges that *annosus* is spread directly through thinning and harvesting activities. Additional research confirms that on true fir stands logged up to a decade earlier, *annosus* root disease could be found on 89% of the stumps (Filip et al. 1992). It's clear that similar or the same types of forest disturbance proposed for the current project have, when used in the past, led to the development of root disease for which borate use is now proposed. What is to prevent the current project from causing the spread of root rot? Heavy-handed use of borate will not prevent the spread of disease caused by forest disturbance activities. It is not apparent that the project has taken into consideration an alternative that will PREVENT the spread of root disease by limiting, altering or changing the proposed management activities. This analysis is necessary to provide the basis for the development of alternatives for the project, but it is missing.

If thinning and commercial logging of stands is to remain sustainable, a primary objective of the Region 5 Forest Service and with the current project must be to develop forest management alternatives that will prevent the use of borate. The "business as usual", approach stemming from 40 years ago, on using borax all the time needs to be analyzed.

To minimize *annosus* spread to stump wounds, thinning should be done at low risk seasons, and with specific regulations on tree age, and diameter at breast height (DBH) (Morrison and Johnson 1999). It is apparent that this critical information was not integrated into the analysis presented in the EA.

The EA fails to adequately analyze that the application of borax to freshly cut stumps may have adverse effects on wildlife or surrounding plants, invertebrates, microorganisms or human health. A closer examination would reveal additional research indicating that the use of borate has both direct negative impacts and possible long-term adverse effects on non-target organisms.

According to a study on conifer forests conducted in Sweden in the summer of 2000, "Both borate and urea [in separate tests] caused severe damage to most ground-vegetation species tested." (Nohrstedt, Westland 2000) Borate as an herbicide interrupts photosynthesis in plants, and as an insecticide is abrasive to insects' exoskeletons. (IPM of Alaska 2002) Borate remains in the topsoil unchanged for at least one year. High rainfall and/or groundwater can leach chemicals, and soil microorganisms cannot break it

down (USFS 1995). Because the chemical is not natural in forest ecosystems there is a general concern about its long-term, indirect effects on soil nutrient cycling.

Has research been conducted to determine if Northern Spotted Owl (NSO) and Northern Goshawk (NGH)—as individual birds—are affected by borate? Borate is a pesticide with toxicological significance and as such an appropriate analysis of its effect on these species must be included in the development of the alternatives.

It is likely that NSO and NGH populations could be indirectly effected, aside from the substantial direct effects both NSO and NGH face in habitat loss. The EA does not address impacts to the NGH and has limited to no information on population trends. This adds to our concerns regarding the paucity of research the USFS has for wildlife, especially Sensitive species, and in relation to the use of borate. Yet the potential for significant impacts exists and must be analyzed for impacts that will result from implementation of the current project.

Borax: Alternatives

"Annosus root disease is a normal part of most forest ecosystems in the West contributing to structural and compositional diversity" (Schmitt et al. 2000).

Valuable research about alternative management for *annosus* root disease was not included in the analysis. The USFS should develop an alternative that incorporates other, non-borate methods of managing *annosus*.

In coniferous ecosystems often similar to those of northern California, scientists and forest managers have utilized a natural and biological control agent to successively control *annosus*. The agent, *phlebiopsis gigantean,* is useful in an integrated pest management system that should be developed as an alternative for the current project. This has been successfully demonstrated in *annosus* control with *phlebiopsis gigantean* in Canada, the United Kingdom and the southeastern United States. (Annesi et al. 2005; Pratt et all. 2000; Ammon and Patel 2000; Pratt 1999; Flip and Morrison 1998; Rishbeth 1963). In southeastern forests of the United States, it has been recorded that *phlebiopsis gigantea* is completely effective in preventing *heterobasidium annosus* from stump colonization, and costs only slightly more than borate treatment (Flip and Morrison 1998).

One reason to consider a non-borate alternative is that borates are not necessarily successful in preventing or eliminating *annosus*. In a study conducted by a USFS Region 5 scientist, R.S. Smith Jr. concluded, "there is continuing concern that *annosus* can infect stumps via the roots rather than just through the stump surface, and that borax treatment may not be fully successful in preventing the disease" (1989). Additional research by Region 5 Forest Service scientists found that borax (aka borate) may be ineffective because it washes off stumps, and evaluation of forests two decades later revealed that stands with borax-treated stumps failed to have significantly lower infection than

untreated stumps (Edmonds at al. 1989). The FS should be looking at getting safe alternatives approved in California.

