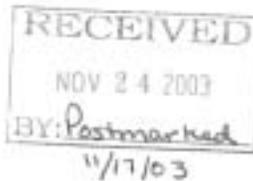




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Letter # 018

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RE: Comments on the Toolbox Post-Fire Logging Draft Environmental Impact Statement

Toolbox Project Description: Preferred Alternative G includes:

- ✓ 14,419 acres of commercial salvage logging;
 - 966 acres of logging in unroaded areas, *DEIS at 3-494*;
 - 3-10 snags per acre >10" DBH retained;
- ✓ 95% ground-based logging;
- ✓ 73 mmbf (14,500 log trucks),
- ✓ 16 miles of road construction,
 - 1.6 miles of road built in unroaded areas,
 - 2.6 miles re-opened in unroaded areas, and;
- ✓ Net present value of negative \$6 million.

Dear Ms. Wisdom,

Thank you for taking our comments related to the proposed actions described in the Toolbox Post-Fire Logging Draft Environmental Impact Statement (Toolbox DEIS or DEIS) and we genuinely hope that you will find them "substantive." We presume that the Fremont-Winema National Forests' response to our comments will be "substantive" as well.

Regrettably, the proposed actions are often unrelated and sometimes contrary to the stated purpose and need for the Toolbox Post-Fire Logging Project (Toolbox or Toolbox

Project). The DEIS ignores or fails to utilize best available science and contains numerous questionable assumptions, unsubstantiated conclusions, and unsupported recommendations. The Toolbox DEIS states that the overall objective of the proposed actions is to promote recovery of the Toolbox Fire Complex area. In accordance with that overall objective, the DEIS then lists its six components to the purpose and need for the project, the first of which is to "maintain sufficient amounts of snag and down wood created by the fire to provide effective habitat for dependent species, while promoting recovery of live forest habitat that was lost as a result of the fire." *DEIS, 1-8.*

Current fuel loading is low in most of the high severity burned stands in the project area and will only begin to increase after ten years or more. Until and after that time, the snags and logs in burned stands play vital roles in natural recovery processes. Imposing the severe disturbance of post-fire logging as proposed would put recovery processes at risk and cause damage to multiple ecosystem components. There is absolutely no valid ecological reason to log right now for the sake of fuels reduction. Unmanipulated, post-fire landscapes and ecosystems are one of the rarest in the Pacific Northwest Region and should be protected unequivocally until it can be demonstrated that these ecosystem types are adequately represented to maintain species viability and ecosystem processes. The rush to log in burned stands is strictly an economic matter and one that is not legally defensible under any statute or regulation governing the management of the National Forest System or the Fremont-Winema National Forest. Often, post-fire logging is a money-losing endeavor on the National Forests in Oregon and nationwide further weakening any economic rationalization.

The proposed actions will not achieve the projects' stated purpose and need but will instead likely cause unacceptable environmental impacts and increase the risk of catastrophic fire rather than decrease it. The Fremont-Winema National Forest must not unreasonably and deliberately state its purpose and need so narrowly as to exclude any alternative that might not include logging. In particular, including in the purpose and need a statement such as "salvage timber for merchantable value" specifically provides the agency an opportunity to drop from consideration any alternative that does not generate commercial logging contracts.

Therefore, the Sierra Club objects to the proposed actions outlined in the Toolbox DEIS and urge you to develop a management plan for the area based on restoring natural fire processes and watershed function while reducing fire risk adjacent to communities. The DEIS must develop and analyze an alternative that will adequately protect the Toolbox Fire landscape and wildlife viability, actively restore some parts of the landscape, allow passive restoration to occur on the rest of the area, reduce risk of fire-related injury and damage to private property, and be fiscally responsible.

The Sierra Club Rogue Group specifically requests that:

- ✓ Component six of the purpose and need statement be dropped and Alternative F be fully developed and analyzed in detail in the FEIS;

- ✓ All ODF&W and Klamath Tribes mule deer herd management objectives be met in MA 1, specifically no LRMP amendment be approved waiving the 40-50% thermal cover and 80% habitat effectiveness standards;
- ✓ No commercial tree-cutting, road construction, or re-construction in Riparian Habitat Conservation Areas as defined by the INFISH, LRMP Amendment #2;
- ✓ No new road construction and take action to reduce road density in the Toolbox Fire Complex to meet the LRMP standards for mule deer habitat;
- ✓ A "dead tree" only policy be adopted for marking in the Toolbox Fire Complex, specifically prohibiting the commercial cutting of any tree that shows green needles to any degree, and:
- ✓ All snags over 20" DBH be left on-site.

The Forest Service cannot ignore its role as trustee, responsible for managing the nation's natural resources. 42 U.S.C. § 4331(b)(1). This duty includes managing natural resources "without degradation, risk to health or safety, or other undesirable and unintended consequences." *Id.* at § 4331(b)(3). The Forest Service is also responsible for carrying out Congress' promise of providing aesthetically pleasing surroundings for all Americans. *Id.* at § 4331(b)(2). Moreover, each person at the Forest Service is responsible for contributing to the preservation and enhancement of the environment. *Id.* at § 4331(c). Consequently, forest managers must balance these goals with the Fremont National Forest Land and Resource Management Plan (FLRMP) objectives. Critical analysis, necessary to ensure that these Congressional policies are met, is lacking in the Toolbox Post-fire logging proposal Draft Environmental Impact Statement.

