FROM: Oregon Natural Resources Council
PO Box 11648
Eugene OR 97440

TO: Carolyn Wisdom
Silver Lake District Ranger
PO Box 129
Silver Lake OR 97638
Email: comments-pacificnorthwest-fremont-silverlake@fs.fed.us

DATE: 16 November 2003

Subject: ONRC comments on Toolbox Fire Recovery Project DEIS

Dear District Ranger Wisdom:

Please accept the following comments from Oregon Natural Resources Council (ONRC) concerning Toolbox Fire Recovery Project DEIS dated September 2003. ONRC represents over 7,000 members who support our mission to protect and restore Oregon's wildlands, wildlife, and waters as an enduring legacy. We seek to permanently protect Oregon wild forests, protect and restore essential habitat for native species, and protect and restore the Klamath Basin from the headwaters to the sea.

Though we have not yet decided whether or not to appeal, and we sincerely hope that the agency makes a sound decision that avoids the necessity of an appeal, ONRC wishes to maintain eligibility to appeal this project, so we provide the following information pursuant to 36 CFR §215.6(a)(3):

**Name and address**: Doug Heiken
Policy and Litigation Coordinator
Oregon Natural Resources Council
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**Title of the Proposed Action:** Toolbox Fire Recovery Project DEIS

**Project Description:** Preferred Alternative G includes:

- 14,419 acres of commercial salvage logging in mature native forest stands,
  - 5,795 acres of harvest in areas with less than 50% mortality;
  - 966 acres of logging in unroaded areas (3-494),
  - 415 acres of salvage in the Dead Indian Rim Bald Eagle Management Area;
  - 826 acres of salvage and hazard tree removal in riparian areas (3-278);

    - 3-10 snags per acre >10" dbh retained;
    - 311 harvest units
- 1,400 landings covering 350 acres (including 10 helicopter landings, 13 acres);
- 1300 landing piles may be burned;
- 95% ground-based logging,
- 2,100 acres of skid trails (3-249);
- 1,084 of roadside hazard tree salvage (including 216 acres in RHCAs);
- 5,596 acres of treating ¼ mile buffers between public and private property;
- yielding 73 mmbf
    - 80% Ponderosa pine;
    - equivalent to over 14,500 log trucks,
- 20,728 (of 34,000) acres replanted with conifers;
    - 3580 acres would require "site preparation" including felling snags for safety;
- 30 miles of unclassified "wheel tracks" reopened as temporary roads (3-115);
- 16 miles of new "temporary" road construction,
    - 1.6 miles of road built in unroaded areas,
    - 2.6 miles re-opened in unroaded areas, and
    - (bulldozers already built 204 miles of fire line in fighting the fire (3-11),
- net present value of negative $6 million

**Signature of Author**: _/s/ Doug Heiken_
for Oregon Natural Resources Council.
(Verification of Identity Available upon request.)

**Specific Substantive Comments and Supporting Reasons:**

1. Natural recovery through all successional stages is most likely t result in diverse complex forest conditions. Salvage logging on the other hand will remove much of the large wood which forms structures, functions, and processes that are essential to development of complex diverse forests. Aggressive tree planting will truncate successional processes. Building 16 miles of road and driving heavy equipment over 95% of over 14,000 acres will damage soil and cause soil erosion.

2. Salvage logging is not restoration. Logging and replanting will convert a structurally complex landscape into a simplified and biologically depraved landscape. Unsalvaged, naturally regenerated, young stands are one of the rarest forest types in the Pacific northwest, and their biodiversity rivals that of old-growth forests.

    > Indeed, naturally developed early-successional forest habitats, with their rich array of snags and logs and nonarborescent vegetation, are probably the scarcest habitat in the current regional [Pacific Northwest] landscape.

    Lindenmayer, David B. and Jerry F. Franklin. 2002. Conserving Forest Biodiversity: A Comprehensive Multiscale Approach. Island Press. Washington, DC: 69. *See also*, DellaSala, D.A., J.E. Williams, C. Deacon-Williams, and J.F.

Franklin. Beyond smoke and mirrors: a synthesis of fire policy and science. In review - Conservation Biology.

3. Don't call this a fire recovery project. It's a commercial extraction project, a.k.a. timber grab. If it was really a fire recovery project you would have retained far more large snags, and included post-fire livestock management in the analysis.
4. Assuming for the sake of argument that you are sincere about "recovery" and you really think that fuels loads are a problem, the Forest Service must acknowledge that there is a threshold where the largest trees that are likely to remain standing the longest, present a *de minimus* threat of fire and fuel loading, while these large trees provide tremendous value in terms of wildlife habitat and connectivity between the past and future stands. In other words, establishing a diameter limit is necessary to make your "recovery" claim even slightly credible.
5. The EIS claims to be reducing fuels and thereby protecting resources, but the risk of future fire and its consequences are speculative and uncertain (and could even be beneficial), while the loss of the many ecological, hydrological, and other values of snags and wood (through salvage logging and associated activities) is certain. However, the EIS conveys just the opposite — that losses from future fires must be avoided, while the current losses of snags from logging must be accepted. The EIS offers no justification for this value judgment.
6. The DEIS abuses the concept of historic range of variability by assuming that stand replacing fire never happened historically. The EIS assumes that the only way to reestablish "sustainable" pine forests is to reduce fuels through a massive salvage logging effort and apply prescribed fire to "thin" young pine stands. This is of course a fairy tale. Occasional stand replacing fire is a characteristic of virtually all conifer forest types. **The forests in this area of the Fremont National Forest have certainly attained high density in the past and they have certainly experienced stand replacing fires in the past, and yet they somehow re-established pine forest without human intervention.** The EIS must consider this reality-based scenario. Foresters like to think they are uniquely qualified to grow trees but nature has and will continue to do it in spite of foresters best efforts to screw things up with their hubris. The Forest Service would be well-advised to watch and learn instead of risking unknown consequences by interfering in something that they know too little about.
7. The EIS fails to accurately disclose the legal requirements that the decision-maker must follow and fails to accurately compare the alternatives to the requirements (or make unsupported conclusions concerning compliance). These legal requirements include:
    a. The LRMP requirement to maintain snag habitat throughout all seral stages (The EIS makes a completely false assertion about exceeding snag retention requirements (3-228));
    b. The INFISH prohibition on retarding attainment of RMOs;
    c. The LRMP requirements to manage for Bald eagle management areas for abundant nest/roost structures, abundant food and minimal disturbance;

d. The NFMA requirement to maintain viable populations of species;

e. Eastside screens (and DecAID) recommended levels of down wood, which the EIS admits would be violated in logged areas (3-154, 172);

f. The eastside screen requirement that "All sale activities (including … salvage) will maintain snags and green replacement trees of >21 inches dbh, (or whatever is the representative dbh of the overstory layer if it is less than 21 inches), at 100% potential population levels of primary cavity excavators. This should be determined using the best available science on species requirements as applied through current snag models or other documented procedures."

g. LRMP road density requirements.

NEPA requires disclosure of information necessary to determine compliance with legal requirements such as the Endangered Species Act, Clean Water Act, National Forest Management Act, and applicable Forest Plan Standards & Guidelines. See 40 CFR 15087.27(b)(10) and NW Indian Cemetery Protective Association v. Peterson, 795 F2d 688 (9th Circ 1986).

The Office of General Counsel agrees that project level analysis must document "Project Compliance With Other Laws."

> In addition to consistency with the LRMP each project must be in compliance with NEPA, CWA, CAA and other laws. Simply being consistent with the LRMP does not fulfill the site-specific requirements of Federal law. Project level analysis is to "determine findings for NFMA, to ensure compliance with NEPA, and to meet other appropriate laws and regulations." Forest Service Land and Resource Management Planning, FSM 1920 and Forest Service Handbook 1909.12, 5.31. 53 Fed. Reg. 26807, 26836 (July 15, 1988).

OGC, "Forest Plan and Project Level Decisionmaking— Overview of Forest Planning and Project Level Decisionmaking,"
http://www.fs.fed.us/forum/nepa/decisionm/p4.html#14

The CEQ NEPA regulations also require an analysis of legal requirements in order to determine whether an action may cause significant impacts on the environment. 40 CFR §1508.27(b)(10) ("*Significantly*, as used in NEPA, requires considerations of both context and intensity: … The following should be considered in evaluating intensity:
… Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment." *Emphasis added.*)

SAS v. Mosely 798 F.Supp. 1473 (W.D. Wash. May 1992) ("The FEIS has thus mentioned what appears to be a major consequence of the plan jeopardy to other species that live in the old growth forests without explaining the magnitude of the risk or attempting to justify a potential abandonment of conservation duties imposed by law. An EIS devoid of this information does not meet the requirements of NEPA." *Emphasis added.*)

See also, Judge King's October 2003 Decision in ONRC Action v. U.S. Forest Service, CV. 03-613-KI ("The underlying EAs for the timber sales at issue did not properly frame the Forest Service's survey and manage duties, they did not analyze a range of alternatives based upon these duties, they did not evaluate completed surveys, they did not demonstrate that the Forest Service had all of the proper information before it before allowing logging, and they did not provide for public influence over the decisions. For all of these reasons, the underlying EAs are legally deficient." *Emphasis added.*)
http://www.onrc.org/press/ONRCv.USFS.pdf

8. The preferred alternative G proposes to retain only 3-10 snags per acre. Some of these retained snags will be as small as 10 inches in diameter. Most of these will fall over quite soon. Only 7% of the retained snags (or .2 to .4 per acre) will be over 30 inches in diameter. These large snags are relatively likely to remain standing and provide long-term snag habitat. According to the Fremont LRMP and the eastside screens, habitat for cavity-dependent species must be provided for the long-term, not just for the immediate post-salvage time period. The Forest Service is not ensuring adequate snag habitat for the entire time period between the fire and the time that the next stand begins recruiting large snags and wood. The EIS admits that snag recruitment is forgone (3-170) but the analysis does not reflect this fact. The EIS implicitly assumes continuous snag recruitment, but this is clearly not possible after a stand replacing fire. Most of the smallest trees will fall down, and only the largest snags are expected to remain standing for any length of time, but even these will be grossly insufficient to meet habitat needs, this means that ALL the largest snags must be retained to help fill the expected temporal gap in snag habitat.

   The DEIS is inconsistent on this matter. The EIS both admits that snag habitat will not be provided in the long-term, while claiming that the large snags (>30" dbh) will provide long-term persistence of snag habitat. The latter claim is false and misleading. A few large snags may persist but not enough to provide "snag habitat" at levels required by the forest plan or the eastside screens. Large snags fall too, but the Forest Service cannot predict which ones, so they must protect all of the largest snags, so that some portion of them will persist and provide snag habitat.

9. The proposed salvage plan will retain a few snags per acre for cavity nesting species in an effort to meet forest plan requirements for cavity nesting birds, but the forest plan snag requirements will only be met for a decade or two until many of the snags fall. The more and larger snags retained the longer the forest plan standards will be met. The proposed action will knowingly lead to a future where the snag standards are not met. The EIS clearly states that the no action alternative is most likely to meet forest plan snag requirements for a longer time period. (3-152, 153).

10. The EIS fails to explain how the removal of large snags (those that are expected to last the longest) will comply with the forest plan duty to meet snag requirements over the long-term. The forest plan (page 104) requires that the

required snag densities be met during “each successional stage” and “retained through the full rotation.”

11. Preferred alternative G retains too few large snags to provide habitat over the long-term for cavity dependent species. All the EISs conclusions that snag habitat would be adequate must be reconsidered in light of the fact that almost all the small snags will fall down soon and too few large snags are retained to provide adequate habitat. The Forest Service *de facto* policy of ignoring the long-term snag requirements in the post-fire landscape will case many species to become non-viable.

12. The EIS makes several unsupported conclusions about the viability of cavity nesting species. The EIS admits that the preferred alternative is the least favorable toward Black-backed woodpecker and Lewis' woodpecker, yet these species will still remain (3-173). In order to make these statements, the EIS must conduct viability analysis (including a population level cumulative impacts analysis of all salvage and other proposals that affect dead wood dependent species). The findings are highly suspect for many species because the EIS admits that many snag dependent species are dependant upon the existence of unlogged post-fire conditions (3-145, 147) and these species have been harmed by past management including fire suppression, high-grading, and salvage logging (3-153), and the EIS admits that these will continue to decline due to continued fire suppression and salvage logging (3-180). How is it that these species sill remain viable if the Forest Service keeps suppressing fire and salvage logging their best habitat?

13. The EIS admits that cavity-dependent species, in order to meet cover and other biological requirements, need more snags in post-fire areas than in green stands. (3-138, 3-144). The EIS also admits that the clumping of snags and the destruction of foraging habitat around the retention clumps may greatly diminish their utility for cavity-dependent species (3-154). But the EIS does not account for these effects in its snag retention criteria. DecAID advisor certainly does not account for this because there were too few unlogged post-fire sites to meet the DecAID data standards. Bottom line: too few snags are retained to meet cavity-dependent species nesting, cover and biological needs. The table on page 3-169 becomes useless and the species viability conclusions must be amended to account for the fact that snag dependent species need more total snags and more dispersed snags in post-fire settings.

14. The EIS presents a false conflict between the habitat needs of Black-backed woodpecker and Lewis' woodpecker (3-174) and the Forest Service uses this false conflict to justify logging that favors Lewis' woodpecker. The EIS fails to recognize that there is no conflict. The apparent conflict is resolved by recognizing that these two species are temporally segregated in the post-fire recovery period. Black-backed woodpeckers appear first and use the high density stands of dead trees with bark still attached, then after many of the smallest trees have fallen yet many of the largest trees remain standing and some vegetative recovery has occurred, the Lewis' woodpecker move in and aerially forage within the more open conditions that characterize a slightly later stage of forest recovery.

15. The EIS fails to recognize the “resistance to control” is primarily an issue where firefighters are working, i.e. along likely fire lines, not within the 14,000+ acres of salvage units.
16. The alleged soil impacts of large logs that may burn if left behind are no worse (and probably much less harmful) than burning thousands of slash piles.
17. The alleged purpose and need to reduce fuels, will not be met because:
    a. Salvage logging will remove the largest least flammable trees and leave behind the smallest most flammable wood;
    b. Salvage can increase ladder fuels (3-36);
    c. Activity fuels will not be treated in the harvest units with less than 50% mortality (3-22);
    d. In planted areas outside of harvest units, site-prep includes felling, lopping, and scattering trees >9” dbh (3-85) leaving a dangerous fuel condition;
    e. 8,404 acres will retain high density clumps and moderate fuel loading under the preferred alterative (3-105). These areas are just as dangerous from a fuel perspective yet will not be “treated” at all because they are not commercially viable;
    f. Planned fuel reduction will not get done because of lack of funds. For instance, the Forest Service assumes that WTY, and YTA will reduce fuels sufficiently to avoid addition treatment of activity fuels, but if the breakage of limbs and tops is higher than expected (and it likely will be because of the brittle nature of the fire-killed trees), then additional activity fuel reduction will be needed; i.e., more fuel >> more expense >> less implementation of activity fuel reduction (3-22);
    g. Salvage areas were not strategically selected to aid fire fighting or facilitate future prescribed fire, but are mainly located where commercial sized trees are concentrated (i.e., harvest skewed to high density high mortality areas (3-253) rather than logical topographic locations that would aid future fire control efforts).
    h. The heavy conifer planting will also lead to a fire prone vegetation condition (dense vegetation close to the ground).
    i. More roads will increase the risk of human caused ignition (This fact is admitted in the EIS but not reflect in the analysis, (3-35)).
    j. The high level of human activity and the use of powered equipment will increase fire risk in the project area.
18. The purpose and need to reduce insects through salvage logging will not be met because:

a. The snags act as a host for breeding beetles for a very short period after the fire. The biggest pulse of insect activity will occur before the vast majority of the salvage logging occurs (1-16).

b. Logging will reduce habitat for birds and other species that prey upon the insects of concern. If the Forest Service removes the snags that provide habitat for these birds, then the insect problem will be worse not better. If the Forest Service would optimize insectivorous bird life, the insect problem would be managed within acceptable limits (3-144).

c. The most effective treatment for beetles is to carefully thin green stands adjacent to the fire in order to reduce competition and increase tree vigor.

d. The proposed action removes much material that is NOT at high risk of increasing beetle problems (e.g. out-year removal of big trees dead since the fire), while leaving behind a great magnitude of material that is at a higher risk of causing beetle increases (e.g. thousands of acres of stressed trees that are too small to be commercially harvested).