We are sensitive to the need to protect conifers, firs, hemlock and other important trees that make up our public forestlands from annosus root rot disease and related mortality. However, we are concerned that in Region 5 (California) the US Forest Service is not using a true integrated pest management (IPM) strategy while managing our national forests and dealing with this fungus. The Forest Service is ignoring the cause of annosus spread and needs to focus on controlling the vectors that facilitate its movement. Region 5 is reliant on borax for annosus disease prevention and has failed to develop non-toxic, non-borax treatment methods for protecting our forests. This is of concern since other parts of the US and other countries (Canada, UK) effectively use non-borax prevention alternatives.

In California the Forest Service has been applying vast quantities of borax as part of forest health and fuel reduction projects, avoiding necessary public review, alternative evaluation and environmental effects analysis as required by the National Environmental Policy Act (NEPA).

Logging has been shown by multiple studies to increase annosus root disease occurrence in western forests for a number of conifer species. The disease typically appears in stands several years after logging and is associated with stumps and logging wounds in remaining trees. The incidence of annosus root disease increases as logging increases for true fir and ponderosa pine stands. Logged stands have a higher occurrence of the disease than un-entered stands, and stands with a history of multiple entries have the greatest rate of infection.

Pre-commercial and commercial thinning is common in California's public forests. Yet, studies have shown it to increase the incidence of annosus root disease. Also thinning actions provide fresh stump sources and wounds to live trees from logging equipment, which can become infection courts for airborne annosus spores, and do contribute to higher rates of infection in thinned stands.

In a study of coastal British Columbia precommercial thinnings, it was suggested that the increase of H. annosum infection can be minimized by thinning before age 15, by cutting only trees less than 10 cm in diameter and by thinning during low risk seasons. The Forest Service should be requiring logging techniques that minimize accidental thinning wounds.

This pathogen can be eradicated or reduced by a couple of simple pre and post harvest techniques. One is using prescribed burns. Two pre-thin burns (one at least six months before thinning) and one or more post-thin burns will destroy reproductive basidiocarps and eliminate litter and other favorable annosus habitat and basidiocarp development environments. Prescribed fires can also start to return the forest to pre-historical natural conditions.

The second annosus eradication and reduction method is simply mechanically removing and burning stumps and attached roots in infested site. This control method seems like common sense and should be incorporated by the Forest Service.

The agency should also be wary of overusing its magic bullet. The use of Sporax in already infested stands may worsen the problem by preventing natural annosus competitors from entering stumps.

Phlebiopsis gigantea, an aggressive, highly competitive fungus is recommended as a borax alternative, as it colonizes stumps to the exclusion of the annosum root rot fungus. Phlebiopsis gigantea is incapable of causing disease in standing trees and is not regarded as hazardous to human health. It has been utilized as a biological control agent for annosum root rot for approximately 40 years in Europe. Canadian scientists have been testing P. gigantea for the same purposes and have been getting good results. In the southeast part of the US it has been shown that P. gigantea is completely effective in preventing stump colonization by H. annosum, with a cost only slightly more than that of borax. This raises the question as to why we are not using this non-toxic protection method here in California.

Streptomyces griseologalbus, an actinomycete isolated from the rhizoplane of the nitrogen-fixing nodules of a common California native, has been identified as a strong antagonist of annosus, and a possible biological control in the Pacific Northwest. Stump treatment with borax is only recommended for sites with known annosus root disease potential and where cultural control is not viable. How much cultural control is occurring in our public forests? This is where the Forest Service should be focusing its energies and not just relying on borax as a magic fix-it solution. The Forest Service needs to analyze annosus disease prevention alternatives for all relevant projects.

It is interesting to note that the only mention of the effects of Sporax on one wildlife species, the marten, was on page 69 of the Wildlife BE. The EA completely fails to analyze and disclose the effects of Sporax on any other species. Further the references in the BE and EA do not provide any quantifiable data to support the broad assumptions that Sporax application is highly unlikely to effect human health or non-target resources, such as prey species for the NSO and NGH. Further the EA contains zero analysis of how Sporax application would affect game species such as deer.