All citations in this comment letter are available from the authors and are incorporated into the administrative record as if repeated verbatim.

- I. Obligation under 40 C.F.R. § 1502 (NEPA Violations): *In the Toolbox DEIS, the USFS has failed to meet its obligations to take a "hard look" at the environmental consequences of its proposed actions, use accurate scientific analysis, or disclose important information contrary to its own.*

NEPA requires government agencies to disclose and take a "hard look" at the foreseeable environmental consequences of their decisions. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21, 96 S. Ct. 2718, 2730 n.21 (1976); 40 C.F.R. § 1502.16. An EIS must include sufficient information to determine what the impacts of a proposed action will be. 40 C.F.R. § 1508.9; *Southern Oregon Citizens Against Toxic Sprays v. Clark (SOCATS)*, 720 F.2d 1475, 1480 (9th Cir. 1983), cert. denied 469 U.S. 1028, 105 S. Ct. 446 (1984).

The agency must take a "hard look" at the project and its impacts, "as opposed to bald conclusions, unaided by preliminary investigation," and must "identify the relevant areas of

environmental concern." *Maryland-National Capital Park & Planning Comm'n v. U. S. Postal Service*, 487 F.2d 1029, 1040 (D.C. Cir. 1973).

The CEQ Regulations state:

"NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail."

40 C.F.R. § 1500.1(b). The information provided in the Toolbox DEIS is quite obviously not of "high quality" nor do they arise from "accurate scientific analysis," rather they simply amass needless detail.

The analysis on which the Forest has relied is inadequate, flawed and biased in a number of ways, rendering any potential decision arbitrary and capricious. 5 U.S.C. § 706. Very little substantive, site-specific information is offered anywhere in the DEIS. The Toolbox DEIS is mostly a qualitative narrative of the Forest Service's predicted and conjectural environmental consequences.

Restoration of Burned Areas

There is no scientific body of knowledge to support the proposed actions. In fact; many of the predicted impacts are contrary to the best available science. The Forest Service is required by NEPA to provide scientific support for its assumptions and predictions as well as disclose any evidence that might introduce significant controversy. Such empirical support is lacking entirely in the Toolbox DEIS.

The best available science supports a very different scenario for recovery of the Toolbox Fire Complex. The Forest Service must rely on this science and not on its professional opinion. Several conclusions can be made based on the best available science:

- The large majority of the Toolbox Fire Complex will recover naturally without any significant intervention (Beschta, et. al., 1995; McIver and Starr, PNW-GTR-486, 2000; Stickney, 1990).
- Sites that were damaged before the fire from roads, timber harvest, grazing, and other developments are most likely to require intervention to aid natural recovery. (Beschta et. al., 1995; Lyon, GTR-INT-184, 1976).
- The likelihood that a home will ignite from wildfire is almost entirely determined by the landscape within 40 meters of the building and by the materials and design of the building. (Cohen, Preventing Disaster, 2000; Cohen, Reducing the Wildfire Fire Threat to Homes: Where and How Much, 2000; Cohen, Why Los Alamos Burned, 2000).

- Management activity, including fuel reduction, beyond 40 meters away from a home has little effect on the likelihood that a home will ignite during a wildfire. (Cohen, Preventing Disaster, 2000; Cohen, Reducing the Wildfire Fire Threat to Homes: Where and How Much, 2000; Cohen, Why Los Alamos Burned, 2000).
- Post-fire logging usually does significant damage, changes the plant and animal succession, and has no ecological benefit. (Beschta, et. al., 1995; Robichaud, et. al., PNW-GTR-486, 2000).
- Stand replacing fires are a natural occurrence to which the forest is adapted with the exception of some lower elevation forest types. (Beschta, et. al., 1995; Interior Columbia Basin EIS, 2000).
- Drought and other climatic factors are the primary causes of large-scale fires, which occur regardless of fuel conditions. (Schmoldt, Daniel L., et. al., PNW-GTR-455, USFS, 1999).
- Fire suppression, logging, and grazing are the primary causes of unnatural fuel conditions. (Beschta, et. al., 1995; McIver and Starr, PNW-GTR-486, 2000; Schmoldt, Daniel L., et. al., PNW-GTR-455, USFS, 1999).

Until this information is incorporated into the DEIS, the document cannot meet the standards of NEPA or the directives found in the Forest Service Manual and Handbook.