19. The EIS makes a false statement that the fires did not reduce beetle populations. Please explain how all the beetles survived the fires. How is this possible?

20. Tree planting should be minimized. The EIS says that planting will be "well-distributed" (3-85), which will leave a dangerous future fuel condition. Where necessary plant a variety of species at low density or in dispersed clumps. Natural regen is much more preferable, and the Forest Service must recognize the ecological value of these stands taking a slow and meandering path through the early seral stages. It is not desirable to truncate the normal successional processes by trying to artificially establish too many conifers at too high density (and with very narrow genetic bandwidth).

21. The proposed salvage logging will never meet the identified need to "reduce surface fuel loading" because salvage will remove only the boles of the largest trees on a small portion of the fire area, while leaving behind: a) all the small non-merchantable trees within salvage areas, b) all the tops and limbs within salvage areas, and c) all the dead trees in areas not subject to salvage. Leaving all this fuel behind will directly conflict with the identified need to reduce surface fuel loadings. Furthermore, the dense young conifer reprod that the Forest Service intends to establish is a fuel hazard in itself. A patchy mosaic of diverse vegetation would be much better from a fire perspective.

22. Removing all the largest trees will also conflict with the fuel reduction objective, because the largest trees are most likely to remain standing and keep the fuel off the forest floor where it s most dangerous. When the large trees do fall, then fall asynchronously so they do not present the problem of fuel pulses like the smaller trees. If the Forest Service is really concerned about "surface fuels" (page 1-9) then the largest trees are not their problem, it's the smaller trees that will fall down more synchronously during the next 10-20 years.

23. The identified “need” to reduce fuel loading in order to allow fire to be reintroduce is questionable because the Forest Service does not have any idea how to use fire to thin dense young stands as implied on page 1-3.
24. The DEIS has conflicting information on the effects of prescribed fire, saying that it is likely to both increase down wood and decrease fuel loading (3-180). The DEIS also fails to disclose that the future use of prescribed fire will consume too much down wood and fail to meet long-term objectives for large down wood. (3-172).
25. The DEIS must address the full impacts of this proposed plan for sustainable forests via prescribed fire. Long-term use of prescribed fire is a “connected action” within the meaning of NEPA and must be considered in this EIS. The Forest Service must recognize that continued livestock grazing will adversely affect it ability to implement effective prescribed fire.
26. ALL trees with ANY green needles must be retained. “Salvage” always results in the loss of live trees that are critical components of the post-fire landscape: a) live trees help provide refugia for soil organisms such as mycorrhyzal fungi that are critically important for post-fire recovery, b) live trees that survived the fire have been released from competition and will now grow to become important components of the next stand, c) when these surviving trees do eventually die they will help fill the temporal gap in snag habitat. These trees may also die in a different way so they will help provide a variety in the snag and coarse wood component of the forest.
27. Logging 5,795 acres of stands with less than 50% mortality should be reconsidered and dropped. The fire thinned the forest and generally increased the vigor of surviving trees. The EIS failed to disclose that logging, ground-based yarding, roads, skid trails, landings, etc. will damage the roots and vascular systems of surviving trees, compact and displace soil, harm the soil food web, create flammable slash, and generally screw up a pretty good thing. The fire did a lot of free restoration work. Now leave it alone.
28. Salvage logging to reduce insect attack is inappropriate because: a) some level of bark beetles are desirable to help thin adjacent forests that did not burn, b) logging can actually increase insect and disease problems by creating huge slash piles, etc.
29. The EIS fails to consider the many structures, functions and processes provided by snags and down wood. Removal of snags on 20,000+ acres will have serious impacts that go beyond woodpecker habitat to include hydrologic and soil processes that are critical to site productivity. The clumping of snags and leaving large areas almost entirely devoid of legacy structures completely fails to recognize and respect the many ecological, hydrological, soil functions and processes provided by well distributed legacy structures. For instance, the EIS analysis of the preferred alternative on pages 3-152 to 3-154 fails to adequately disclose and analyze this critically important issue and the consequences of widespread removal of large logs (except to say that logged areas would be at or <u>below</u> recommended levels of down wood). See Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber.

2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 *in* ***Wildlife-Habitat Relationships in Oregon and Washington*** (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://www.nwhi.org/nhi/whrow/chapter24cwb.pdf See also PNW Research Station, "Dead and Dying Trees: Essential for Life in the Forest," Science Findings, Nov. 1999 (http://www.fs.fed.us/pnw/sciencef/scifi20.pdf) ("Management implications: Current direction for providing wildlife habitat on public forest lands does not reflect findings from research since 1979; more snags and dead wood structures are required for foraging, denning, nesting, and roosting than previously thought.") See also:

Jennifer M. Weikel and John P. Hayes, HABITAT USE BY SNAG-ASSOCIATED SPECIES: A BIBLIOGRAPHY FOR SPECIES OCCURRING IN OREGON AND WASHINGTON, Research Contribution 33 April 2001, http://www.fsl.orst.edu/cfer/snags/bibliography.pdf; and DecAID, the Decayed Wood Advisor for Managing Snags, Partially Dead Trees, and Down Wood for Biodiversity in Forests of Washington and Oregon, http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf

30. The DEIS totally misuses the DecAID decision support tool by failing to recognize that DecAID does not consider snag fall rates over time or snag recruitment rates over time. In a post-fire landscape over time, there are high rates of snag fall, but low rates of snag recruitment. The EIS relies on DecAID to analyze impacts on snag dependent species, but the EIS fails to recognize that "DecAID is NOT: … a snag and down wood decay simulator or recruitment model [or] a wildlife population simulator or analysis of wildlife population viability. … Because DecAID is not a time-dynamic simulator … it does not account for potential temporal changes in vegetation and other environmental conditions, … DecAID could be consulted to review potential conditions <u>at specific time intervals</u> and for a specific set of conditions, but <u>dynamic changes in forest and landscape conditions would have to be modeled or evaluated outside the confines of the DecAID Advisor</u>." Marcot, B. G., K. Mellen, J. L. Ohmann, K. L. Waddell, E. A. Willhite, B. B. Hostetler, S. A. Livingston, C. Ogden, and T. Dreisbach. In prep. "DecAID -- work in progress on a decayed wood advisor for Washington and Oregon forests." Research Note PNW-RN-XXX. USDA Forest Service, Pacific Northwest Region, Portland OR. (pre-print) http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/HomePageLinks/44C813BC574BDFCC88256B3E006C63DF ("The inventory data likely do not represent recent post-fire conditions very well … young stands originating after recent wildfire are not well represented because they are an extremely small proportion of the current landscape … The dead wood summaries cannot be assumed to apply to areas that are not represented in the inventory data." "DecAID caveats" http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf).

31. Instead of using the more conservative 80% species tolerance thresholds, the EIS uses DecAID's lower 30-50% species tolerance thresholds which is totally inconsistent with the eastside screens goal of maintain 100% population potential. The fact that DecAID (and this EIS) use snags down to 10 inches in diameter to

meet snag requirements is further evidence that this tool was not designed to address post-fire situations where such small snags and logs will not persist long enough to be useful in the long term.

32. The EIS failed to consider the differing fall rates of large vs. small snags see: "Snag Dynamics in Western Oregon and Washington," Janet L. Ohmann, July 26, 2002 http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf ("Snag fall rates in undisturbed stands were substantially lower for the largest snags … These findings have several implications for planning for desired future conditions of snags. The high fall rate (almost half) of recent mortality trees needs to be considered when planning for future recruitment of snags and down wood. Trees that fall soon after death provide snag habitat only for very short periods of time or not at all … Our findings suggest that snag size (DBH) and species should be considered when identifying particular snags to retain in harvest units. The larger the snag diameter, the more likely it is to survive harvest operations and remain standing in future years. [93% of snags ≥100 cm dbh remained standing over the 10 year study period.])

33. The Fremont National Forest must prepare a new forest plan amendment to address the fact that the "population potential" methods is now discredited. For instance, secondary cavity users select snags that are more and larger snags than those selected by the primary cavity excavators that the Forest Service tends to focus on (3-144). The agencies must ensure the viability of species in light of this new information.

34. The EIS repeatedly cites the *Conservation Strategy for East-Slope Landbirds* (Altmann 2000), but the EIS completely fails to explain (3-171) why they refuse to follow the recommended biological objectives including leaving 50% of burn areas unsalvaged, retaining all snags >20 inches, retaining 50% of snags 12-20 inches, retaining 13% of the understory in shrubby conditions (3-150). The landbird strategy wisely seeks to manage post-fire landscapes to lengthen the time that stands are suitable for cavity-dependent species. This is best accomplished (possible only accomplished) by retaining all the living trees and all the largest snags.

35. The EIS also double counts retained snags by counting snags left inside the RHCAs towards it harvest unit retention goals. This is inappropriate. The forest plan (page 103) requires that snags be provided "within the harvest units." The RHCAs are a different land allocation and cannot be used to help meets goals in the other land allocations.

36. The EA also fails to say how snags in helicopter units will be retained given the likely need to cut virtually all snags for safety reasons.

37. The EIS dismisses the recommendations of the Beschta Report by saying that the authors offered no rationale for their recommendation for retaining all live trees, all large and old snags, and 50% of all smaller sized snags. Let us offer some sound rationale:

a. retaining large quantities of legacy structures will more closely match the natural historic development of post-fire landscapes.

b. retaining large numbers of standing trees will preserve an important ecological process, that is falling snags over time that will help to thin and break up the continuity of brush and other reprod.

c. retaining snags and dying trees will help provide some level of shade that will help suppress growth and break up the continuity of brush and other reprod

d. retaining large quantities of snags will help provide some hiding cover for Mule deer and elk

e. retaining large quantities of tree boles will help to retain water storage mechanisms on site.

38. We urge the Forest Service to consider an alternative modeled on the recommendations of the Beschta report. Specifically:

- prohibit post-fire logging AND roadbuilding on all sensitive sites, including: severely burned areas (areas with litter destruction), on erosive soils, on fragile soils, in roadless/unroaded areas, in riparian areas, on steep slopes, and any site where accelerated erosion is possible. We would add: Late-Successional and Riparian Reserves, and protective land allocations or designations including Botanical and Scenic River Areas;
- protect all live trees;
- protect all old snags over 150 years old;
- protect all large snags over 20 inches dbh;
- protect at least 50% of each size class of dead trees less than 20 inches dbh.

*See* Beschta RL, Frissell CA, Gresswell R, Hauer R, Karr JR, Minshall GW, Perry DA, and Rhodes JJ. 1995. Wildfire and Salvage Logging: recommendations for ecologically sound post-fire salvage logging and other post-fire treatments on Federal lands in the West. Corvallis, OR: Oregon State University. Available at: http://www.fire-ecology.org/science/Beschta_Report.pdf

39. The maps included with this EIS are inadequate. For instance, the stream names are illegible, the various cross hatchings are either illegible or do not match the key.

40. The Forest Service should delay their decision until the journal Conservation Biology publishes a special fire related issue in June 2004. The authors of the Beschta report plan to offer a peer-reviewed update to their oft-cited recommendations on post-fire logging. This should be quire relevant to your decision.

41. The EA offers no scientific support or analysis to justify dismissing the Beschta report recommendations.

42. The EIS offers no explanation of how 415 acres of salvage logging within the Dead Indian Rim Bald Eagle Management Area will meet forest plan

requirements. The forest plan requires managing for an abundance of nest and roost structures, an abundance of food, and a minimum of disturbance. Logging will remove nest and roost structures, and reduce habitat for prey/scavenge species, and logging will cause disturbance. The unsupported conclusions in the EIS (e.g., "no effect" on bald eagles, p. 3-184) must be withdrawn and the logging in the BEMA must be withdrawn.

43. The alleged risk of forest soil "lignification" is totally speculative. The EIS offers no hard data to show any future adverse effects from high tree density in the past. The forests may have been "relatively" dense for the given "site" but since these sits were dry, the density was not high in absolute terms, so there were shrubs in the species mix. Also, the future development of these stands in the future is likely to have a nice mix of species. The two biggest risks are: 1) salvage which will set back vegetative recovery, and 2) the agencies knee-jerk efforts to truncate the successional pathways and get conifer established too early and at too high density. The best thing for these soils is for them to go through a slow and natural successional pathway. Conifer planting should be done at low density and in clumps to allow grasses, forbs, and shrubs to play a big role in the early seral stages and avoid the "scourge of lignification."

44. The DEIS fails to disclose the serious adverse soil impacts caused by whole tree yarding and yarding with tops attached. The small ends of the branches of the fire kills trees will break off leaving the stubs of large branches which will act like plows raking through the fragile soils.

45. The DEIS soil discussion failed to completely describe the serious adverse effects of the proposed logging on the soil foodweb. Heavy logging equipment, roads, and the removal of trees that are no yet completely dead and some that will in fact live for years will severely harm the ongoing recovery of the soil foodweb.

    In healthy ecosystems, the soil foodweb is a tightly coupled below-ground ecosystem that directly affects many above ground processes such as succession, plant establishment and growth, and erosion and water quality.

    In a forest, this below-ground ecosystem is fed primarily by photosynthates exuded from the fine roots of trees. These photosynthates feed a plethora of bacteria and fungi species which feed thousands of arthropod and nematode species and so on. Each species fills a niche and represents both a sink and a source and of nutrients for other organisms. Logging will kill trees and cut off the supply of photosythate which forms the basis of this food web, so the tightly coupled nutrient retention systems will be disrupted, allowing nutrients to "leak" from the system. Removal of trees that are dying but not yet dead will pull the rug from under the mycorrhyzal fungi that remain in refugia near the roots of these surviving trees.

    Burning slash piles also kills the below ground ecosystem and soil compaction from road building and other heavy equipment kills or destroys habitat for many soil dwelling species and shifts the below ground ecosystem from aerobic to anaerobic.

The NEPA document fails to consider these significant effects.