Sporax References

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Nohrstedt, H., Anders Westulund. 2000. Effects of Stump-treatment Substances for Root-rot Control on Ground Vegetation and Soil Properties in a *Picea abies* forest in Sweden. Scandinavian Journal of Forest Research.

The reference does not meet CEQ regulation §1502.21 *The incorporated material shall be cited in the statement and its content briefly described. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment.*

USDA Forest Service. Borax, Pesticide Fact Sheet. November 1995. Prepared for USFS by Information Ventures, Inc. http://infoventures.com/e-hlth/pesticide/borax.html

Smith, R.S., Jr. 1989. History of Heterobasidion annosum in Western United States. Pg. 10-16 in Proceedings of the Symposium on Research and Management of Annosus Root Disease in Western North America. GTR-PSW-116. USDA Forest Service. Pacific Southwest Forest and Range Experiment Station.

Insects And Disease

Logging spreads disease. The EA fails to analyze or mention how logging may well exasperate insect and disease.

Franklin et al. (1989)[13] discuss the importance of *ecosystem resilience*, i.e., the "ability to absorb stress or change without significant loss of function."

[13] Franklin, J.F., D.A. Perry, T.D. Schowalter, M.E. Harmon, A. McKee, and T.A. Spies. 1989. Importants of ecological diversity in maintaining long-term site productivity. Pp. 82-97 in D.A. Perry, R. Meurisse, B. Thomas, R. Miller, J. Boyle, J. Means, C.R. Perry, R.F. Powers, eds. Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems. Timber Press. Portland, Or.

They found that disease and pest problems may be worse in managed stands than in natural stands, and that thinning practices contribute to diseases such as root rot.

Certainly root disease (See also the Sporax section of these comments) attacks the trees that are under stress, and the beetles are moving in. But why, really is the Mc Cloud Flats suffering from widespread tree die-offs, when the rest of the Shasta-Trinity National Forest is not?

The Mc Cloud Flats are an early symptom of an emerging problem that is buried within a century of intensive logging in the Mc Cloud Flats, and includes assumptions made by land managers and the timber industry that are simply incorrect, and need to be abandoned. These assumptions include:

1. That logging native forests and replacing them with new genetically raised strains of pine seedlings would not weaken the forest.
2. Logging on a landscape scale can control beetle outbreaks.
3. That nature (bats, woodpeckers and spiders for example) are not better suited to fight beetle outbreaks than mankind.

There are a number of possible reasons for the beetle outbreaks including trees killed by root disease, drought, fire suppression leading to overcrowded stands and climate change. Either way, the forest is out of balance now and nature is using natural selection to weed out the genetically inferior trees, and marginal growing sites, and culling out the remaining forest to make it better able to withstand future beetle attacks. Based upon roadless area comparative studies, it is very likely that nature is attempting to re-grow a native forest here that would be in "balance" with forest pathogens and predators. Natural Selection could result in a large loss of pines, but there is no guarantee that the Forest Service can do any better. In fact logging could make matters much worse by spreading root disease while removing habitat needed by populations of natural predators who feed on wood boring insects.

Multiple studies link the occurrence of laminated root rot and annosus to logging activities in western forests (Smith 1989[14]; Goheen and Goheen 1989[15]; Filip et al. 1992[16]) found that laminated root rot predisposes Douglas firs west of the Cascades to bark beetle attack. In contrast, old-growth and unmanaged forests are less vulnerable to pest outbreaks than simplified forests created by silvicultural management.

[14] Smith, R.S., Jr. 1989. History of Heterobasidion annosum in Western United States. Pp. 10-16 in Proceedings of the Symposium on Research and Management of Annosus Root Disease (Heterobasidion annosum) in Western North America. W.J. Otrosina and R.F. Scharpf, tech. coord. USDA Forest Service General Technical Report GTR-PSW-116.

[15] Goheen, E.M. and D.J. Goheen. 1989. Losses caused by annosus root disease in Pacific Northwest forests. Pp. 66-69 in Proceedings of the Symposium on Research and Management of Annosus Root Disease (Heterobasidion annosum) in Western North America. W.J. Otrosina and R.F. Scharpf, tech. coord.