Examples of the biased assumptions and conclusions in the Toolbox DEIS are rampant. For instance, the DEIS makes the customary "reburn" claim: that the standing dead trees will eventually fall to the ground and contribute to future undesirable fire effects. However, this theory has been abandoned by the agency's own scientists and is contrary to the best available information concerning large woody material. Further, the agency has based all of its fuel model predictions on the flawed assumption that there would be no periodic prescribed or wildland fire in the Complex over the time period modeled that would significantly control fuel buildup. The reburn hypothesis is directly contradicted by several literature reviews, including the agency's own:

- "We found no studies documenting a reduction in fire intensity in a stand that had previously burned and then been logged." (Environmental Effects of Postfire Logging, USDA Forest Service, 2000).
- "We are aware of no evidence supporting the contention that leaving large dead wood material significantly increases the probability of reburn." (Wildfire and Post-fire logging, Beschta, et al., 1995).
- "The removal of large, merchantable trees from forests does not reduce fire risk and may, in fact, increase such risk." (Depts. of Agriculture and Interior, Report to the President, September 2000).
- Large downed logs with stored interior water function like natural fire extinguishers that can retard fire intensity and rate of spread. (Amaranthus et al. 1989).

Post-fire logging

There are no legitimate ecological justifications for post-fire logging. Erosion and sedimentation, and the accompanying loss of soil nutrients, are acknowledged to be major issues in post-fire logging operations, especially post-fire operations (Klock 1975, Marton and Haire 1990, Minshall et al. 1994, Beschta et al. 1995). It has been strongly recommended that post-fire logging be prohibited in sensitive areas, including areas such as the Toolbox Fire Complex, or in any site where accelerated erosion is possible (Beschta, 1995).

Further, research on post-fire logging on the Winema NF, showed that logged sites in '93 produced only about 38% of the understory biomass of that on the unlogged site; in '94 produced only about 27% of the understory biomass of that on the unlogged site. (Sexton 1998). Since understory groundcover is the primary mechanism for post fire recovery of erosion and runoff, and consequent downstream sediment-related effects, this indicates that post-fire logging seriously impedes recovery. A conclusion contrary to that is made throughout the DEIS or simply ignored.

Sexton's work also indicates that the post-fire logging also reduced understory species richness by 13% in '93 and 30% in '94--logging reduced species richness, diversity and altered species composition, and stunted the growth rates of naturally regenerating ponderosa pine and the survival of planted ponderosa pines relative to unlogged, burned sites. The area was logged using ground based equipment over >60cm of snow.

Sexton concluded that his study

"...demonstrates that salvage logging retards the re-establishment early growth of [P. ponderosa] and [P. tridentata], two important wildfire restoration priorities."

There simply is no scientific literature in support of post-fire logging, but there is substantial literature explaining the negative impacts of such logging. For example, the Beschta Report (1995) advances several recommendations, nearly all of which are in direct opposition to various aspects of the proposed Toolbox project.

These recommendations include:

- No tractors and skidders in all salvage areas because of the exacerbated soil compaction and erosion problems they create on sensitive soils
- No road building
- Retention of at least 50% of all snags in all size classes
- Retention of all snags greater than 20 inches or older than 150 years
- Presumption against reseeded
- General recommendation to allow burned areas to recover naturally rather than resorting to human intervention.

Fire and Fuels

Contrary to the logic in the DEIS regarding the contribution of large woody debris (>3" dbh) to fire behavior, site-specific conditions like fuel moisture levels, which can differ according to stage of decay, season of the year, and prevailing weather conditions, can further diminish the flammability of large diameter snags and downed logs. Downed logs can store large amounts of water, especially if they lay directly on the ground surface. Forest Service research on hot, dry forest sites in the Klamath region revealed that even after prolonged drought and high intensity fire events, tremendous amounts of water can still be found in the interior of logs.

The centers of large logs can actually be cool and moist even when the outer shell of a log is on fire. Consequently, large logs can provide vital "fire shelters" that enable a number of wildlife species, as well as mycorrhizal fungi and other micro-flora and fauna essential to post-fire natural recovery, to survive fires. Over a typical fire season, this stored water in the interior of logs is slowly released in the form of water vapor. This water release, coupled with the shade that snags and downed logs provide, can raise the relative humidity of micro-sites, which in turn can decrease the rate of evapotranspiration of adjacent live vegetation, and promotes greater moisture retention in adjacent dead fine fuels. These microclimatic effects make local sites adjacent to downed logs moister and "greener" compared to sites devoid of large downed logs. With significant amounts of stored interior water, large diameter downed logs can function like "heat sinks" because significant heat energy is required for fire to evaporate the water and ignite the biomass. In effect, large downed logs with stored interior water function like natural fire extinguishers that can retard fire intensity and rate of spread. Amaranthus et al. 1989.

Large downed logs can also provide important shade structures that obstruct solar radiation and surface winds. These microclimate influences can result in lower ground surface temperatures and reduced surface wind speeds, which translate into higher live and dead fuel moisture levels compared to areas cleared of shade from standing or downed trees. Large downed logs can also reduce the speed and variability of surface winds, which inhibits extreme or erratic fire behavior. Thus, the ability of large downed logs to store water and provide shade from the sun and wind can function to lower the fire intensity and rate of spread. (Countryman 1955). The Forest Service failed to calculate the moisture retention, shade contribution, and other factors related to large downed logs in determining the purpose and need of the Toolbox project.