> The structure and function of the soil foodweb has been suggested as a prime indicator of ecosystem health (Coleman, et al. 1992; Klopatek, et al. 1993). Measurement of disrupted soil processes, decreased bacterial or fungal activity, decreased fungal or bacterial biomass, changes in the ratio of fungal to bacterial biomass relative to expected ratios for particular ecosystems, decreases in the number or diversity of protozoa, and a change in nematode numbers, nematode community structure or maturity index, can serve to indicate a problem long before the natural vegetation is lost or human health problems occur (Bongers, 1990; Klopatek et al. 1993).
>
> Soil ecology has just begun to identify the importance of understanding soil foodweb structure and how it can control plant vegetation, and how, in turn, plant community structure affects soil organic matter quality, root exudates and therefore, alters soil foodweb structure. Since this field is relatively new, not all the relationships have been explored, nor is the fine-tuning within ecosystems well understood.
>
> Regardless, some relationships between ecosystem productivity, soil organisms, soil foodweb structure and plant community structure and dynamics are known, and can be extremely important determinants of ecosystem processes (Ingham and Thies, 1995). Alteration of the soil foodweb structure can result in sites which cannot be regenerated to conifers, even with 20 years of regeneration efforts (Perry, 1988; Colinas et al, 1993). Work in intensely disturbed forested ecosystems suggests that alteration of soil foodweb structure can alter the direction of succession. By managing foodweb structure appropriately, early stages of succession can be prolonged, or deleted (Allen and Allen, 1993). Initial data indicates that replacement of grassland with forest in normal successional sequences requires alteration of soil foodweb structure from a bacterial-dominated foodweb in grasslands to a fungal-dominated foodweb in forests (Ingham, E. et al, 1986 a, b; 1991; Ingham and Thies, 1995).
> …
> …Without doubt, plant establishment, survival and successional processes are influenced by these soil organisms
>
> Soil processes are important for maintaining normal nutrient cycling in all ecosystems (Coleman et al., 1985; Dindal 1990; Ingham, E. et al. 1986a, b). Plant growth is dependent on the microbial immobilization and soil foodweb interactions to mineralize nutrients. In undisturbed ecosystems, the processes of immobilization and mineralization are tightly coupled to plant growth but following disturbance, this coupling may be lost or reduced. Nutrients may be no longer retained within the system, causing

> problems for systems into which nutrients move (Ingham and Coleman, 1984; Hendrix et al. 1986; Nannipieri et al. 1990). Measurement of disrupted processes may allow determination of a problem long before normal cycling processes are altered, before the natural vegetation is lost, or human health problems occur. By monitoring soil organism dynamics, we can perhaps detect detrimental ecosystem changes and possibly prevent further degradation.
>
> Immobilization of nutrients in soil, i.e., retention of carbon, nitrogen, phosphorus, and many micronutrients in the horizons of soil from which plants obtain their nutrients, is a process performed by bacteria and fungi. Without these organisms present and functioning, nutrients are not retained by soil, and the ecosystem undergoes degradation. Thus, to assess the ability of an ecosystem to retain nutrients, the decomposed portion of the ecosystem, i.e., active and total fungal biomass, and active bacterial biomass must be assessed.

Ingham, Elaine, **The Soil Foodweb: It's Importance in Ecosystem Health** http://www.rain.org/~sals/ingham.html

46. The DEIS asserts that the proposed salvage activities will not prevent the attainment of the INFISH Riparian Management Objectives (RMOs), but the DEIS completely fails to address the INFISH requirement that proposed actions not "retard" attainment of RMOs. It is undisputable that ground-based logging over 13,000 acres and building 16 miles of new road will set back ongoing recovery of soil and vegetation and accelerate erosion and sedimentation, thereby retarding attainment of INFISH RMOs. The EIS on page 2-61 admits that salvage will retard recovery of deer forage species. These forage species are also required to recover soil stability, hydrologic functions, and water quality. FACT: If succession is retarded then so are RMOs. The EIS admits on page 3-252 that roads "accelerate and concentrate erosive forces." Thirty miles of re-opended "wheel tracks," 16 miles of new "temporary" roads, 1,400 acres of landings, and 2,100 acres of new skid trails will cause soil and water impacts that will certainly violate INFISH.
47. Page 3-367 admits serious fisheries impacts including decreased pool volume, impaired quality spawning habitat, and decreased rearing habitat. The EIS does not explain how these impacts are consistent with INFISH requirements.
48. The EIS analysis of unroaded areas fails to disclose the unique characters and values of each unroaded area. And the analysis fails to recognize unroaded areas as bulwarks against invasive weeds.
49. The EIS says that 80% of the unroaded areas are allocated to intensive forestry (MA-5) (3-494, 495), but this allocation is so outdated as to be meaningless. If the Fremont National Forest followed it's forest plan in this regard it would be violation of NFMA's species viability requirement, the Clean Water Act, and others.

50. The roadless/unroaded analysis fails to disclose and consider the significant value of natural recovery in unroaded areas. Natural recovery will be more diverse and complex and result in actual diverse forest conditions, whereas heavy salvage and loss of hazard trees will result in uniform, dense, stands that resemble plantations tree farms. The EIS also failed to consider a non-commercial alternative for unroaded areas (such as removing only small fuels).

51. The DEIS would allow later contractors to make highly subjective decision whether to log old-growth trees based on whether they had >20% "bright green" canopy. Does this mean that more green trees get cut on overcast days when the bright green canopy is less pronounced? This is unacceptable. ALL green trees with ANY green needles must be retained to provide for soil and wildlife needs.

52. Large trees that were damaged by the fire but not killed by the fire are more likely to survive. See Donald W. Scott, Craig L. Schmitt, Lia Spiegel; *Factors Affecting Survival of Fire Injured Trees: A Rating System For Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains*; Blue Mountains Pest Management Service Center; La Grande, Oregon 97850; November 25, 2002; Report No. BMPMSC-03-01. http://www.fs.fed.us/r6/malheur/easy/deis/app_b.pdf The DEIS (3-81) fails to consider the higher survivability of the larger trees, the increase ecological value of the larger trees, and failed to consider an alternative that would selectively retain these large fire-damaged trees.

53. The wildlife "issue indicators" used in the EIS (p 2-7) are inadequate because they focus too much on a few thousand acres of inadequately "identified" woodpecker habitat, rather than focusing on the total breadth of impacts to snag-dependant wildlife.

54. The EIS analysis of cavity-dependent species is based on the amount of identified optimal habitat for various cavity dependent species, but the EIS admits that not all optimal habitat has been identified (3-143) so the effects analysis is not accurate or credible. For instance, only 900 of 4,938 acres of optimal habitat for Lewis' woodpecker was identified and another 3,000+ acres of suboptimal habitat exists as well.

55. We object to non-commercial felling snags to facilitate planting. This will only simplify the future forest and retard or prevent the development of complex old growth forests. If planting must be done, it should be done as soon as possible before snags have decayed to the point of being hazardous.

56. The EIS fails to explain why its acceptable to expose snag fellers to the hazard of danger trees, but not acceptable to expose tree planters to that same hazard.

57. Roadside hazard trees must be specifically focused on small trees that are most likely to fall the soonest and on trees that are obviously leaning toward the road.

58. Roadside hazard in RHCAs must retain all the large material to meet RMOs in the long term. The EIS fails to disclose how RMOs will be met in the long-term if the largest trees that will last the longest are removed.

59. The EIS is inconsistent about how will be selected for retention. The EIS claims that trees will be the largest available, representative of the stand, clumped, and clumped around pre-fire snags (3-141). It is not possible to simultaneously meet all these selection criteria.

60. The EIS is inconsistent in how it addressees "long-term sustainability." The EIS claims that removal of large fuels is requires to facilitate future use of prescribed fire, however, many areas will not be treated. Are these areas unsustainable? How can the Forest Service approve such an uncoordinated combination of allegedly sustainable and "unsustaintable" forest conditions.

61. The EIS fails to acknowledge that dense uniform plantations are not sustainable. They require a huge input of effort and investment in order to re-establish some of the complexity that is being removed through this proposed salvage operation.

62. "Pile only" as a "final treatment" for activity fuels as contemplated on page 2-19 of the EIS is contrary to the fuel reduction purpose for this project.

63. Locations of temporary roads must be spelled out in the EIS. The EIS says that they will be located later based on contract negotiations. This violates NEPA.

64. The EIS fails to disclose whether the temporary roads will be built, used, and fully decommissioned within one operating season. If they will be left open over a winter then they are semi-permanent roads with completely different impacts in terms of soil, hydrology, and water quality and the EIS fails to disclose those impacts.

65. The ¼ mile fuel treatments between public and private lands should be reconsidered. The agency is dramatically underfunded to do fuel reduction work to protect homes and communities. The agency should not be spending its limited resources to "protect" uninhabited private property using techniques that are highly unlikely to be ultimately successful. These property boundaries do not make logical fire breaks. Fires will follow topography, wind, and weather to burn across these artificial property boundaries. Depending on wind direction and topography, fires are often much more likely to move from private to public, so why should the entire swath of habitat modification be on public land? Why not make the private landowners take responsibility for preventing fires from escaping to public land.

66. The EIS admits that prescribed fire will reduce cover for Mule deer but the EIS fails to admit that salvage logging will do the same thing. The fire has reduced deer cover, but the dead and dying trees provide some cover that the Forest Service completely discounts. The forest plan should not be amended to allow the Forest Service to take too many big trees and violate the forest plan.

67. The EIS analysis of "resistance to control" focused only on the areas treated. The EIS failed to consider the landscape perspective. What about the other 30,000 acres of National Forest land that was burned and will not be treated? What about all the many logical fire control points across the Fremont National Forest that are not begin treated?

68. The EIS failed to display the tolerance levels for cavity nesters provided by the no action alternative. (Similar to the alt G chart on page 3-169.)

69. The post-fire landscape should be a pocket of snag abundance and large fire sites like this one (if left unlogged) would be an important "source" area for maintaining viable populations of snag dependant species (p 3-145). The salvage logging operation will reduce snags to the point that the vast majority of the project area is below the 30% tolerance level for snag species. (3-169).

70. The EIS admits that areas salvage logged are often below historic range of variability for snags. (3-138). This salvage logging project is inconsistent with the eastside screens and will prevent the maintenance of viable populations of snag and down wood dependent species.

71. The proposed logging, yarding, road building, pile burning, log hauling, on the proposed scale will certainly cause water quality problems in violation on INFISH and the Clean Water Act and state implementation programs.

72. The Fuel models used in the DEIS do not appear to account for the relatively high rates of decay rates of the most hazardous small fuels. (3-6).

73. The DEIS used the BEHAVE fire behavior model but used inappropriate assumptions such as: calm winds (failed to account for wind gusts or plausibly windy summer conditions), no multiple fire starts (failed to account for the dry lightning that started the Toolbox, Silver, Winter fire complex), average fuel moisture levels (failed to account for future droughts and late summer/early fall conditions), average slopes (failed to account for variable topography), constant response times (failed to account for unroaded areas), uniform and constant fuel bed (failed to account for realistic patchy fuel conditions), etc (3-8, 9).

74. The DEIS admits that the fuel models are "conjecture" (3-11), "extremely variable" and "dynamic" (3-18). In other words the no action alternative may not be so bad.

75. The EIS is biased against the no action alternative.

    a. The DEIS claims that ZERO acres will become LOS under the no action alternative (3-105).

    b. The DEIS claims that 20,000 acres will become non-forested under the no action alternative (3-105).

    c. The EIS claims the no action alternative is least desirable from a fire perspective even though it admits that tree boles are generally "unavailable to burn" (3-11) and high mortality areas have little or no fine fuels and "offer the least resistance to control" (3-17).

    d. Page 3-20 implies that under the no action alternative decay of down wood does not start until year 50. This is ridiculous.

    e. The DEIS also claims that fuels resulting from snags felled for safety as site-prep for tree planting need not be treated because they will shatter upon falling and the smaller pieces will decay at an accelerated rate (3-

103), however the EIS fails to admit that snags that fall under the no action alternative would have a similar fate, so they would remain intact and create a fire hazard.

f. Another bias against the no action alternative is that under the action alternatives prescribed fire will retain “large logs” (3-28), but under the no action alternative large logs would burn hot killing “all trees” and “sterilize the soil.” (3-102). Why not consider the possibility that “good fires” could occur under no action, or al least consider that a less aggressive salvage alternative could allow the Forest Service to retain more large snags. Also, why not consider the more significant loss of site productivity under roads, skid trails, landings, and burned slash piles?

g. Another bias is that the EIS says that almost all the big trees that survived the fire in the low mortality area will die in the years to come. (3-82, 83). Ands the EIS says that the partially burned areas (1-50% mortality) are in the “worst condition to achieve LOS.” (3-102). This is an absurdly pessimistic prediction.

76. The EIS discloses that the preferred alternative presents a HIGH RISK of spreading weeds (3-471), but the EIS fails to disclose the significant long-term negative effects on native ecosystems and site productivity.

77. The DEIS says that the fuel loads would be at their maximum in 10-12 years (3-17), this implies that the smaller trees (those likely to fall soonest) are the real fuel problem, so why is the EIS focused on removing mostly the largest trees (many of which will in fact remain standing beyond the 10 year fuel peak) and leaving all the small non-merchantable trees behind.

78. the Forest Service is arbitrary and capricious to acknowledge that past fire suppression and salvage are a big part of the problem and at the same time assume they will continue. The Forest Service must do a comprehensive programmatic EIS to explain the dire consequences of this sad and irresponsible scenario. Where’s the comprehensive Fremont fire plan?

79. The EIS fuel evaluation criteria failed to account for the size of the fuels. Fuel treatment is triggered at 20 tons per acre regardless of the size or arrangement of the fuels. The EIS concludes that high fuel loads are bad and must be avoided even if those fuel loads are mostly in the form of large standing snags that do not contribute to high flame lengths and rate of spread.

80. Important mitigation efforts (especially fuel reduction) are contingent upon funds and funds will likely not be available, therefore the EIS analysis fails to disclose the likely consequences of the proposed action. The Forest Service naively assumes that funds will be available (3-26). Please provide a through analysis of this issue. The EIS admits that fuel hazards will be at elevated levels in the period between harvest and fuel reduction (3-22), however the EIS fails to disclose the consequences if funds are not available and fuel reduction is not implemented.

81. The DEIS claims that firefighter and worker safety is paramount (and we agree) but we also recognize (and the Forest Service does not) that there is a choice

whether to send firefighters into an area. If we want to protect soil and water and wildlife habitat we can, all we have to do it keep workers out of dangerous situations. In other words, we have choice about whether expose workers to these risks, but soil degradation should not be an option. The Forest Service would be better stewards if they would assign soil, water, and wildlife to a more important place in its institutional priorities.

82. The EIS has a grossly inadequate analysis of short-term uses and long-term productivity (3-520). This is a significant issue in salvage proposals.

83. The Forest Service in concerned about alleged loses of long-term site productivity from hot fire that may occur in concentrated log piles, but the Forest Service is apparently not concerned about loses of long-term site productivity from roads, landings, skid trails, and burning slash piles. Please explain why one is more of a concern. Please account for and compare the acres of each condition on long-term site productivity.

84. The rosy scenario for long-term sustainable forests under the action alternatives is totally dependent upon the availability of funds for PCT and/or prescribed fire. However, PCT and other stocking control will probably not get done. The Forest Service must disclose and consider the fact that TSI needs are trending up, while the TSI accomplishment is trending down. See Powell, David C.; Rockwell,Victoria A.;Townsley, John J.; Booser, Joanna; Bulkin, Stephen P.; Martin,Thomas H.; Obedzinski, Bob; Zensen, Fred. 2001. Forest density management: recent history and trends for the Pacific Northwest Region. Technical Publication R6-NR-TM-TP-05-01. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 22 p. What are the implications for this project?

85. The 30 miles of “wheel tracks” that will be re-opened must be more fully disclosed and analyzed. These tracks were not constructed with environmental considerations in mind and may be located in RHCAs. The EIS does not disclose these issues.

86. The EIS says that rapid recovery of vegetation will help limit erosion and sediment (3-244), but the EIS fails to adequately disclose the consequences of salvage will set-back vegetative recovery that has already started.

87. The WEPP erosion model used in the EIS uses several overly optimistic assumptions, such as: a) uniform low severity fire effects, b) 35-65% ground cover, c) 75% of groun cover survives logging (3-245, 249). These assumptions are not supported by the facts on the ground (the fire was intense in many places and salvage will reduce ground cover). The analysis must be redone. The likely result is unacceptable erosion and sediment from salvage logging and associated activities. In general, the WEPP model is not well-suited to analysis of post-fire soil erosion.