[16] Filip, G.M., C.L. Schmitt and K.P. Hosman. 1992. Effects of harvesting season and stump size on incidence of annosus root disease of true fir. Western J. of Applied Forestry 7:54-56.

Late-successional forests are those forest seral stages that include mature and old-growth age classes. One goal is to maintain late-successional and old growth species habitat and ecosystems on federal lands. Another goal of forest management on federal lands is to maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations. The intent is to maintain natural ecosystem processes such as gap dynamics, natural regeneration, pathogenic fungal activity, insect herbivory, and low-intensity fire. Biological diversity is best done by nature, logging should focus on young stands and plantations, nature will use insect outbreaks and fire to prune the forest and create diversity as long as young stands are managed properly.

Fire, wind, insects, and diseases have greatly influenced the development of Pacific Northwest forests. Fine-scale disturbances, generally by insects or diseases, cause deaths of single trees or small groups of trees which result in small patches of early-successional vegetation embedded in a larger portion of older forest. Coarse-scale disturbances, such as fire and wind, result in more extensive areas of early-successional vegetation. Many native forest organisms have adapted to these cycles and scales of disturbance and regrowth. It is important to remember that the forest evolved with insects, and in late successional reserves, insects play an important role in ensuring that there are a variety of seral stages and snags throughout the landscape over time.

Smaller scale disturbances, such as those caused by insects, diseases, and wind, create small gaps in the overstory that characterize the transition and shifting-gap stages of old-growth forest development. Tree mortality is an important and natural process within a forest ecosystem. Diseased and damaged trees and logs are key structural components of late-successional and old-growth forests. Salvage of dead trees affects the development of future stands and habitat quality for a number of organisms. Snag removal may result in long-term influences on forest stands because large snags are not produced in natural stands until trees become large and begin to die from natural mortality. Cavity-nesting birds and mammals such as woodpeckers, nuthatches, chickadees, squirrels, red tree voles, and American marten use snags extensively. Insect damaged, mistletoe and moss laden trees provide appropriate structural components in late successional forest ecosystems.

There is very little evidence that logging can control insects or disease. There are few peer-reviewed studies that have looked at this. Cronin (et al 1999) [17] had a notable quote:

"*Even more striking is the paucity of studies that have examined the consequences of human intervention on pest movement patterns. In fact, we know of no studies that have experimentally evaluated the effects of management strategies on the dispersal of insect pests in forest systems*."

[17] Cronin, J.Y., P. Turchin, J.L. Hayes and C.A. Steiner. 1999. Area-wide efficy of a localized forest pest management practice. Environmental Entomology 28(3): 496-504.

Some scientists have suggested caution in using thinning to control bark beetles as geographic and climactic variables may alter the effect. Thinned stands can exhibit a higher attraction rate of mates by males of *Ips pini*, while females had longer egg galleries, more eggs per gallery and higher egg densities. Warmer temperatures in thinned stands also contributed to a higher reproduction rate. The number of males and females setting on logs was also higher in thinned stands.

There is even less evidence that we can control insects once an outbreak starts. The weight of opinion seems to be that most control efforts to date have had little effect on the final size of outbreaks, although they may have slowed beetle progress and prolonged outbreaks in some cases.

The following paper is a compilation of summaries of over 150 scientific papers and Forest Service documents. The report may be downloaded in .pdf format from http://www.xerces.org/Forest_Pest_Myths/Logging_to_Control_Insects.htm
See Black, S.H. 2005. *Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests."* A Synthesis of Independently Reviewed Research. The Xerces Society for Invertebrate Conservation, Portland, OR.

Key findings in the report include:

· Native forest pests have been part of our forests for millennia and function as nutrient recyclers; agents of disturbance; members of food chains; and regulators of productivity, diversity, and density.
· Fire suppression and logging have led to simplified forests that may increase the risk of insect outbreaks.
· Forests with diverse tree species and age classes are less likely to develop large insect outbreaks.
· There is no evidence that logging can control bark beetles or forest defoliators once an outbreak has started.
· Although thinning has been touted as a long-term solution to controlling bark beetles, the evidence is mixed as to its effectiveness. The report also outlines general guidelines to follow when considering pest insects and forest management.