The BEHAVE fuels model used to predict fire behavior and resistance to control does not even include fuels greater than 3" DBH. *DEIS at 3-8*. Yet, the DEIS makes the specious argument that large fuels are somehow a significant factor in fire behavior and resistance to control. The DEIS stretches this argument to almost comical levels, when it opines that these smoldering large fuels might actually "ignite" and "torch" causing a crown fire. *DEIS at 3-8*. Such a stretch of the imagination is best left for sci-fi movies, as the USFS makes no attempt to cite scientific or even observational evidence of this "phenomenon!" That the alleged soil impacts resulting from the burning of large woody debris if left behind are worse more significant than the burning thousands of slash piles is beyond comprehension. The Toolbox DEIS must disclose and compare the negative soil impacts resulting from large woody debris naturally smoldering versus the impacts of thousands of slash piles being burned post-logging.

Third, the Forest Service proffers the unsubstantiated claim that without post-fire logging, standing burned trees will fall to the ground in 10 to 20 years and increase the fire hazard. This assertion is not based on available scientific data describing surface fuel accumulation and tree fall rates. The Forest Service's projection that burned trees will fall to the ground within 20 years assumes unnaturally high fall rates. The authorized action would leave behind the smaller trees that will most likely fall soonest but remove the vast majority of larger trees that otherwise will remain standing the longest.

Forest Service research, which the Fremont-Winema National Forest fails to apply, clearly shows that small fire killed conifers fall most rapidly and larger trees stand increasingly longer with greater size. Everett et al. 1999. Larger trees may remain standing and unavailable to combustion far longer than 30 years after a fire. For example, Everett and others (1999) studied burned forests in the eastern Washington Cascades and determined that 79 percent of ponderosa pine trees larger than 41 centimeters (16.1 inches) in diameter still stood after having been killed by fire 60 years earlier. There are thousands of trees larger than 16 inch DBH proposed for removal in the Toolbox Salvage Project.

Fourth, there are two pivotal assumptions the Toolbox DEIS makes that totally undermine its fire and fuels analysis: 1) that funding will indeed be available to conduct post-logging fuels reduction and 2) that helicopter units will indeed all receive broadcast burning. If these assumptions prove untrue or even partially untrue, the Toolbox project will in fact result in higher fuel loads in tons/acres of the most volatile fuels (those under 3" diameter) that result from logging activities. The history of the Forest Service has demonstrated that it is highly likely that funds such as Knudtsen-Vandenberg funds will not be made available and the logged areas will end up with higher volatile fuel loads than if they were left to recover on their own. These critical assumptions must be eliminated before the agency signs a Record of Decision.

Determination of Dead and Dying Trees

"Predicting whether conifers damaged by wildfire will live or die is not an exact science."

DEIS at 3-81. The Forest Service is proposing to log dead and dying trees. The agency claims it will determine mortality following recommendations in "*Guidelines for Estimating the Survival of Fire damaged Trees in California*," Wagener 1961. A document published 42 years ago is simply not adequate to guide marking in post-fire landscapes in the 21st millennium.

The Toolbox DEIS states that it will use a 20% bright green crown as a mortality guideline. DEIS at 3-81. In other words live trees will be logged. As noted *infra*, the Eastside screens contain a salvage exemption to the ecosystem standards. *Eastside screens*, p.2. Although the screens do not provide a definition of "salvage," other guidance frameworks, like the Sierra Nevada Framework, define salvage as only "dead" trees. For the salvage exception to apply, the Forest Service must ensure only dead trees are salvaged. The wildlife standards also prohibit harvest of "live" trees greater than 21 inches in diameter. *Eastside screens*, p. 10. If the Forest

Service harvests any live trees greater than 21 inches in diameter, the agency violates the Eastside screens.

The Forest Service acknowledges that determining survival and marking trees accordingly is difficult and complex. According to Forest Service research, site-specific factors including elevation, wind exposure, slope aspect, soil depth, site moisture, bark thickness, burn severity and seasonality of disturbance all influence tree mortality and decay rates. Lowell and others 1992. The Fremont-Winema National Forest failed to account for site-specific factors that affect tree mortality and decay rates, despite the clear recommendation of relevant scientific research.

“Good estimates of loss of timber volume and value over time are necessary for each of the alternatives listed in the impact statement and to help in the planning and decision-making process... The one goal for determining the rate of deterioration is to be able to apply the information to the appraisal of fire-killed and fire-damaged timber... The conditions of each sale must be carefully evaluated for all factors influencing the rate of deterioration and selling values adjusted accordingly.”

Lowell et. al. 1992. Stephens and Finney (2002) found that among ponderosa pines approximately 20 inches DBH, about 60 percent of the trees studied survived a 90 percent crown scorch by fire. Also, a substantial percentage of the ponderosa pines studied survived 100 percent crown scorch. This study is particularly significant to the burned forest in the Toolbox Fire Complex, which is dominated by ponderosa pine trees. Another study by Ryan and Reinhardt (1988) identified bark thickness as an important factor influencing tree mortality after fire. Only 60 percent of conifers with bark thickness of 3 cm (which equates to fairly small trees – in the range of 15 inches DBH) survived 65 percent crown scorch. 75 percent of trees with bark 4 cm thick survived 65 percent crown scorch. For trees with bark 5 centimeters thick and 65% crown scorch, over 80 percent survived.