88. The EIS also assumes that intact riparian areas will help filter sediment before it reaches streams (3-297). The fire reduced vegetation and soil litter in riparian

areas (3-266) to the extent that it does not fulfill this filtering function. The analysis must be redone.

89. Redband trout are designated both sensitive species and management indicator species (3-261, 263), but the EIS lacks disclosure of monitoring data to show that salvage logging on this scale is consistent with long-term viability of this species.

90. The EIS discloses that two streams are 303(d) listed for temperature (3-266) but the EIS fails to disclose that increased sediment can change the shape of stream channels (filling pools and making streams wider and shallower) and cause temperature increases.

91. The EIS has conflicting disclosures about sediment production from the project. Page 3-271 discloses that there is a .2 tons per acre net "loss" of sediment form roads. Pages 3-278, and 3-288 claim that sediment "gains" from road improvements and decommissioning outweigh "losses."

92. 45-90% of the subwatersheds in the project area are located in the road-on-snow zone (3-294). The EIS analysis of cumulative watershed effects fails to consider that the presence of relatively abundant unsalvaged down logs provides beneficial structure (e.g., natural "drift fences," wells, traps, and terraces, that trap and hold snow) as well as thermal buffering that would slow water runoff during rain-on-snow events. Large scale salvage logging will have significant CWE not disclosed in the EIS.

93. There are particularly significant cumulative watershed risks in Lower Duncan Creek, Upper Silver Creek, and West Fork Silver Creek (3-296, 318, 348, 356), but these risk are not mitigated except through BMPs. This is not enough.

94. The EIS claims that BMPs will be followed, but the rush to get logs out before they decay will cause the Forest Service to allow contractors to operate outside of the normal operating season causing increased fire risk (during fire season), and increased erosion and sedimentation (during the wet season).

95. The EIS never adequately addresses the actual impact of log hauling and road use. The project will require almost 15,000 fully loaded log trucks and untold other vehicle trips. There are almost 20 miles of open roads located within 300 feet of streams. The EIS does not disclose how many vehicle trips will occur on how many miles of these riparian roads during what season but these are important facts to know. The soil and water quality impacts are significant.

96. The preferred alternative will violate LRMP road density requirements (2.5 miles per square mile) in several ways:

    a. With 37.4 miles of roads "added" to the system to facilitate implementation of log removal, road density will increase to 4.18 miles/mile$^2$ (3-278).

    b. Benny sub-basin will have 3.08 miles/mile$^2$ (3-307);

    c. East Duncan sub-basin will have 3.36 miles/mile$^2$ (3-314);

    d. Thompson Reservoir sub-basin will have 3.7 miles/mile$^2$ (3-337);

e. Upper Duncan sub-basin will have 3.42 miles/mile$^2$ (3-344);

f. Upper Silver sub-basin will have 3.23 miles/mile$^2$ (3-352);

g. West Fork Silver sub-basin will have 3.02 miles/mile$^2$ (3-363);

h. The entire project area will have 2.56 miles/mile$^2$ (3-368)

97. The EIS described a "Road Impact Index" (i.e. road density X stream crossings) and "drainage network efficiency" analysis that "will be" done, but we could not find this in the EIS. These analyses would be useful to the public and the decision-maker.

98. Field surveys for sensitive plants took place on one day and failed to visit all potential habitat sites.

99. The Forest Service must survey and protect habitat for *Illiamna Bakeri* (Baker's globe mallow) which is a rare species associated with large burn areas in pine ecosystems. The EIS claims that impacts are mitigated by the fact that the species has been found after salvage in other areas (3-448, 460), but this analysis fails in several respects. The Forest Service fails to disclose whether the other occupied sites were disturbed by salvage or not. The Forest Service also fails to provide a comparative analysis of whether the plant might have been more abundant if left unsalvaged.

100. The EIS discloses that the preferred alternative presents a HIGH RISK of spreading weeds (3-471), but the EIS fails to disclose the significant long-term negative effects on native ecosystems.

Sincerely,

/s/

Doug Heiken

Enclosed: Other relevant considerations and background information

Other relevant considerations and background information concerning salvage logging:

## SNAGS, DECAYED WOOD AND ASSOCIATED FUNCTIONS AND SPECIES

Bats, martens, woodpeckers, bears, and many other species are dependant upon snags and down wood. Snags and down wood also serve several crucial ecosystem functions. Current direction for protecting and providing snags and down wood does not ensure the continued operation of these ecosystem functions or meet the needs of the many species associated with this unique and valuable habitat component. Please use the DecAID decision support tool and consider all the many values of snags and down wood presented in Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 *in* ***Wildlife-Habitat Relationships in Oregon and Washington*** (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://www.nwhi.org/nhi/whrow/chapter24cwb.pdf

### Introduction

Decaying wood has become a major conservation issue in managed forest ecosystems.[16, 64, 69a, 149, 201] Of particular interest to wildlife scientists, foresters, and managers are the roles of wood decay in the diversity and distribution of native fauna, and ecosystem processes. Numerous wildlife functions are attributed to decaying wood as a source of food, nutrients, and cover for organisms at numerous trophic levels.[231, 232, 234, 346, 369] Principles of long- term productivity and sustainable forestry include decaying wood as a key feature of productive and resilient ecosystems.[10, 229, 291, 293, 386] In addition to a growing appreciation of the aesthetic, spiritual, and recreational values of forests, society increasingly recognizes ecosystem services of forests as resource .capital. with tangible economic value to humansy, such as air and water quality, flood control, and climate modification.[15, 262, 290]

The ecological importance of decaying wood is especially evident in coniferous forests of the Pacific Northwest. In this region, the abundance of large decaying wood is a defining feature of forest ecosystems, and a key factor in ecosystem diversity and productivity.[127] … Large accumulations of decaying wood provide wildlife habitat and influence basic ecosystem processes such as soil development and productivity, nutrient immobilization and mineralization, and nitrogen fixation.[85, 115, 218, 233] …

…

Since the publication of Thomas et al.[369] and Brown,[48] new research has indicated that more snags and large down wood are needed to provide for the needs of fish, wildlife, and other ecosystem functions than was previously recommended by forest management guidelines in Washington and Oregon. For example, the density of cavity trees selected and used by cavity-nesters is higher than provided for in current management guidelines.[53, 102] …

…

### Ecological Functions of Decaying Wood

…

Recent significant advancements have defined wildlife species-specific relationships with particular characteristics and components of decaying trees, both standing and fallen,[56, 95, 185, 284, 351, 373, 386, 402] and implications for management.[13, 68, 223, 226, 250, 327] …

…
Hollow trees larger than 20 inches (51 cm) in diameter at breast height (dbh) are the most valuable for denning, shelter, roosting, and hunting by a wide range of animals.[7], **…**
…
… In the Interior Columbia Basin, grand fir and western larch form the best hollow trees for wildlife uses. …
…
Recent studies have provided valuable insight on wildlife uses of snags (dead trees).[21, 56, 314, 402] Snags provide essential habitat features for many wildlife species (Figure 6). The abundance of cavity-using species is directly related to the presence or absence of suitable cavity trees. Habitat suitability for cavity-users is influenced by the size (diameter and height), abundance, density, distribution, species, and decay characteristics of snags.[307] In addition, the structural condition of surrounding vegetation determines foraging opportunities.[402]

The Habitat Elements matrix on the CD-ROM with this book lists a total of 96 wildlife species associated with snags in forest (93 species) or grassland /shrubland (47 species) environments. Most of these species use snags in both environments. In forests, this includes 4 amphibian, 63 bird, and 26 mammal species. Additionally, 51 wildlife species are associated with tree cavities, 45 with dead parts of live trees, 33 with remnant or legacy trees (which may have dead parts), 28 with hollow living trees, 21 with bark crevices, and 18 with trees having mistletoe or witch's brooms. Habitat uses include nesting, roosting, preening, foraging, perching, courtship, drumming, and hibernating (Figure 7).

Of the 93 wildlife species associated with snags in forest environments, 21 are associated with hard snags (Stages 1 and 2), 20 with moderately decayed snags (Stage 3), and 6 with soft snags (Stages 4-5) in the five-stage classification system. According to the matrixes,188 most snag-using wildlife species are associated with snags >14.2 inches (36 cm) diameter at breast height (dbh), and about a third of these species use snags >29.1 inches (74 cm) dbh.

This query of the Habitat Elements matrix illustrates the breadth of updated information about wildlife and snag habitat relations. Research results have expanded the number and variety of decaying wood categories over what was previously presented in Thomas[366] and Brown.[48]
…
. Down Woody Material (logs). Down wood affords a diversity of habitat functions for wildlife, including foraging sites, hiding and thermal cover, denning, nesting, travel corridors, and vantage points for predator avoidance.[56, 64, 230] Larger down wood (diameter and length) generally has more potential uses as wildlife habitat. Large diameter logs, especially hollow ones are used by vertebrates for hiding and denning structures.[214, 230] …
…
**Long term Productivity**

… Processes that sustain the long- term productivity of ecosystems have become the centerpiece of new directives in ecosystem management and sustainable forestry.[78, 229, 291, 320] Given the key role of decaying wood in long-term productivity of forest ecosystems in the Pacific Northwest,[122, 169, 261, 302] the topic should remain of keen interest to scientists and managers during the coming decade.[149] …

**Nutrient Cycling and Soil Fertility.** Decaying wood has been likened to a savings account for nutrients and organic matter,[376] and has also been described as a short-term sink, but a long-term source of nutrients in forest ecosystems.[164] …

… Substantial amounts of nitrogen are returned to the soil from coarse wood inputs, yet even where annual rates of wood input are high, 4 to 15 times more nitrogen is returned to the forest floor from foliage than from large wood.[164] …

… The low nutrient content in wood, small mass of tree boles relative to foliar litterfall, and slow rates of wood decay suggest that large wood plays a minor role in forest nutrition.[18, 159, 162] After large scale disturbance such as fire and blowdown, however, the large nutrient pool stored in woody structures of trees (bole, branches, twigs, roots) becomes available to the regrowing forest. Large down wood may thus be an ample source of nutrients throughout secondary succession.[281]
…
Recent studies indicate that wood may release nutrients more rapidly than previously thought through a variety of decay mechanisms mediated by means other than microbial decomposers, i.e. fungal sporocarps, mycorrhizae and roots, leaching, fragmentation, and insects.[107, 158, 159, 162, 339, 405] …

Soil is the foundation of the forest ecosystem.[68, 348] … On the H. J. Andrews Experimental Forest of western Oregon, 20-30% of the soil volume consists of decaying wood dispersed throughout a matrix of litter and duff.[294] Because wood is a relatively inert substance, it may help to stabilize pools of organic matter in forests by slowing soil processes and buffering against rapid changes in soil chemistry. …
…
… Numerous studies have demonstrated that losses in soil productivity often are closely linked to losses in soil organic matter.[298]
…

**Mass Wasting and Surface Erosion.** … Large wood helps to anchor snowpacks, limit the extent of snow avalanches, and may even stabilize debris flows, depending on the depth of the unstable area.[125, 356, 358] … By covering soil surfaces and dissipating energy in flowing and splashing water, logs and other forms of coarse wood significantly reduce erosion.[357] Large trees lying along contours reduce erosion by forming a barrier to creeping and raveling soils, especially on steep terrain. Material deposited on the upslope side of fallen logs absorbs moisture and creates favorable substrates for plants that stabilize soil and reduce runoff.[230]

**Stand Regeneration and Ecosystem Succession.** Decomposing wood serves as a superior seed bed for some plants because of accumulated nutrients and water, accelerated soil development, reduced erosion, and lower competition from mosses and herbs.[160, 376] In the Pacific Northwest, decaying wood influences forest succession by serving as nursery sites for shade-tolerant species such as western hemlock, the climax species in moist Douglas- fir habitat.[80, 123, 160, 163, 244] Wood that covers the forest floor also modifies plant establishment by inhibiting plant growth, and by altering physical, microclimatic, and biological properties of the underlying soil. For example, elevated levels of nitrogen fixation in *Ceanothus velutinus* and red alder[35, 88] have been reported under old logs.

**Streams and Riparian Forests.** Long-term productivity in streams and riparian areas is closely linked to nutrient inputs, to attributes of channel morphology, and to flow dynamics created by decaying wood.[144, 233, 360] …

Large wood is the principal factor determining the productivity of aquatic habitats in low- and mid-order forested streams.[262] Large wood stabilizes small streams by dissipating energy, protecting streambanks, regulating the distribution and temporal stability of fast-water erosional areas and slow-water depositional sites, shaping channel morphology by routing sediment and water, and by providing substrate for biological activity.361 The influence of large wood on energy dissipation in streams influences virtually all aspects of ecological processes in aquatic environments, and is responsible for much of the habitat diversity in stream and riparian ecosystems.[262, 376]

**Key Ecological Functions of Wildlife Species Associated With Decaying Wood**

…

Various symbiotic relations can be described for the 96 snag-associated species. Sixteen species are primary cavity excavators and 35 are secondary cavity users; 8 are primary burrow excavators and 11 are secondary burrow users; 5 are primary terrestrial runway excavators and 6 are secondary runway users. Nine snag-associated species create nesting or denning structures and 8 use created structures. Sixteen species might influence vertebrate population dynamics and 22 might influence invertebrate population dynamics. Snag-associated species also contribute to dispersal of other organisms including seeds and fruits (21 snag-associated wildlife species perform this function), invertebrates (8 species), plants (8 species), fungi (2 species), and lichens (1 species). Six snag-associated species can improve soil structure and aeration through digging, 2 species fragment standing wood, and 2 species fragment down wood. One snag-associated species creates snags, and at least 1 can alter vegetation structure and succession through herbivory.