"The findings are very clear," said Scott Hoffman Black, executive director of the Xerces Society for Invertebrate Conservation and author of the report. "A review of over three hundred papers on the subject reveals that logging is not the solution to forest insect outbreaks and in the long run could increase the likelihood of epidemics."

The Forest Service should examine the relevant peer-reviewed citations regarding insects and disease contained in the Xerces Report, we highlight four papers for your consideration.

Schowater, T.D. 1990. Consequences of insects. In *Symposium Proceedings. Forests – Wild and Managed: Differences and Consequences.* January 19-20, 1990, pp. 91-106. University of British Columbia, Vancouver, BC.

Summary: Forest insects and pathogens do not threaten forest resources unless changes in forest conditions facilitate population growth. Healthy trees in diverse forests are protected from potential pests by defensive compounds that kill or deter plant-feeding pests, and by the abundance of non-hosts that increase the distance between hosts and chemically hide host trees. Contrary to numerous assertions, old-growth forests are highly productive and remarkably resistant to potential pests.

Aber, J., N. Christensen, I. Fernandez, J. Franklin, L. Hidinger, M. Hunter, J. MacMahan, D. Mladenoff, J. Pastor, D. Perry, R. Slangen, and H. van Miegroet. 2000. Applying ecological principles to management of U.S. national forests. *Issues in Ecology No. 6.* Ecological Society of America, Washington, D.C.

Summary: The authors identify major ecological considerations that should be incorporated into sound forest management policy and their potential impacts on current practice. There is no evidence to support the view that natural forests or reserves are more vulnerable to disturbances such as wildfire, windthrow, and pests than are intensively managed forests. Indeed, there is evidence natural systems may be more resistant in many cases. The spread of native and exotic pests and pathogens in many forest systems can be linked to the simplification and fragmentation of the forest. From an ecological standpoint, the strategy with the greatest probability of long-term success in protecting forests against pests and pathogens is one that encourages the maintenance of a diverse set of controls, such as occurs in nature.

Franklin, J.F., D.A. Perry, T.D. Schowalter, M.E. Harmon, A. McKee, and T.A. Spies. 1989. Importance of ecological diversity in maintaining long-term site productivity. In *Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems*, ed. By D.A. Perry, pp 82-97. Timber Press, Portland Or.

Summary: Disease and insect problems may be worse in managed stands than in natural stands. The authors suggest that old-growth forests have greater diversity of insect predators, which may in turn limit pest insect populations. They also suggest that damage by herbivorous insects could increase as the area of old-growth forests diminishes.

Schowater, T.D. 1995. Canopy arthropod communities in relation to forest age and alternative harvest practices in western Oregon. *Forest Ecology and Management* 78: 115-25.

Summary: The author compared arthropod community structure in replicate Douglas-fir and western hemlock canopies in intact old-growth stands; natural, mature stands; and regenerating plantations in western Oregon. Species diversity and abundance for several taxa, especially predators and detritivores, were significantly lower in plantations than older forests. Old-growth stands had less variability (tighter clustered) arthropod diversity

and abundance than partially harvested stands. The data suggest that Douglas-fir canopies may largely recover old-growth structure by 150 years. The author concludes that the recent conversion of large portions of old growth and mature forests to young plantations (in Oregon's Willamette National Forest) likely has reduced regional populations of many predator and detritivore species. Reduced predator diversity increases the probability that herbivores will escape regulation by predators, which could lead to a greater likelihood of pest outbreaks.

Conclusion

The majority of the project as proposed is far better than how these forested stands have been treated in the past. However to meet NEPA, LRMP standards and guidelines, the purpose and need of the project and recommendations in the Porcupine Watershed Analysis and STNF RAP, as listed in the substantive comments above, we urge project planners and the forest supervisor to consider and adopt;

1.) Thinning rather than regenerate Lodgepole and Ponderosa pine stands.
2.) Ensuring large diameter trees in the Mature Stand prescription are retained.
3.) Reducing or eliminating construction of 6 miles of new "temporary" road.
4.) Not adding more roads to the transportation system.
5.) Adequately analyzing the impacts of Sporax application.
6.) Surveying for Sensitive species.

Thank you for the opportunity to comment. Please send hard copies of future NEPA documents to our offices.

Sincerely,

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