A substantial portion of the large ponderosa pines that had 100% crown scorch in the North Fork fire of 2001 on the Sierra National Forest produced significant new green foliage in 2003, despite the fact that they showed no signs of life in the late summer and fall of 2001 or the entirety of 2002. Pers. Comm. with Mike Price, Sierra National Forest, 7/10/03. So many of the large ponderosas that were previously believed dead came “back to life” nearly two years after the fire that Forest Service personnel are not sure they will be able to sell the timber sale. *Id.*

The Forest Service’s failure to disclose published findings that contradict its own assessment of tree mortality and decay rates violates NEPA. The Toolbox DEIS lacks a reasoned discussion of scientific disagreements. See *Seattle Audobon Society v. Mosely*, 798 F.Supp. 1473, 1482 (W.D. Wash. 1992), *affirmed*, 998 F.2d 699 (9th Cir. 1993). The NEPA document must meaningfully address uncertainties surrounding the relevant scientific evidence concerning post-fire forest conditions. See *Seattle Audobon Society v. Espy*, 998 F.2d 699, 704 (9th Cir. 1993).

NEPA requires the Forest Service to provide the "hard data" upon which it relies for its conclusions and decisions. Idaho Sporting Congress v. Thomas, 137 F.3d 1146, 1150 (9th Cir. 1998). The record must disclose the studies and data used compiling NEPA documents, which must be "sufficient to enable those who did not have a part in its compilation to understand and consider meaningfully the facts involved." Environmental Defense Fund v. Corps of Engineers, 492 F. 2d 1123, 1136 (5th Cir. 1974). Without full disclosure the public is not be able to make independent judgments about the agency's action. Izaak Walton League of America v. Marsh, 655 F. 2d 346, 368-369 (D.C. Cir. 1981). "Conclusory statements which do not refer to scientific or objective data supporting them do not satisfy NEPA's requirement for a 'detailed statement'" Citizens Against Toxic Sprays v. Bergland, 428 F. Supp. at 908.

The Freemont-Winema fails to provide enough information for the public to be able to challenge the agency. Robertson v. Methow Valley Citizens, 490 U.S. at 349. NEPA requires the agency to prepare a detailed analysis of the environmental impacts and adverse environmental effects of proposed actions. 42 U.S.C. § 4332(2)(C). The DEIS fails to divulge the extent of live, green and partially burned trees that would otherwise survive that would be removed and the impacts of this on habitat and fire severity.

The Forest Service cannot ensure that it will not log live trees, in particular live trees over 21" DBH. As a result, the agency must follow ecosystem standards prescribed in the Eastside screens and the LRMP. By arbitrarily calling large, live, viable, partially burned trees "dead" or "dying" even though the relevant science shows that they will likely survive, the Toolbox post-fire logging project violates the prohibitions in the Eastside screens ecosystem and wildlife standards, the LRMP, and NFMA. 36 C.F.R. § 219.10(e). The Forest Service fails to provide the public with science and hard data to support mortality determinations, fails to acknowledge contradictory science, and fails to provide an impacts analysis of the effect of harvesting live trees in violation of NEPA. This constitutes arbitrary and capricious decision making in violation of the APA. 5 U.S.C. § 706(2)(A).

Soil and Water Impacts

The DEIS fails miserably to take a hard look at several critical contributors to soil compaction and sediment delivery; namely reconstruction of 21.4 miles of decommissioned roads and 16 miles of new road construction as well extensive private land post-fire logging in the Toolbox Fire Complex.

Again, there is ample science demonstrating the impacts of roads. For example, Amaranthus et. al (1985) concluded that soil erosion rates due to debris slides were many times higher on forests with roads, landings, and logging activity than on undisturbed forests. **Roads were found to cause 60% of the erosion volume.** Eaglin and Hubert (1993) concluded that the volume of fine sediment present in streams increased in direct proportion to logging in the watershed **and stream crossings by roads.** Corn and Bury (1989) found that a higher proportion of fine sediment occurred in streams flowing through forest stands with logging than streams flowing through unlogged forest stands. Potts et al (1985) found that sedimentation increases after large fires, but increases significantly more after post-fire logging. This increased

sedimentation caused by post-fire logging is particularly severe where high-intensity fires occurred and erosion and resulting sedimentation is most severe with ground-based skidding systems. (Megahan and Molitor 1975; Klock 1975).

The Toolbox DEIS relies entirely on BMPs, some voluntary, to explain away any significant impacts on soil compaction and erosion. The selected alternative proposes logging mostly high severity burn areas, where hydrophobic soils will be most prevalent. However, the DEIS fails to take a "hard look" at the impact to hydrophobic soils from soil compaction and other impacts.

Obviously, the road reconstruction, construction, and fire suppression and recovery components of the Toolbox post-fire logging proposal cannot be ignored, considered separately or treated as a brief narrative and to do so is in direct violation of the statutes and directives that shape the agency's compliance with NEPA. Nor can the DEIS rely simply on BMPs to account for significant effects as it does regularly.