…

… both snag- and down wood-associated wildlife more or less equally participate in dispersal of seeds and fruits (although the particular species they disperse may differ); however, snag- associated wildlife play a greater role in dispersal of invertebrates and plants, and down wood-associated wildlife play a greater role in dispersal of fungi and lichens. Down wood-associated species might contribute more to improving soil structure and aeration through digging, and to fragmenting wood. This is one example of the far greater differentiating power afforded by a well-constructed set of matrixes than was previously available in Thomas [366] and Brown.[48] …

…

**Fire Suppression.** In the eastern Cascades and through much of the intermountain area, extensive forest insect and disease problems have resulted from decades of fire suppression in combination with selective harvesting of pines.[177, 194, 236, 401, 403] An analysis of landscape dynamics in the Interior Columbia River Basin[302, 379] revealed that fire suppression resulted in a decreased abundance of large- diameter trees, and caused fuel accumulations that predisposed forests to stand-replacement fires**.** As mentioned previously, more intense fires not only consume more wood, but can inhibit wood decay by reducing nitrogen availability (and other elements) through volatilization and leaching, especially for wood in close association with the soil.[245] Wood decay in post-fire regenerating forests also may be exacerbated by a decline in symbiotic nitrogen-fixing plant species in stands subject to prolonged fire suppression.[169]

…

**Management Considerations Management Ramifications of Snag and Down Wood Abundance**

…
… The apparent dearth of large snags in Ponderosa pine may mean lower suitability for the 54 wildlife species associated with large snags (20+ in or 51+ cm dbh) in that wildlife habitat. Intensive forest management activities that have decreased the density of large snags in early forest successional stages (sapling/pole and small tree stages) may have had adverse impacts on the 61 associated wildlife species (Figure 12). Similarly, the lesser amount of large down wood in early forest successional stages may not provide as well for the 24 associated wildlife species. Such results suggest the continuing need for specific management guidelines to provide large standing and down dead wood in all successional stages.
…
**Depletion of Large Wood.** The loss of large wood structures has numerous potential impacts on ecological functions of forests, although available information is inadequate for a definitive assessment. The lack of large logs on steep slopes can decrease water percolation into soil, impair slope stability, accelerate soil erosion and sediment input to streams, and increase nutrient losses in litter.[164, 358, 359, 360, 361] Some data support a linkage between intensive management (especially depletion of decaying wood) and reduced forest biomass productivity, particularly on less productive sites. Lower productivity is attributed to nutrient losses from managed forests, reduced nutrient availability in older stands, and decreased nutrient storage, particularly in the soil.[272, 383, 384] Depletion of soil organic matter has been cited as a primary factor contributing to declining forest productivity and biodiversity in the Pacific Northwest and elsewhere.[17, 137, 198, 199, 228, 292, 293, 298, 299]
…
**Riparian Forests.** … Far-reaching effects of the absence of large wood structures in streams include: 1) simplification of channel morphology, 2) increased bank erosion, 3) increased sediment export and decreased nutrient retention, 4) loss of habitats associated with diversity in cover, hydrologic patterns, and sediment retention.[33, 144, 262] In coastal environments and estuaries, the loss of large wood may disrupt trophic webs and alter coastal sediment dynamics.[233]
…
**Lessons Learned During the Last Fifteen Years**
…
Several major lessons have been learned in the period 1979-1999 that have tested critical assumptions of these earlier management advisory models:

- Calculations of numbers of snags required by woodpeckers based on assessing their .biological potential. (that is, summing numbers of snags used per pair, accounting for unused snags, and extrapolating snag numbers based on population density) is a flawed technique. Empirical studies are suggesting that snag numbers in areas used and selected by some wildlife species are far higher than those calculated by this technique.[226]
- Setting a goal of 40% of habitat capability for primary excavators, mainly woodpeckers,[369] is likely to be insufficient for maintaining viable populations.
- Numbers and sizes (dbh) of snags used and selected by secondary cavity-nesters often exceed those of primary cavity excavators.
- Clumping of snags and down wood may be a natural pattern, and clumps may be selected by some species, so that providing only even distributions may be insufficient to meet all species needs.
- Other forms of decaying wood, including hollow trees, natural tree cavities, peeling bark, and dead parts of live trees, as well as fungi and mistletoe associated with wood decay, all provide resources for wildlife, and should be considered along with snags and down wood in management guidelines.

**.** The ecological roles played by wildlife associated with decaying wood extend well beyond those structures per se, and can be significant factors influencing community diversity and ecosystem processes.

We have also learned that managing forests with decay processes should be done as part of a broader management approach to stand development, with attention paid to retaining legacies of large trees and decaying wood from original or prior stands. Further lessons have been learned in the area of technical and operational developments; some of these are discussed below.

…

… Studies suggest that wood habitat structures function best for wildlife when they are broadly distributed as well as occurring in locally- dense clumps, such as with scattered snag or down wood patches. …

…

… A new modeling tool named DecAID is available to assist with this task. DecAID (as in .decayed. or .decay aid.) is a new Decayed Wood Advisory Model being developed to address some of the recent lessons learned.226, 247 DecAID is based on a thorough review of literature, available research and inventory data, and expert judgement. It broadens the paradigm for wildlife species and habitat assessment by considering the key ecological functions of wildlife (see below) as well as the ecosystem context of wood decay in terms of secondary effects on forest productivity, fire, pest insects, and diseases.

…

The manager will be able to use DecAID for advice on the following topics by first specifying wildlife habitat, structural stage, and statistical (confidence) level: 1) wildlife species associated with particular sizes and densities of snags and down wood, or, conversely, the sizes and densities required to meet specified wildlife management objectives, at three levels of confidence; 2) the array of key ecological functions of wildlife associated with decaying wood; 3) the recent-historic and current range of natural conditions of snags and fallen trees; 4) advice on fire risk assessment and mitigation; 5) advice on the roles of insects and diseases associated with various amounts of decaying wood; 6) and the influence of the abundance of decaying wood on ecosystem processes and productivity.

…

**Management Tools and Opportunities**

…

… In young stands, Franklin[122] recommends that management should:

1. Aggressively create stands of mixed composition to maintain habitat for a broad array of species (and to achieve diversity in quality and timing of nutrient inputs to streams).
2. Delay the process of early canopy closure (wide spacings, pre-commercial thinning etc.).
3. Provide for adequate amounts and a continuous supply of large wood, including snags and down logs, for maintaining structural diversity in forests and streams and maintaining all other ecosystem processes associated with wood.

The basic theme of these revisions of intensive forestry practices is to retain the higher levels of complexity found in natural forests, and in so doing, to protect processes and structures that retain future options for ecosystem management. …

…

> … Retention of snags provides numerous habitat benefits.[154, 239, 402] However, safety and liability issues associated with snag retention have posed an operational barrier to management objectives for structural retention. Two approaches useful in reducing hazards associated with snags are: 1) to cluster snags in patches rather than wide dispersal, and 2) to create snags from green trees after cutting.[122]

… Managers must also consider the temporal dimension to decaying wood, to ensure that sufficient sufficient snag and down wood densities are provided through time. …

**Live (Green) Tree Retention.** Retention of living trees on cutover areas is one form of structural retention that can provide for future recruitment of snags and down wood …

> Green trees function as a refugium of biodiversity in forests. For example, many species of invertebrate fauna in soil, stem, and canopy habitats of old-growth forests do not disperse well, and thus, do not readily recolonize clear-cut areas.[207, 326] The same concept holds for many mycorrhizae-forming fungal species.[293] Added benefits of green tree retention include moderated microclimates of the cutover area, which may increase seedling survival, reduce additional losses of biodiversity on stressed sites,[293] and facilitate movement of organisms through cutover patches of the landscape. Green trees retained across harvest cycles can also be used to grow very large trees for either ecologic or economic goals. …

Green tree retention offers many benefits to wildlife. For example, the higher structural diversity in young stands that contain legacy trees from previous stands provides much improved habitat values to late successional species such as the northern spotted owl, as well as other vertebrates that use late-successional stands for some elements of their life history.[69, 122, 314] Such stands may provide wildlife habitat as early as age 70-80 years rather than 200-300 years, the approximate time interval required for old-growth conditions to develop after secondary succession. …

…

**Summary of Management Recommendations**

The information presented in this chapter emphasizes several properties of decaying wood in forest ecosystems: (1) each structure formed by decaying wood helps support a different functional web in the ecosystem; (2) no one decaying wood structure supports all functions equally; and (3) all decaying wood habitats together support the widest array of ecological functions and associated wildlife species. The CD-ROM with this book in combination with the DecAid model provides managers with a powerful tool that makes it possible to assess the degree of .full functionality. of ecosystems as supported by the various decaying wood structures, and which functions are strengthened, diminished, or lost through alternative silvicultural management practices.

Lessons for managers are:

…

**2. Emphasize retention of wood legacies, and secondarily promote restoration where legacies are deficient to meet stated objectives.** The decline of species associated with late-successional forest structures, as well as the prolonged time needed to produce wood legacies, suggests that it is both ecologically and economically advantageous to retain legacy structures across harvest cycles wherever possible, rather than attempt to restore structures that have been depleted. This is especially obvious for slow-growing tree species and very large wood structures. …

…

**Operational Considerations**

…

… OSHA revised the federal Logging Standard (29 CFR 1910.266) in 1995, to clarify its intent that danger trees may be avoided, rather than being removed or felled.[72a] A danger tree is any standing tree (live or dead) that poses a hazard to workers, from unstable conditions such as deterioration, damage, or lean. The revised rule allows some discretion in determining the hazard area around a danger tree, by ....allowing work to commence within two tree lengths of a marked danger tree, provided that the employer demonstrates that a shorter distance will not create a hazard for an employee..(OSHA Logging Preamble, Section V). Determining a safe working distance requires a case-by-case ....evaluation of various factors such as, but not limited to, the size of the danger tree, how secure it is, its condition, the slope of the work area, and the presence of other employees in the area. …

…

Concerns frequently arise where high public use creates a risk of third party liability. Considerations include the proximity of reserve trees to roads, trails, campgrounds, ski areas, and other recreation areas and public access points. Methods for addressing these concerns include signage and clear delineation of potential hazard areas, fencing and other barriers to discourage public access, snag height reduction and use of setbacks to minimize exposure.

The bottom line is that current management at both the plan and project level does not reflect all this new information about the value of abundant snags and down wood. The agency must avoid any reduction of existing or future large snags and logs (including as part of this project) until the applicable management plans are rewritten to update the snag retention standards. See also PNW Research Station, "Dead and Dying Trees: Essential for Life in the Forest," Science Findings, Nov. 1999 (http://www.fs.fed.us/pnw/sciencef/scifi20.pdf) ("Management implications: Current direction for providing wildlife habitat on public forest lands does not reflect findings from research since 1979; more snags and dead wood structures are required for foraging, denning, nesting, and roosting than previously thought.") See also: Jennifer M. Weikel and John P. Hayes, HABITAT USE BY SNAG-ASSOCIATED SPECIES: A BIBLIOGRAPHY FOR SPECIES OCCURRING IN OREGON AND WASHINGTON, Research Contribution 33 April 2001, http://www.fsl.orst.edu/cfer/snags/bibliography.pdf; and DecAID, the Decayed Wood Advisor for Managing Snags, Partially Dead Trees, and Down Wood for Biodiversity in Forests of Washington and Oregon, http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf (Note: the agency must address snag fall raes which are not accounted for in the DecAID advisor.)

Current science shows that 4 snags/acre minimum are required for 100% population potential for woodpecker species associated with snag cavities. Wolf Vegetation Management EA, Wallowa-Whitman National Forest, May 2001, page 57. "Historic snag levels could have been much higher, closer to 6-14 snags/acre. (Harrod, Gaines, Hartl, and Camp, 1998)." Goose EA, Wallowa-Whitman National Forest. Additional snags should be left because future fires (both managed and unmanaged) and illegal firewood cutting is almost certain to take a heavy toll on snags over the next several decades.

Snags should be carefully inventoried by species, size, decay status, quality, and location during project planning, and they should be treated as "special habitats" and given special protection during project planning and implementation (i.e. keep workers out of the vicinity of snags so that OSHA doesn't order them cut). For instance, the May 2001 Wolf Vegetation Management Project on the Wallowa-Whitman National Forest includes a mitigation measure protecting trees from being harvested if they are near hazardous snags >15 inches dbh. The NEPA document does not adequately address the need to protect and provide snag habitat.

The snag retention requirements in the applicable management plan Standards & Guidelines for this project fail to retain enough snags to provide habitat for viable populations of cavity dependent species. Since snags have a patchy spatial distribution, surveys to determine snag abundance require very large sample sizes relative to other general vegetation surveys. This was not recognized until relatively recently, so most past surveys conducted to determine natural snag abundance have therefore grossly underestimated the true abundance of snags. This has lead the Agency to underestimate the number of snags necessary to protect species. This new information must be disclosed and documented in a EIS and it requires a forest plan amendment.

The agency must do away with the caveat that they will protect snags "except where they create a safety hazard." This is based on a false choice between snags and safety. The agency can just buffer snags from activities that involve workers, then all ecologically important snags can be protected. The agency must consider this as an alternative to their proposed "management by caveat." An example of this was the Umpqua National Forest, Cottage Grove Ranger District's 2001 decision to burn a picnic table near Moon Falls in order to avoid placing the public in a hazardous situation with respect to a nearby snag. Similarly, the agency here should save the snags by avoiding the activity in the hazard zone around the snags.

The EA must at least disclose how many large snags will be protected vs. felled for safety under the preferred alternative.

**Salvage is not Restoration**

Salvage logging and replanting will convert a structurally complex landscape into a simplified and biologically depraved landscape. Unsalvaged, naturally regenerated, young stands are one of the rarest forest types in the Pacific northwest, and their biodiversity rivals that of old-growth forests.

> Indeed, naturally developed early-successional forest habitats, with their rich array of snags and logs and nonarborescent vegetation, are probably the scarcest habitat in the current regional [Pacific Northwest] landscape.

Lindenmayer, David B. and Jerry F. Franklin. 2002. Conserving Forest Biodiversity: A Comprehensive Multiscale Approach. Island Press. Washington, DC: 69. *See also*, DellaSala, D.A., J.E. Williams, C. Deacon-Williams, and J.F. Franklin. Beyond smoke and mirrors: a synthesis of fire policy and science. In review - Conservation Biology.

If this project involves post-fire commodity extraction (also often referred to erroneously as “salvage” logging) please carefully analyze and take the following into account:

Please consider and disclose the site-specific analysis of the many reasons NOT to do post-fire commodity extraction, including but not limited to:

- adverse impacts to soil, such as erosion, compaction, displacement, litter disturbance, nutrient depletion; loss of chemical buffering; loss of soil organic matter; loss of burrowing wildlife that help aerate soils; reduction of nitrogen fixing plants that boost soil fertility; loss of slope and snow stabilizing effects which could lead to mass wasting or eliminate mechanisms that may mitigate mass wasting;
- loss of down wood functions s such as trapping sediment and aiding water infiltration, and creating microsites favorable for germination and establishment of diverse plants, and habitat for diverse wildlife;
- loss of decaying wood and depletion of the “savings account for nutrients and organic matter” which affects site productivity through the removal of dead trees which store nutrients and slowly release them to the next stand. Recent studies indicate that wood may release nutrients more rapidly than previously thought through a variety of decay mechanisms mediated by means other than microbial decomposers, i.e. fungal sporocarps, mycorrhizae and roots, leaching, fragmentation, and insects;
- loss of nutrients from live trees that are determined to be “dying.” Live trees produce serve as refugia for animals, invertebrates, and mycorrhizae; produce litter fall; and help cycle nutrients which are all extremely valuable in the post-fire landscape;
- loss of wood that serves to buffer soil chemistry and prevent extreme changes in soil chemistry;
- water quality degradation;
- loss of water storage capacity in down logs;
- altered timing of storm run-off which could lead to peak flows that erode stream banks and scour fish eggs;
- delaying the pace of vegetative recovery and reducing the quality/diversity of the vegetation community;
- spread of invasive weeds through soil disturbance and extensive use of transportation systems;
- loss of legacy structures that can carry species, functions, and processes over from one stand to the next;
- loss of terrestrial and aquatic habitat (mostly snags and down logs) potentially harming at least 93 forest species (63 birds, 26 mammals, and 4 amphibians) that use snags for nesting, roosting, preening, foraging, perching, courtship, drumming, and hibernating, plus many more species that use down logs for foraging sites, hiding and thermal cover, denning, nesting, travel corridors, and vantage points for predator avoidance;
- Depletion of large wood structures in streams that can cause: 1) simplification of channel morphology, 2) increased bank erosion, 3) increased sediment export, 4) decreased

nutrient retention, 5) loss of habitats associated with diversity in cover, hydrologic patterns, and sediment retention;

- commercial salvage usually removes the largest trees, but this will disproportionately harm wildlife because: (1) larger snags persist longer and therefore provide their valuable ecosystem services longer and then serve longer as down wood too, and (2) most snag-using wildlife species are associated with snags >14.2 inches diameter at breast height (dbh), and about a third of these species use snags >29.1 inches dbh.
- Truncation of symbiotic species relations and loss of biodiversity. Sixteen species are primary cavity excavators and 35 are secondary cavity users; 8 are primary burrow excavators and 11 are secondary burrow users; 5 are primary terrestrial runway excavators and 6 are secondary runway users. Nine snag-associated species create nesting or denning structures and 8 use created structures.
- Reduced avian and terrestrial species diversity which affects plant and invertebrate diversity. Since different wildlife help disperse different sets of seeds and invertebrates, reduced wildlife diversity can significantly affect pace of recovery and the diversity of the regenerating stand. Snag- associated wildlife play a greater role in dispersal of invertebrates and plants, while down wood-associated wildlife play a greater role in dispersal of fungi and lichens. Down wood-associated species might contribute more to improving soil structure and aeration through digging, and to fragmenting wood which increases surface area encouraging biological action that releases nutrients.
- loss of partial shade that helps protect the next generation of forest;
- loss of cover quality and fawning areas for big game;
- loss of future disturbance processes such as falling snags that help thin and diversify the next generation of forest;
- increased human activity and human access that can increase fire risk;
- increased fine fuels on the forest floor that can cause an increase in fire hazard;
- loss of seed sources, and
- loss of diversity of vegetation and microsite conditions.
- The fact that regional standards for snags and down wood fail to incorporate the most recent science indicating that more snags and down wood (especially large snags and logs) are required in order to maintain species viability and sustain site productivity.
- Arguments in support of the “reburn hypothesis” are specious. (1) partial reburn may be completely natural and desirable in some cases to consume some fuel and diversify the regenerating forest, and (2) salvage logging will cause a pulse of fine fuels on the ground and actually increase the reburn risk/hazard above natural levels, and (3) fuels that fall to the ground over time will to some extent decay as they fall.
- Uncertainty calls for a cautious approach.

Compare these adverse impacts of salvage logging to the few scant reasons to salvage (e.g., economic recovery of fiber).

Prevention of reburn must not be used as a justification for post-fire logging, without carefully documenting the rationale and providing references to published scientific

studies (not just hypotheses and speculation and anecdotes). Also, the Forest Service must explain whether logging will increase or decrease the risk of reburn in terms of fuels profiles over various time horizons, ignition sources, etc. Salvage logging increases fine and mid-size fuels in the short-term by leaving treetops, branches, and needles on site. Fine and mid-size surface fuels also occur in unsalvaged areas, but accumulate gradually over time. It is unlikely that fuels in an unsalvaged area would reach the same magnitude as in the post-salvage scenario because decomposition breaks down new material accumulates.

Please consider at least one non-commercial, restoration-only alternative that invests in restoration and recovery of the fire area by, for instance, eliminating livestock grazing, emphasizing native species recovery, not building any new roads, stabilizing soils disturbed by the fire suppression effort, decommissioning unneeded roads.

Also, consider an alternative modeled on the recommendations of the Beschta report. Specifically:

- prohibit post-fire logging AND roadbuilding on all sensitive sites, including: severely burned areas (areas with litter destruction), on erosive soils, on fragile soils, in roadless/unroaded areas, in riparian areas, on steep slopes, and any site where accelerated erosion is possible. We would add: Late-Successional and Riparian Reserves, and protective land allocations or designations including Botanical and Scenic River Areas;
- protect all live trees;
- protect all old snags over 150 years old;
- protect all large snags over 20 inches dbh;
- protect at least 50% of each size class of dead trees less than 20 inches dbh.

*See* Beschta RL, Frissell CA, Gresswell R, Hauer R, Karr JR, Minshall GW, Perry DA, and Rhodes JJ. 1995. Wildfire and Salvage Logging: recommendations for ecologically sound post-fire salvage logging and other post-fire treatments on Federal lands in the West. Corvallis, OR: Oregon State University. Available at: http://www.fire-ecology.org/science/Beschta_Report.pdf

***Recognize the effects of compound disturbances such as fire followed by logging.***

> Compound disturbances have the potential to fundamentally alter an ecosystem structure and function. This study examines the effects of a natural disturbance and a compounded natural and anthropogenic disturbance on soil properties, biogeochemical cycles, and ecosystem reorganization in a windblown and salvage-logged ecosystem in northwestern Colorado. Areas of intact forest are used as a control to compare the disturbance effects. Results indicate that soils in the salvage-logged areas are drier, significantly warmer, denser, and contain less organic matter than soils in blowdown or control areas. Significant amounts of erosion occurred in the salvage-logged areas to produce these results. Furthermore, net nitrogen mineralization rates are lower in soils from salvage-logged areas than in blowdown areas. By contrast, net nitrogen mineralization rates are twice as high in blowdown areas than in control areas. Seedling density,

> herbaceous cover, and plant species diversity are greatest in blowdown areas, and least in salvaged-logged areas. The results of this four-year study indicate that the mitigation effects of salvage logging significantly alter ecosystem functions and retard the rate of recovery when compared to unlogged blowdown areas.

Cristina M. Rumbaitis-Del Rio and Carol A. Wessman. **Impact of compound disturbances on N-cycling and forest reorganization in a wind-disturbed and logged forest.** Paper presented to the 86th Annual Meeting of the Ecological Society of America, August 6 –10, 2001.
http://www.fs.fed.us/r2/mbr/resourcemgmt/blowdown/CRresearch.pdf

***Recognize that dead and down wood are key elements of the forest ecosystem.***

> There are implications for management of old-growth stands selected for perpetuation. Salvage logging is inappropriate since it removes at least two of the major structural components-dead and down-that are key elements of the system. In all likelihood, some of the more decadent, live trees would also be removed. Salvage logging is also inappropriate because of the damage inevitably done to root systems and trunks of the residual stand which results in accelerated mortality of trees and overall deterioration of the stand.

Franklin, J.F., K. Cromack, Jr., W. Denison, A. McKee, C. Maser, J. Sedell, F. Swanson, and G. Juday. 1981. Ecological characteristics of old-growth Douglas-fir forests. PNW-GTR-118. USDA Forest Service. PNW Research Station. February 1981.
http://www.fs.fed.us/pnw/pubs/gtr118part1.pdf
http://www.fs.fed.us/pnw/pubs/118part2.pdf

- Salvage has been shown to increase fire hazard, especially when dead trees less than 10" diameter will be left behind. Harvesting all the larger diameter trees, especially in an old growth preserve is not acceptable. Large trees need to be left behind.
- As stated in Appendix C-9 of the Warner Fire Recovery Project EIS (Willamette NF), standing dead trees provide about 25% daily shade to seedlings. This in itself is reason to leave standing trees, especially larger ones.
- Pile burning leaves the area prone to invasives.

**Salvage retards watershed and aquatic recovery**

> "In places where salvage logging occurs, the amount of snags that can be removed from the uplands without serious adverse effects on stream macroinvertebrate but ecosystem recovery is unknown and is likely to vary with forest type, geology, and topographical relief. However, it is know that virtually all forms of postfire logging can have various adverse effects on stream ecosystems (e.g., Mehahan, 1983; Smith et al., 1993a, b; Stout et al., 1993; Ketcheson and Megahan, 1996). Based on results from watersheds having various proportions of their areas burned by wildfire (e.g., Minshall et al., 1995, 2001b; Minshall, personal observation), **it is probable that the amount of timber removed should not exceed about 25% of the merchantable timber** (unless contradictory information is available). In

addition, postfire removal should be appropriately spaced across the landscape and should be in proportion to the size classes (DBH) of trees present at the time of the fire (see also Beschta et al., 1995). This proportional harvesting is necessary because of the important graded inputs (Lyon, 1984) that a mix of such large woody debris contributes to streams over the extended recovery period (Minshall et al., 1989). In addition, fire lines should be obliterated prior to logging, and road construction or other major ground-disturbing activities should be avoided in order to prevent additional runoff and erosion. Salvage harvest yeilds responses (e.g., ground disturbance, woody debris removal, interruption of normal infiltration pathways, and acceleration of surface flows) that interact with the direct and indirect effects of fire to make these actions so potentially damaging. In addition, the negative effects extend many years beyond the actual time of salvage activities because of the harvest of snags that normally fall and become incorporated into stream channels and forest floors over several decades or more (Lyon, 1984). These wood inputs are important to create habitat, increase nutrients, and retard runoff and channel alteration during what is normally the most critical stage of stream and riparian vegetation recovery (Minshall et al., 1989; Lawrence and Minshall, 1994)."

**Minshall, G.W. 2003. Responses of stream benthic macroinvertebrates to fire. Forest ecology and management. 178: 155-161**. NOTE: Volume 178, issues 1-2 was a special issue of Forest Ecology and Management on the effects of wildland fire on aquatic ecosystems in the western USA. The Minshall article as well as all others can be found online at www.sciencedirect.com. The *in press* version is here: http://www.fs.fed.us/rm/boise/teams/fisheries/fire/FAE%20Papers/MinshallFEMFinal.pdf

Post-fire logging inevitably involves increases in road use, which increases erosion and sedimentation, especially at road crossings (Reid and Dunne, 1984; Roni et al., 2001). Roni et al. (2001) identified reductions in road traffic as a component of watershed restoration, indicating that increased road traffic works in opposition to watershed and stream restoration.

Beschta et al. (1995) noted that even relatively low impact logging systems such as helicopter yarding should be avoided where sedimentation is already a major problem for salmonids or other sensitive aquatic species, because any activity that disturbs litter layers of soil surface horizons, either pre- or post-fire can accelerate soil erosion and sediment delivery to aquatic systems.

The USFS and USBLM (1997a; c) conceded that logging generally increases erosion and, consequently, sedimentation, regardless of how carefully it is implemented. Megahan et al. (1992) came to similar conclusions. Elevated erosion and sedimentation persist for several years after logging disturbance (USFS and USBLM, p. 1101, 1997a).

BMPs do not eliminate the persistent erosional impacts of post-fire logging. USFS and USBLM (p. 446, 1997c) concluded that although BMPs can reduce sediment yields

compared to historical practices, risks of increased sedimentation will continue to occur if road building or timber harvest occur, damaging aquatic habitats. Ziemer and Lisle (1993) stated that there are no reliable data indicating that BMPs are cumulatively effective in protecting aquatic resources from the adverse effects of logging and associated impacts. Espinosa et al. (1997) provided evidence from watershed case histories that BMPs thoroughly failed to cumulatively protect salmonid habitats and streams from severe damage from roads and logging.

Logging effects on soils and vegetation increase erosion and sedimentation in the post-fire environment. Logging causes soil compaction which causes loss of soil productivity and increased erosion. The latter is essentially permanent (Beschta et al., 1995) and is the most severe source of reductions in long-term soil productivity (USFS and USBLM, 1997a; b). Soil compaction persists for at 50-80 years (USFS and USBLM, 1997a). Compaction and reduced soil productivity are already major concerns on public lands on regional scales (USFS and USBLM, 1997a; CWWR, 1996).

Logging also reduces soil productivity by removing trees which are major sources of the coarse woody debris (CWD) and organic matter critical to soil productivity (USFS and USBLM, 1997a). Even the removal of slash consisting of tops and branches negatively affects soil productivity by negatively affecting nutrient and organic matter levels; **burning these materials in place** (as occurs with wildland fire) causes much less negative impacts on soils (USFS and USBLM,1997a). USFS and USBLM (p. 466, 1997a) found that losses in soil productivity were correlated with logging and roads within the ICBEMP project area.

USFS and USBLM (p. 206, 1997a) and Kattleman (1996) state that the prevention of soil damage and loss of productivity is easier and more effective than attempts to restore it after damage has occurred. A primary approach to restoring soil productivity is to restore organic matter and coarse woody debris levels by leaving areas <u>undisturbed until organic matter levels have recovered</u> (USFS and USBLM, p. 206, 1997a, emph. is mine). Avoidance of increased erosion is key to restoring soil productivity (Beschta et al., 1995; USFS and USBLM, p. 206, 1997a). The most effective means of controlling erosion is to avoid activities that disrupt/damage soils and vegetation, as is exceedingly well-documented in the literature. Due to the manifold negative effects of logging on soil productivity, erosion, and sedimentation, USFS and USBLM (1997b) concluded that logging had greater negative effects on ecosystem functions than the baring of soils by fire.

The USFS and USBLM (Ch. 4, pp. 12-13, 1997b) notes that although fire may reduce soil productivity, it typically does not reduce it as much as from soil compaction and whole tree removal (e.g. logging), except in the rare cases where fire consumes <u>all</u> organic material. It states: "Because of the mosaic pattern that wildfire produces, and the residual wood that is left on site...wildfire usually has fewer implications for loss of soil productivity and function than disturbances which remove oil organic matter and [increase] bulk density as well." Logging effects on soil properties are usually more severe and more persistent than those of fire (USFS and USBLM, Ch. 4, pp. 13, 1997b).

These multiple impacts on soil productivity are probably why salvage-logging retards post-fire vegetative recovery. Sexton (1998) documented that post-fire salvage logging over snow reduced regrowth of ponderosa pine and other species relative to adjacent burned, but unlogged, areas. Naturally regenerating groundcover in unlogged areas also had greater survival and growth than plantings on areas that had been salvaged logged after fire. Notably, these adverse effects of logging on regrowth were from over-snow logging (Sexton, 1998). It is highly likely that ground-based logging without snowcover retards regrowth to a greater extent due to its greater negative effects on soils.

Kattleman (1996) noted that "If postfire treatments of salvage logging and site preparation prevent rapid reestablishment of low vegetation, resulting erosion can be greater than that directly produced by the fire." Coupled with Sexton's work and the known effects of logging on soil productivity and concomitant effects on revegetation, it appears that post-fire logging creates more erosion and sedimentation than fires.

Logging and elevated road use are also primary vectors for the dispersal and establishment of noxious weeds (USFS, 1999; 2000b). Noxious weed establishment can increase erosion and sediment delivery and impede the recovery of native vegetation USFS (2000a). This is of special concern in burned landscapes because noxious weeds are well-adapted to disturbed environments.

The construction and reconstruction of roads and landings also cause tremendous and enduring increases in erosion and sedimentation in both the post-fire and between fire environments. But that's been covered adequately elsewhere and won't be here.

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**Salvage: Natural recovery alternative**.

The NEPA analysis fails to consider a minimal restoration and natural recover alternative. Fires are a completely natural feature of western forest landscapes. Removing much of the biomass from the area after a fire is not natural. Salvage logging and road work:

- removes or damages many of the building blocks needed to build the future forest (soil, large wood, and habitat structures),
- disrupts many of the post-fire recovery processes (nutrient storage and cycling in down wood, falling snags that thin the young reprod, water storage in down wood, erosion control, etc), and
- alters the developmental pathways of the future forest.

The NEPA analysis failed to disclose the significant adverse effects of salvage on these building blocks and recovery processes. An EIS is necessary to consider and disclose these issues

**Salvage: Protect all live trees**

While it is true that some trees with signs of life will soon die, the agency fails to acknowledge or disclose the degree of confidence in their estimates (i.e. how many false positive predictions of imminent death will the agency make) and fails to recognize the huge importance of remaining live trees as future sources of snags to fill the temporal gap between the batch of snags created by this fire and those to be produced in the distant future by the next stand of trees.

Salvage operations typically assume that many living trees will soon die and then salvage becomes a self-fulfilling prophecy. Trees that may survive the fire are an extremely valuable feature of the future forest. Providing scarce canopy and shelter in the short-term and providing scarce large snag and down wood habitat in the long-term, during a period when forest-fire landscapes are typically depauperate in snags and large wood. The

NEPA analysis failed to adequately disclose and analyze this and an EIS is necessary to consider the effects of harvesting numerous trees that may survive.

See: Residual Trees as Biological Legacies, CCEM Communiqué #2. Sept. 1995. http://www.fsl.orst.edu/ccem/pdf/95Comque.pdf

**Salvage: Protect all large snags**

Because large snags last much longer than small snags, large snags are disproportionately valuable as wildlife habitat, nutrient and water reservoirs, soil stabilizers, etc. If the agency chooses to conduct a salvage operation in this fire area, they must use a diameter cap and protect these scarce and valuable forest structures.