Several resource issues are simply ignored based solely on BMPs and mitigation measures. For example noxious weeds, fire and fuels, hydrology, soil compaction etc. Such reliance on BMPs and mitigation measures has been found to be inconsistent with NEPA by the federal court system. The Neighbors of Cuddy Mountain case provides clarification with respect to the Forest Service's duty to properly formulate and discuss mitigation measures:

"The Forest Service's perfunctory description of mitigating measures is inconsistent with the "hard look" it is required to render under NEPA . . . A mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by NEPA."¹

While the use of BMPs is to be encouraged in timber salvage projects, we note that the use of these measures is not in and of themselves sufficient to ensure compliance with the law. Again Neighbors of Cuddy Mountain,

"The Forest Service's broad generalizations and vague references to mitigation measures in relation to the streams affected, do not constitute the detail as to mitigation measures that would be undertaken, and their effectiveness, that the Forest Service is required to provide."²

II. Clean Water Act: Without established TMDL's for streams listed on the states 303(d) list, the agency has no idea whether or not it can safely elevate temperatures and sediment load in those streams and thus violates the CWA.

Because the Toolbox DEIS fails to protect the designated uses of Silver Creek and West Fork Silver Creek, the Toolbox post-fire logging project will violate the Clean Water Act ("CWA") as well. Furthermore, the Forest Service's claim that the initial increase of sediment caused by the proposed action will be followed by a greater decrease over current levels after the

¹ 137 F.3d at 1380 (quoting Carmel-by-the-Sea v. U.S. Dep't of Transp., 123 F.3d 1142, 1154 (9th Cir. 1997) and Northwest Indian Cemetery Protective Ass'n v. Peterson, 795 F.2d 688, 697 (9th Cir. 1986), rev'd on other grounds, 485 U.S. 439 (1988).

² Id., at 1381.

project is completed is pure speculation. Neither the Forest Service nor the state of Oregon has established TMDLs for the planning area. Presently, there is no baseline to determine whether sediment from the proposed action will impact water quality. Without knowing what the TMDL limits are for the adjacent creeks and rivers, the Forest Service cannot know whether sediment from road building and logging operations will be irreversible or insignificant. Consider the following:

"The Forest Service argues that the initial increase caused by the Project will be followed by a greater decrease over current levels after the Project is completed. That may or may not be true. However, the Forest Service is working by speculation here because neither it nor the State of Montana has established Total Maximum Daily Loads. By the Forest Service's own estimates, fish are likely to be threatened. Before the Forest Service decides to do anything that will increase sedimentation, even if the proposed action should ultimately decrease long-term sedimentation, the Forest Service must know how much the stream can carry away. Without a baseline, there is no way but speculation to determine how the sediment impacts water quality, adversely or beneficially. The Best Management Practices employed in the Project are not sufficiently reasonable under Mont. Code Ann. 75-5-703(10)(b), because it is possible that even perfect compliance with the best practices would not be enough. The Forest Service simply does not know. By deciding to carry out this project in watersheds with already compromised streams, without knowing the exact condition and capacity to cope of those streams, the approval of the Lolo Post-Burn Project is arbitrary and capricious within the terms of the APA...Consequently, sales impacting these streams segments cannot proceed until TMDL's are established."

Sierra Club v. Austin, No. CV-03-22-M-SWM, slip op. at 18 - 19 (D. Mont. Apr. 30, 2003).

The Toolbox project is analogous to the situation in *Austin*. This case makes it clear that timber harvest that will exacerbate degraded conditions may not go forward absent a TMDL for the listed waterways.

Two stream sections in the Toolbox post-fire logging area are listed on the state's 303(d) list as functioning at unacceptable risk due to temperature and sediment. *DEIS at 3-266*. The Toolbox DEIS discloses that stream temperatures will continue to exceed state standards and will be further increased "with the loss of overstory vegetation from fire-induced mortality. *DEIS at 2-291*. Yet, it clumsily argues that temperature "characteristics" in the 303(d) streams are not "expected" to change or "should" not increase as a result of any of the action alternatives. *DEIS at 3-354 & 365*. However, the agency's logic seems fundamentally flawed because in the same breath it states that these negative effects are less likely to occur in alternatives with fewer acres in RHCA harvest. If that statement is true, then it leads one to infer that logging in RHCAs does directly affect water temperature and yet the DEIS does not include any quantified analysis of how the various degrees of logging in RHCAs will increase temperature in the 303(d) streams. Further, the vague and non-committal terms such as "expected" and "should" are totally inappropriate for NEPA and an issue as chief as compliance with the Clean Water Act.

Because the streams in the planning area are at risk or are not properly functioning according to Oregon State standards, the USFS will violate the CWA and NFMA if the Toolbox project is implemented. 36 C.F.R. § 219.23(d). By proposing to carry out this project in watersheds with already compromised streams, without knowing the exact condition and capacity to cope of those streams, approval of the Toolbox DEIS would be arbitrary and capricious within the terms of the Administrative Procedure Act. 5 U.S.C. § 706(2)(A).