Meeting management plan snag targets is grossly inadequate. Historically, a mosaic of recent and not-so-recent fires, left lots of "snag patches" and patchy accumulations of down wood of various sizes and decay-stages. These snag patches provided tremendous habitat value for a whole host of wildlife species, include birds, mammals, amphibians, insects. 96 species are known to be associated with snags and 86 species are associated with down wood. Most of these species depend upon or prefer large snags and wood. With aggressive salvage policies that continue to this day, these snag patches are an under-represented feature on the landscape.

The agency's snag retention guidelines are based on wildlife needs, but fail to consider or analyze the need to large snags and large down logs for shade, water storage, disturbance (via falling and sliding), nutrient storage, channel forming, sediment trapping, soil conservation, underground processes, etc.

The NEPA analysis failed to disclose and analyze these significant issues. An EIS is needed to fully consider them.

> Although rate of biomass input and average piece size generally are thought to increase with succession (Harmon and others 1986), the amount of dead wood can follow a U-shaped pattern if young forests inherit large amounts of dead wood and live trees from preceding stands (Spies and others 1988). The snags in our study—especially large snags—increased with succession in almost all of the habitats. No wildlife habitats exhibited a U-shaped pattern, probably because snags tend to be cut within harvest units, which reduces the density found in early successional forests. . . .
> … The lack of a U-shaped successional pattern for snags is not surprising. . . . Snags also are much more likely than down wood to be damaged or intentionally removed by humans through the course of forest management and harvest activities. …
>
> All of the habitats we examined had similar patterns: distributions were non-normally distributed and strongly skewed to the right. A large proportion of the plots did not contain snags or down wood, and a very small proportion of the plots contained extremely large accumulations of dead wood.

Janet L. Ohmann and Karen L. Waddell; **Regional Patterns of Dead Wood in Forested Habitats of Oregon and Washington;** USDA Forest Service Gen. Tech. Rep. PSW-GTR-181. 2002. http://www.fs.fed.us/pnw/pubs/journals/PSWGTR181Deadwood.pdf

**Salvage: Give it a long rest from grazing.**

The fire area must be rested from grazing. The NEPA analysis fails to disclose the significant adverse effects of livestock grazing in a post-fire landscape in terms of degrading water quality, spreading invasive weeds, retarding vegetative recovery, soil compaction, etc.

In the short term, grazing must be eliminated to allow recovery of plants, soil, and to protect water quality. In the long term, grazing must be eliminated of the agency is sincere about re-establishing natural fire regimes which depend on natural fuel profiles, which are seriously adversely affected by livestock grazing.

**Salvage: Watershed restoration.**

Salvage logging will adversely affect the ability of the land to absorb, store and release high quality water and the NEPA analysis fails to address these concerns.

First, post-fire soils are fragile because the soil duff is often consumed by the fire and the carbon and other nutrients have been largely removed. Logging will further disturb the soils and disrupt the natural soil recovery processes. Logging will also disturb and rearrange the soil protecting needle litter that will fall in the months after the fire.

Second, large wood absorbs water and serves as a significant water reservoir that is especially critical during the dryer summer months. Logging removes the wood and so reduces the potential water reservoir. Recent research indicates that much water is stored in buried wood. This buried wood is likely to result of trees that have fallen on hillslopes and become buried in natural sediment moving downslope. Salvage will adversely affect the recruitment of future buried wood.

The agency's snag retention guidelines are based on wildlife needs, but fail to consider or analyze the need to large snags and large down logs for soil, water storage, nutrient storage, or other purposes.

Third, road construction, reconstruction, and road use all adversely affect the ability of the lad to "distribute quality water." The Cub EA admits that 12.9 miles of roads are located in proximity to streams and are potential sources of sediment to the stream system (EA at 39). Using these roads for log haul will cause water quality problems inconsistent with the sustain yield principles.

The EA failed to address these significant issues. An EIS is needed.

**Salvage Beschta Report comments**

*Protect live trees and large snags*. The Beschta report recommends retaining all live trees, all large and old snags, plus 50% of each smaller diameter class. This project fails to address each of these recommendations separately and just makes up excuses to implement large unnatural salvage clearcuts.

This project tries to excuse removal of large snags on safety grounds but they failed to consider a simple alternative, that its, to restrict workers (and others) from the hazard zone around hazard trees. Also, the Tiller Ranger District in their 1997 "Benchmark" timber sale partially implemented a Beschta-type prescription which retained 50% of the dead snags in a variety of diameter classes while providing for worker safety. If they can do it there, why can't you do it here? See: http://www.umpqua-watersheds.org/unf/benchmark.html

The NEPA analysis also tries to excuse salvage based on the reburn hypothesis, but the NEPA analysis fails to consider that they are only removing the commercial sized trees and leaving behind the more hazardous small material. IF there is a reburn problem, the agency is making it worse instead of better.

*Vegetation recovery*. Contrary to the Forest Service assertions the salvage will not alter the successional pathways and disrupt natural recovery of the forest. It is important that snags be left well-distributed within the fire area. As snags fall over during subsequent years (even after decades in same cases), they damage and kill some of the young trees that may have become established in the fire area and help to thin the trees out. Without well-distributed snags, this thinning mechanism is lost. Forest Service scientists are interested in this issue:

> How much thinning is due to competition, snag and big limb fall (in post-fire sites), snowdown, bugs/bears/other animals, root rots, wind, and perhaps other processes? What are the implications of these early successional effects on stand composition and structure for development of old forest composition and structure? One hypothesis is that snag/big limb fall was an important and greatly under-appreciated process that strongly influenced early stand dynamics and stocking in young forests established after wildfire. One reason we don't have a sense of this process is that we see so few young stands that have a full complement of snags left after fire. Our mental images of young stands come from clearcuts.

http://www.fsl.orst.edu/lter/research/component/disturb/summary.cfm?sum=dstrbyr5&topnav=60

*Soils*. Contrary to the Forest Service assertions, ground-based logging on fire-affect forestland will cause detrimental soil impacts that are inconsistent with the recommendations of the Beschta report. Studies have shown again and again that the agencies are often wrong in its wishful thinking that ground-based logging can be mitigated to avoid detrimental soil impacts. This logging is proposed on soils that are seriously affected by fire and are less resilient than most forest soils that have not been

recently subjected to fire. The agency cannot rely on soil science that is derived from unburned sites.

**Salvage: Capturing commercial log value is a questionable purpose for this project**.

Conducting destructive salvage operations in order to capturing commercial log value is inappropriate. The Forest Plan is so outdated that it is effectively invalid. The plan, like so many others in the Interior Columbia Basin, calls for the liquidation of most of the remaining old forest, so the ICBEMP process was initiated to deal with the loss of old forests and the species viability issues caused by such mismanagement. Just because this burned area is in a "timber production zone" in an outdated forest plan is not a reason to salvage this area.

This nation does not need to destroy public resources in order to supply its wood product needs. The local timber industry should get its raw materials from private lands. The highest and best use of the National Forests is for clean water, wildlife habitat, recreation, carbon sequestration, etc. NOT for fiber. Because of this, the recommendations of the Beschta report deserve much more careful consideration and should be followed.

**Hazard tree removal must not be used as an excuse to get timber volume.**

Truly hazardous trees located in high use areas should be felled (often leaving a high stump for wildlife) but such trees should generally be left to provide for wildlife and soil needs.

The NEPA analysis also fails to acknowledge that the public assumes certain risk when recreating on public lands, so not every hazardous tree on every dead end spur road needs to be felled and removed. See ORS §§ 105.672(3), 105.682(1) and Brewer v. ODFW, 2 P.3d 418, 167 Or.App. 173. http://www.publications.ojd.state.or.us/A103245.htm

ORS 105.682(1) provides:

> Except as provided by subsection (2) of this section [pertaining to intentional injuries], and subject to the provisions of ORS 105.688 [limiting immunity to those who do not charge for use of the land or who charge no more than $20 per cord for woodcutting on the land], an owner of land is not liable in contract or tort for any personal injury, death or property damage that arises out of the use of the land for recreational purposes, woodcutting or the harvest of special forest products when the owner of land either directly or indirectly permits any person to use the land for recreational purposes, woodcutting or the harvest of special forest products. The limitation on liability provided by this section applies if the principal purpose for entry upon the land is for recreational purposes, woodcutting or the harvest of special forest products, and is not affected if the injury, death or damage occurs while the person entering land is engaging in activities other than the use of the land for recreational purposes, woodcutting or the harvest of special forest products.

"Owner" is defined by ORS 105.672(4) as "the possessor of any interest in any land, including but not limited to possession of a fee title. 'Owner' includes a tenant, lessee, occupant or other person in possession of the land." "Land" is defined by ORS 105.672(3) as including "all real property, whether publicly or privately owned."

ORS 105.676 provides:

> The Legislative Assembly hereby declares it is the public policy of the State of Oregon to encourage owners of land to make their land available to the public for recreational purposes, for woodcutting and for the harvest of special forest products by limiting their liability toward persons entering thereon for such purposes ...

The Oregon Court of Appeals in Brewer said,

> The trade-off represented by this policy is manifest. The owner of land opened for recreational use in accordance with the Act gives up exclusive enjoyment of the land and, in return, is insulated from certain types of liability for injuries that may occur there. The users of recreational lands opened in accordance with the Act give up their rights to sue land owners for certain types of injuries but gain the benefit of using land for recreation that otherwise would not be available to them."

Also, the Federal Tort Liability Act provides the government some degree of immunity in exercising their discretionary functions like hazard tree management. For instance, the Great Smokey Mountains National Park Service was found not liable for failing to remove a tree weakened by root rot that fell and killed a recreational motorist, even when the road involved was a high use paved road near a visitor center, and when the tree species at issue (Black Locust) was known by the Park Service to be prone to fall down. AUTERY v. UNITED STATES 992 F.2d 1523 (11th Cir. 1993). http://classweb.gmu.edu/erodger1/prls560/content/autery.htm. The appeal court overturned the district court and held that the agency's balancing of public safety and preserving natural areas prevented judicial second guessing ands gave them immunity from liability for the death of the motorist.

Based upon the evidence in this case, the appeals court held that "the decisions made by GSMNP personnel in designing and implementing its unwritten tree inspection program fall within the ambit of the discretionary function exception."

> Although the district court may have disagreed with the balance struck by the Park Service, or believed that some other policy would have been better, the discretionary function exception is designed to protect against just this type of "judicial 'second-guessing"...
>
> To decide on a method of inspecting potentially hazardous trees, and in carrying out the plan, **the Park Service likely had to determine and weigh the risk of harm from trees in various locations, the need for other safety programs, the**

> **extent to which the natural state of the forest should be preserved, and the limited financial and human resources available**. Indeed, the district court recognized this when it criticized the Park Service for elevating he overriding policy considerations of protecting the trees and the natural state of the area over the safety of humans using the park roadway.

This means that the agency is free to weigh the value of snags for wildlife and other ecosystem services and need not reflexively cut down every hazard tree. The agencies proposal in the present case it not consistent with applicable law or conservation principles.

29 CFR § 1910.266

> (c) Danger tree. A standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree.
>
> **…**
>
> (d)(vi) Each danger tree shall be felled, removed or **avoided**. Each danger tree, including lodged trees and snags, shall be felled or removed using mechanical or other techniques that minimize employee exposure before work is commenced in the area of the danger tree. If the danger tree is not felled or removed, it shall be marked and no work shall be conducted within two tree lengths of the danger tree unless the employer demonstrates that a shorter distance will not create a hazard for an employee.
>
> (vii) Each danger tree shall be carefully checked for signs of loose bark, broken branches and limbs or other damage before they are felled or removed. Accessible loose bark and other damage that may create a hazard for an employee shall be removed or held in place before felling or removing the tree.

http://a257.g.akamaitech.net/7/257/2422/06sept20031800/edocket.access.gpo.gov/cfr_2003/julqtr/29cfr1910.266.htm

Preventing Injuries and Deaths of Loggers; NIOSH ALERT: May 1995; DHHS (NIOSH) Publication No. 95-101; http://www.cdc.gov/niosh/logging.html

**Plant at low density to extend the early seral community and avoid future stand management costs.**

Unsalvaged, naturally regenerated, young stands are one of the rarest forest types in the Pacific northwest, and their biodiversity rivals that of old-growth forests.

> Indeed, naturally developed early-successional forest habitats, with their rich array of snags and logs and nonarborescent vegetation, are probably the scarcest habitat in the current regional [Pacific Northwest] landscape.

Lindenmayer, David B. and Jerry F. Franklin. 2002. Conserving Forest Biodiversity: A Comprehensive Multiscale Approach. Island Press. Washington, DC: 69. *See also*, DellaSala, D.A., J.E. Williams, C. Deacon-Williams, and J.F. Franklin. Beyond smoke and mirrors: a synthesis of fire policy and science. In review - Conservation Biology.

If this project involves artificial planting, avoid dense replanting that creates dense homogenous plantations. Such areas inhibit biodiversity and also represent dangerous fuel conditions. Please replant in patches and/or at a fairly low density and avoid the need for future thinning and other stand management costs. Let's be patient and allow these stands recover slowly as diverse early seral communities. Diverse early seral plant communities are becoming less common and we should encourage slow and easy regeneration of forest communities. This is consistent with the research being done by Nathan Poage which indicates that many stands developed over much longer time periods than we typically allow under the agricultural model of forest management.

**SPECIES VIABILITY CONCERNS**

USDA policy does not allow the Forest Service to take actions that would cause trends toward listing species under the Endangered Species Act. Relevant policy directs the Forest Service to: "1. Manage 'habitats for all existing native and desired non-native plants, fish, and wildlife species in order to maintain at least viable populations of such species.' 2. Habitat must be provided for the number and distribution reproductive individuals to ensure the continued existence of a species generally throughout its current geographic range." FSM 2620.1 and USDA Department Regulation 9500-4 (August 22, 1983. Forest Service objectives are to "provide a sound base of information to support management decision-making affecting wildlife and fish, including endangered, threatened, and sensitive animal and plant species, and their habitats." FSM 2620.2. Forest Service policy is to "use management indicators to address . . . species habitat through all planning levels." FSM 2620.3. The USDA also requires that the Forest Service "avoid actions which may cause a species to become threatened or endangered." DR 9500-4(3)(d).

The 9th Circuit also does not approve of the "proxy on proxy" approach favored by the Forest Service where indicator species are chosen to represent a suite of other species but then the indicator species populations are not even monitored— instead the agency monitors habitat levels that may or may not reflect populations levels. The Forest Service must refrain from destroying habitat until they have completed population monitoring and documented viable populations of native species. See
Idaho Sporting Congress and Alliance for the Wild Rockies v. Rittenhouse

http://www.ca9.uscourts.gov/ca9/newopinions.nsf/D6B0EF3C12752B5588256C360081AA9E/$file/0135403.pdf?openelement

**Faulty analysis of reburn potential.**

The NEPA analysis asserts that leaving large numbers of snags is unsafe and the NEPA document describes an undesirable scenario with respect to the no action and restoration alternatives, but the NEPA document fails to acknowledge the fire risks associated with salvage logging including: (a) salvage logging will remove most of the largest logs that least prone to burn (because large logs hold the most water the longest and they have relatively high ratios of volume to surface area), (b) salvage logging leave behind almost all of the smallest material which is most prone to drying and burning (e.g., relatively low ratio of volume to surface area), (c) the proposed action may lop and scatter the tops of

large trees that are too big for the ground-based harvest machinery, (d) salvage logging equipment and workers could start fires, (e) increased human access increases the risk of human caused ignition, (f) the replanting will create a fuel load that is dense, uniform, extensive, volatile, and close to the ground (During an extreme weather conditions this is one of the most extreme fire hazards in the forest).

The NEPA document also fails to disclose that NOT salvage logging (e.g., natural recovery) may have some counter-veiling benefits in terms of fire risk and reburn potential, including: (a) large logs store water, (b) standing snags provide some shade, (c) regrowth tends to be more patchy and less dense and continuous, (d) fuels in the form of branches and dead trees fall to the ground slowly over time and have a chance to decay as they added, (e) falling snags over time ten to break up the continuity of fuels in the form of brush and reprod.

Salvage typically removes the largest water “reservoirs” that are least prone to drying. *See* Amaranthus, M.P.; Parrish, D.S.; and D.A. Perry. 1989. Decaying Logs as Moisture Reservoirs After Drought and Wildfire. In: Alexander, E.B. (ed.) Proceedings of Watershed '89: Conference on the Stewardship of Soil, Air, and Water Resources. USDA-FS Alaska Region. RIO-MB-77. p. 191-194. This study found that large down logs in a post-fire landscape contain 25 times more moisture than the surrounding soil. While the authors recommended preventing large accumulations of "woody residue" (which the author described as very small diameter material--branches, twigs, etc.), they also recommended leaving down logs after fires to PREVENT future fire severity. They concluded that, "When forest managers are analyzing for fire risk, they should take into account the high water content of fallen logs during the period in which wildfire potential is greatest ... Fallen trees, in a range of decay classes, therefore provide a long-term reservoir of moisture. A continuous supply of woody material left on the forest floor, not only protects the productive potential of the forest soil, but also provides a sanctuary for ectomycorrhizae and a significant source of moisture in the event of prolonged drought or wildfire." The study was conducted in the Klamath region in an area with roughly 40 inches of annual rainfall. It was published in 1989 in Proceedings of Watershed '89: a conference on the stewardship of soil, air and water resources. USDA Forest Service, Alaska Region: pp. 191-194 (1989).

**Landscape fire**

Fire is largely driven by weather conditions. Commercial logging is highly unlikely to affect fire behavior at a landscape scale and will therefore fail to achieve this project’s purpose and need.

“The federal government reports that 70 million acres of federal lands need immediate thinning and another 140 million acres must be thinned soon. The president's plan to thin 25 million acres in the next 10 years will cost as much as $4 billion yet leave nearly 90 percent of those acres untreated,” according to Jerry Taylor, the CATO Institute's Director of Natural Resource Studies, "A recent Forest Service report estimates there are just 1.9 million high-risk acres with homes and other structures near federal lands. To

defend homes and communities, we should treat those acres and fireproof the homes. That could be done in just one or two years at a tiny fraction of the cost of the president's plan." (Administration's Forest Plan Doomed to Fail, *"Forests Initiative" Will Leave 90 Percent of Acres Vulnerable to Fires, 5/20/03;* http://www.cato.org/new/05-03/05-20-03r-2.html, http://www.cato.org/dailys/09-07-02.html)

It is arbitrary and capricious to spend billions on a program that essentially fails to address the problem. This timber sale project is a microcosm of the larger issue identified here. Until the larger issue is dealt with, this significant issue requires an EIS.

Landscape fuel treatments are not likely to influence fire behavior at a landscape scale. The proposed action proposes to treat fuels at a landscape scale and cause significant soil damage, wildlife habitat disturbance, and hydrological effects, yet only reduce extreme fire hazard by a small degree across the project area. This fuel reduction benefit will only be realized during ideal weather conditions but will have virtually no effect during the most extreme fire conditions. This level of fire hazard reduction is a drop in the bucket, and the NEPA analysis fails to balance the minute level of benefit in terms of fire risk reduction against the great level of soil, water, and wildlife impacts.

The small amount of fuel reduction benefits from this project are also short-lived and will last only about 10-15 years at which point another entry will be required. So all the soil, wildlife, and watershed impacts will be repeated again and again and probably still not stop the big fire from burning it all down during extreme weather conditions that humans cannot control. We have to stop kidding ourselves. On the day of the big fire (and it will come), the difference between the action alternative and the no action alternative is almost nothing, but if the agency instead focused on careful and conscientious treatment in the community zone, maybe the homes and communities can be saved.

The agency should focus fuel reduction efforts within 1/4 mile of the homes and communities and prepare an EIS to more carefully balance the competing interests here (soils, fuels, etc). Jack Cohen's work clearly shows that the most important steps to be taken to protect home and communities are not at the landscape level but at the homesite and immediately adjacent to the homesite. See USDA Forest Service Gen. Tech. Rep. PSW-GTR-173. 1999 and the publications listed here:
http://www.firelab.org/fbp/fbresearch/wui/pubs.htm

Outside the community zone the Forest Service should focus on restoration using non-commercial treatment using hand crews and prescribed fire. The Forest Service must focus on treatment that can be maintained, and do not required repeated entries with heavy equipment that will violate soil standards and exacerbate concerns about hydrology, wildlife, weeds and water quality.

The agency also seems to forget that much of the project area is made up of plant communities that naturally burn at high intensity. No amount of thinning is going to radically alter this natural phenomena over the scale of the next 50-100 years.

Since the benefits of fuel reduction will not be realized during the most extreme fire conditions. The agency must consider what is the likelihood that sometime during the next 50-100 years, there will be a large fire during extreme conditions. If there is a significant risk of that occurrence, then all the soil damage, hydrologic degradation, weed infestations, and wildlife disturbance (of this project and many that will be needed in the future) will be for naught. This is a very significant issue, not only for this project but for many others as well. The agency should do an EIS to consider these weighty issues.

**Plantations are a fire hazard**

Dense young plantations are more susceptible to severe fire effects than unmanaged older forests (DellaSala et al. 1995, Weatherspoon & Skinner 1995). The increased susceptibility of plantations to severe fire is due to:

- Structural characteristics that promote high heat energy output by fire (Sapsis & Brandow 1997).
- Warm, windy and dry microclimates compared to what would exist in an unlogged burned forest that possessed more structural diversity and ground shading (Countryman 1955, van Wagtendonk 1996).
- Accumulations of large volumes of fine logging slash on the ground surface (Weatherspoon & Skinner 1995).

The number and distribution of plantations resulting from industrial timber management likely has altered fire behavior and effects at both stand and landscape scales (Hann et al. 1997, Huff et al. 1995). Perry (1995) suggests that the existence of a threshold proportion of highly combustible even-age tree patches on a forest landscape creates the potential for "a self-reinforcing cycle of catastrophic fires." In addition, most plantations occur next to roads that spread invasive and exotic plants (DellaSala & Frost 2001) and increase the risk of human-caused ignitions during hot, dry conditions (USDA 2000).

The March 2003 Wildfire Effects Evaluation Project for the Umpqua National Forest clearly documents this disproportionate fire intensity of young managed vs. mature unmanaged stands. ("The young vegetation, including plantations, experienced a disproportionately high amount of stand replacement mortality caused by crown fires as compared to older, unmanaged forests. … 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." p 4 "This early seral vegetation pattern, and the types and arrangement of fuels present, increased the fire's rate of spread and the area of stand replacement fire effects." p 64.)
http://www.fs.fed.us/r6/umpqua/publications/weep/weep.html

**Prescribed fire**

We support prescribed fire as a fuel management technique but fire management must be carefully planned so as to minimize effects on wildlife, soil, site productivity, and large trees, down woody debris, and snags. Fall burning should be considered because that is when nature would have done most of the burning. The effects of spring burning on the life-cycles of plants and wildlife must be fully considered in the NEPA process. Arthur R. Tiedemann, James O. Klemmedson, Evelyn L. Bull recently suggested:

> that a broader array of resource questions be considered before prescribed burning is implemented. We think the objectives of prescribed burning must be. clearly defined and realistic estimates stated for out- comes for all affected resources. If the objective is to restore forest health, then we suggest that forest productivity, wild- life, biodiversity, and other resources and values are as much a part of the forest health equation as are the structure of a forest stand and its tolerance to fire. Thus, management aimed at returning forests to an open, seral condition should be carefully evaluated from the perspective of all the key resources and values.
> * * *
> we question how well presettlement forest conditions are understood. How pervasive was the influence of fire throughout forests of the Blue Mountains? Hall (1976) indicates that the ponderosa pine/pinegrass (*Calamagrostis rubescens* Buckl.) association was burned by surface fires at 7±10-year intervals. Of 22 habitats now dominated by grand fir and subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.) listed by Johnson and Clausnitzer (1992), however, only three were historically seral ponderosa pine that were burned by periodic surface fires (personal communication, Dr. F.C. Hall, Pacific Northwest Region, USDA Forest Service).
> * * *
> A primary concern whenever prescribed fire is used in forest management is loss of nutrients and impaired site productivity. . . . If sites are harvested and residues are burned, not only will nutrients removed in trees be lost, but also — potentially— much of the nutrient pool in slash and forest floor, depending on burning conditions. Thus, the potential to adversely affect long-term site productivity is always present.
> * * *
> The consequences of large-scale prescribed burning on wildlife in the Pacific Northwest are largely unknown because studies have been limited to investigating the effects of small prescribed burns on specific species for a relatively short time after burning. The potential effects of prescribed burning on a landscape scale should be examined carefully to determine if the changes caused by prescribed burning are compatible with other management objectives for wildlife.

Tiedemann, A.R., Klemmedson, J. O., and Evelyn L. Bull, *Solution of forest health problems with prescribed Fire: Are forest productivity and wildlife at risk?,* Forest Ecology and Management 127 (2000) 1±18 3, http://147.46.94.112/forestfire/f14_20001271301.pdf

**No Roadbuilding Please**

> Nothing is worse for sensitive wildlife than a road. Over the last few decades, studies in a variety of terrestrial and aquatic ecosystems have demonstrated that many of the most pervasive threats to biological diversity - habitat destruction and fragmentation, edge effects, exotic species invasions, pollution, and overhunting - are aggravated by roads. Roads have been implicated as mortality sinks for animals ranging from snakes to wolves; as displacement factors affecting animal distribution and movement patterns; as population fragmenting factors; as sources of sediments that clog streams and destroy fisheries; as sources of deleterious edge effects; and as access corridors that encourage development, logging and poaching of rare plants and animals. Road-building in National Forests and other public lands threatens the existence of de facto wilderness and the species that depend on wilderness.

http://www.wildrockies.org/WildCPR/reports/ECO-EFFECTS-ROADS.html

See also NRDC Report: "End of the Road: The Adverse Ecological Impacts of Roads and Logging: A Compilation of Independently Reviewed Research" (1999) which discusses the fact that roads:

1. Harm Wildlife
2. Spread Tree Diseases and Bark Beetles
3. Promote Insect Infestations
4. Cause Invasion by Harmful Non-native Plant and Animal Species
5. Damage Soil Resources and Tree Growth
6. Adversely Impact Aquatic Ecosystems

**Temporary Roads**

For the semi-permanent roads that will be tilled, BLM's own soils scientist has little faith in the restorative value of this technique. He says: "What I have seen so far have been nothing more than modified rock rippers and little lateral fracture of the soil occurs and the extent of de-compacting is very limited." Coos Bay BLM, Big Creek Analysis file, section F, Soils Report. page 4.

BLM assumes that temporary and semi-permanent new roads will have no effect because they are temporary. BLM has shown no scientific evidence for this assumption. In fact, scientific research has shown exactly the opposite. Effectiveness of Road Ripping in Restoring Infiltration Capacity of Forest Roads. Charles H. Luce, USDA Forest Service Intermountain Research Station, 1221 S. Main, Moscow, ID 83843. September 1996. Restoration Ecology, Vol. 5, No. 3. page 268.

Research results, published in *Restoration Ecology,* shows there is nothing temporary about temporary roads, and that ripping out a road is NOT equal to never building a road to begin with. "The saturated hydraulic conductivity of a ripped road following three rainfall events was significantly greater than that of the road surface before ripping... most saturated hydraulic conductivities after the third rainfall event on a ripped road were in the range of 22 to 35 mm/hr for the belt series and 7 to 25 mm/hr for the granitics. These conductivities are modest compared to the saturated hydraulic conductivity of a

lightly disturbed forest soil of 60 to 80 mm/hr." id. Even this poor showing of restoring pre-road hydrologic effects worsened with repeated rainfall. "Hydraulic conductivity values for the ripped treatment on the granitic soil decreased about 50% with added rainfall (p(K1=K2)=0.0015). This corresponded to field observations of soil settlement and large clods of soil created by the fracture of the road surface dissolving under the rainfall... The saturated hydraulic conductivity of the ripped belt series soils also dropped from its initial value. Initially, and for much of the first event, the ripped plots on the belt series soil showed no runoff. During these periods, run-off from higher areas flowed to low areas and into macropores.... Erosion of fine sediment and small gravel eventually clogged these macropores... Anecdotal observations of roads ripped in earlier years revealed that after one winter, the surfaces were nearly as solid and dense as the original road surfaces." Id. Even though ripped roads increase water infiltration over un-ripped roads, it does not restore the forest to a pre-road condition. "These increases do not represent "hydrologic recovery" for the treated areas, however, and a risk of erosion and concentration of water into unstable areas still exists." Id.

**Weeds**

On Earthday 2003 Chief Dale Bosworth said that more attention needs to be paid to beating back invasive species. Opening up the canopy and disturbing the soil through road building and logging as proposed in this project could spread non-native weeds far and wide. The invasive weed sites in the analysis area and along all log and gravel haul routes should be fully inventoried and documented as part of the NEPA process for this project . In the absence of valid and complete weed survey information, harvest and road and fuel treatment activities planned as part of this project might exacerbate the problem instead of contain it.

We find it highly unlikely that conducting ground disturbing activities over so many acres of this planning are will not make the weed problems worse instead of better. These weeds are "a slow motion explosion" that should not be taken lightly. It is often better to just close roads and avoid ground disturbing activities while sending crews in to do hand-pulling of weed infestations as necessary.

**Don't tier to the outdated forest plan**

Certain areas of the forest were allocated to commodity production in the LRMP, but since the LRMP was approved the regional forester has had to adopt several regional plan amendments in order to increase protection for species associated with old forests and aquatic environments (e.g., eastside screens, PACFISH, INFISH). The regional forester also produced the ICBEMP science reports which made clear that large scale restoration is needed on eastside forests. This restoration will have some short-term negative effects on species that rely on old forests and streams. These species have limited capacity to absorb more disturbance. The restoration efforts will take up all the available "disturbance space," leaving no room for commodity production such as commercial logging or grazing. The Forest Service cannot rely on the outdated LRMP and especially the management allocations related to timber production.

**Non-Economic Values Of Biodiversity**

> We may know the names of every tree in the forest, but we don't begin to understand the complex matrix of organisms and relationships that comprise the web of life. We are not capable of predicting the consequences of losing a species; nor can we predict the future importance of some as-yet-undiscovered human use of a forest organism. Therefore, an economic impact analysis is beyond reach and perhaps even trivializes the profound meaning of biological diversity to life on earth; in short, this benefit is unquantifiable. A look at recent forest history points to the commercial importance of hemlock bark for the tanning process and white pine for boxboard--two uses now obsolete. The recent discovery of a cancer-fighting chemical in Pacific yew bark serves as a prominent example of important new forest products. Because we can't read the future, no dollar value can be attached to unknown goods and services. What we can do is adopt an approach that conserves all the native elements of the web of life, common and rare alike. At the same time, public policies that give incentives to protect biological diversity can be created and employed.

Massachusetts Forest Stewardship Program's, Task Force on Reforming Forest Taxation, "Quantifying Public Benefits on Private Forestland, in Massachusetts," January, 2000 http://www.massforesters.org/public.htm