Furthermore, the Forest Service must consider the recent District Court decision from the Northern District of California. EPIC v. Pacific Lumber Company (C01-2821)(N.D. Cal. October 14, 2003). Under this new decision, the Forest Service must obtain a National Pollutant Discharge Elimination System (NPDES) permit from the Oregon Department of Environmental Quality (DEQ) for all point source discharges. Under the CWA, all discharges from a discernable conveyance, like a ditch, require a permit. 33 U.S.C. § 1301. The Forest Service must survey the project area and contact DEQ to determine if a permit is necessary.

III. Socio-Economic Analysis (Violations of NEPA, MUSYA, RPA, NFMA, APA and GCCPA): *The socio-economic analysis is incomplete because it fails to provide the Forest Service with the information needed to insure that the Toolbox project is economically justified.*

The Toolbox post-fire logging project must be economically justifiable.

Various statutes, regulations, and rules governing Forest Service management require the Toolbox project to be economically justified, from a broad-multi-resource perspective. This obligation extends to all Forest Service programs and projects, but is especially important in the context of "stewardship" projects designed for restorative purposes.

To be economically justified, the Toolbox project must rest upon a socio-economic analysis that fully accounts for effects on all market and non-market goods and services, and considers the economic interests of all those who are economically affected by management activities.

To demonstrate the economic feasibility of the Toolbox project, the Forest Service must engage in an economic efficiency analysis that “adds other economic costs and benefits that are not part of Forest Service monetary transactions.” FSH 2409.18.12.2. This includes all marketed and non-marketed benefits and costs to all those who derive economic value from the lands affected by the project. As characterized by Niemi and Whitelaw (1997), classes of interests that must be represented in such an economic analysis include four major groups: (1) those who benefit from timber sales; (2) those who incur economic costs from timber sales; (3) those who see the unlogged forest resources affected as an element of quality of life, and (4) those who place an intrinsic value on unlogged forest resources.³ A comprehensive socio-economic analysis that addresses costs and benefits to all these interests is required for projects that are analyzed in the context of an environmental impact statement. FSH 2409.18.32.2.

The Toolbox DEIS falls far short of this mark because only a limited financial efficiency analysis – one that is limited to costs and benefits to the wood products sector and the Forest Service- was completed. Not only does the DEIS fail to conduct a full cost accounting analysis, but it fails to recognize that Oregon’s National Forests regularly lose money on their timber sales program and that post-fire logging often results in even greater losses than green tree sales. Although, the Forest Service has discontinued its timber sale accounting program, data is available from year previous. For instance, Niemi (2003) cites figures for 1998 indicating that the National Forests in Oregon lost more than \$100 million in 1998 on their logging programs. More to the point, the Fremont National forest lost \$3.7 million in 1998 and the Winema, in the top ten money losing National Forests, lost \$12.8 million.⁴ Oppenheimer (2001) suggests that the Fremont National Forest operated its timber sale program at a loss of \$105,180 per million board feet in 1998.⁵ In addition, Niemi estimates in a recent study for the Biscuit post-fire logging project that salvage logging in Oregon could result in losses of \$100,000 per million board feet, indicating a loss of \$7.32 million if the preferred alternative G were selected.

The DEIS fails to address the issue of salability to the purchaser

Deterioration of the trees (loss of commercial value) and the cost of operations may be such that the Toolbox post-fire logging project is not saleable. The Forest Service has an obligation to disclose that there are serious issues related to the salability and economic feasibility of the project. In particular:

“If anticipated value of the timber to the purchaser does not cover the purchaser’s costs, verify that the sale is feasible for an operator to harvest either with or without supplemental funding. If the sale is not feasible to a purchaser and will, most likely, receive no bids, drop or delay the sale until market conditions are better, or redesign the sale, within the limits of the forest plan, to make it more attractive to potential purchasers.” FSH 2409.18.23.

³ Niemi, E. and E. Whitelaw (1997). Assessing Economic Tradeoffs in Forest Management. USDA Forest Service, Pacific Northwest Research Station, Gen Tech. Rpt. PNW-GTR-403.

⁴ www.taxpayer.net/forest.

⁵ *Ibid.*

Thus, not only does the Forest Service have the obligation to demonstrate feasibility in the DEIS, but the agency has an additional duty to either drop the Toolbox project in its entirety or substantially redesign the sale because it will likely receive no bids in its present form.

The DEIS grossly overstates economic benefits to the wood products sector.

As set forth above, the DEIS fails entirely to discount its projections of revenues, incomes, and jobs in the wood products sector to reflect significant uncertainties as to whether or not the project will actually be sold and logged. Economists have developed a wide range of tools for dealing with projections of uncertain benefits, and these tools should be applied in the context of the Toolbox DEIS. In particular, the calculations of project revenues, incomes, and jobs generated should be multiplied by the probabilities of the timber sale actually being sold and logged. For a more complete discussion of how uncertainty needs to be incorporated into the DEIS's economic analysis, we refer the Forest Service to Boardman, et al. (2001).⁶

Economic benefits to the wood products sector are also grossly overstated because the Forest Service has failed to recognize that the DEIS must disclose only the incremental revenues, incomes, and jobs generated by the sale. If the Toolbox project is simply displacing revenues, incomes, and jobs that would otherwise be associated with logging on non-federal lands, the Forest Service can claim absolutely no additional revenues, incomes, or jobs generated by the project. The Office of Management and Budget clearly requires this kind of accounting:

"Analyses should take particular care to identify the extent to which a policy such as a subsidy program promotes substitutes for activities of a similar nature that would occur without the policy. Either displaced activities should be explicitly recorded as costs or only incremental gains should be reported as benefits of the policy. (OMB Circular A-94 at 6)."

The DEIS fails to acknowledge displacement effects and instead, erroneously concludes that all revenues, jobs, and incomes associated with the project would be "created" out of thin air. Further, if the DEIS is to be taken at face value, taxpayers are being asked to pay for (subsidize) approximately 400-500 temporary industry jobs. *DEIS at S-19*. Taking the preferred alternative G, this equates to a cost of approximately \$11,000 per industry job or \$7,400 per overall induced job, which equate closely with Oppenheimer's (2001) findings of \$6,585 lost per job on the Fremont's timber sale program.⁷ Why should the taxpayers be asked to support a tiny fraction of the jobs in Oregon, by some estimates equal to only 2% of all employment in the state? (Niemi 2003).

⁶ Boardman, A., Greenberg, D., Vining, A., and Weimer, D., (2001). *Cost Benefit Analysis, Concepts and Practice*. Upper Saddle River, Prentice Hall. Chapter 7.

⁷ www.taxpayer.net/forest.

IV. Purpose and Need and Range of alternatives are unnecessarily restrictive (Violations of NEPA and Forest Service Handbook and Manual): The Forest Service is required to analyze a no-harvest alternative when proposing stewardship projects. The Toolbox DEIS dismisses both a no-harvest restoration only alternative and a prescribed fire alternative with extremely flawed logic.

Purpose and Need Narrowly Restricted

NEPA mandates that an agency "shall to the fullest extent possible: Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment." 40 CFR §1500.2(e). NEPA documents must discuss alternatives to the proposed action in order to "provide(e) a clear basis for choice among options by the decisionmaker and the public." 40 CFR §§1502.14, 1507.2(d), 1508.9(b); 42 USC §4332(e). The purpose of this requirement is "to insist that no major federal project should be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means." Environmental Defense Fund v. Corps of Engineers, 492 F.2d 1123, 1135 (5th Cir. 1974); Methow Valley Citizens Council v. Regional Forester, 833 F.2d 810 (9th Cir. 1987), rev'd on other grounds, 490 US 332 (1989) (agency must consider alternative sites for a project).

Courts have ruled that:

The goal of [NEPA] is to ensure "that federal agencies infuse in project planning a thorough consideration of environmental values ... The consideration of alternatives requirements furthers that goal by guaranteeing that agency decision makers "[have] before [them] and take into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit balance.

Bob Marshall Alliance v. Hodel, F.2d 1223 (9th Cir. 1988). The Council on Environmental Quality clarified their regulations by announcing that "Alternatives that are outside the scope of what Congress has approved or funded must still be evaluated in the EIS if they are reasonable ... " 48 FR 18026.

Although the Forest Service may limit the design of alternatives to those alternatives that meet the purpose and need identified for the project, the courts have reprimanded the Forest Service for formulating a purpose and need so as to exclude other alternatives. "An agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative ... would accomplish the goals of the agency's action, and the EIS would be a foreordained formality." Sierra Club v. Robertson, 845 F. Supp. 485, 500 (S.D. Ohio 1994); Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 196 (D.C. Cir. 1991), cert denied 502 US 994, 112 S. Ct. 616 (1991).

The Seventh Circuit has stated:

No decision is more important than that delimiting what these "reasonable alternatives" are ... One obvious way for an agency to slip past the structures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence) ... If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role.

Simmons v. United States Army Corps of Engineers, 120 F.3d 664, 660 (7th Cir. 1997).

Range of Alternatives

The manner in which the Toolbox DEIS dismisses the non-commercial alternative F is completely ridiculous and contrary to existing evidence. There are no legitimate ecological justifications for post-fire logging. Erosion and sedimentation, and the accompanying loss of soil nutrients, are acknowledged to be major issues in post-fire logging operations.

Viable alternatives to those presented in the Toolbox DEIS do exist, and the failure of the Forest Service to analyze such alternatives "renders (the) environmental impact statement inadequate." Seattle Audubon Society v. Lyons, 871 F.Supp. 1291, 1319 (W.D. Wash. 1994). Although citizens have suggested other ways to implement this project, it is the Forest Service's, not citizen's, duty to come up with alternatives. "Compliance with (NEPA) is a primary duty of every federal agency; fulfillment of this vital responsibility should not depend on the vigilance and limited resources of environmental plaintiffs." City of Carmel-By-The-Sea, 123 F.3d at 1161; see also City of Davis v. Coleman, 521 F.2d 661, 671 (9th Cir. 1975). As the Seventh Circuit has noted, "(w)hat other alternatives exist we do not know, because the (government) has not looked." Simmons v. United States Corps of Engineers, 120 F.3d 664, 670 (7th Cir. 1997).

The Forest Service failed to analyze a reasonable range of alternatives in the Toolbox DEIS. The DEIS must address a no-harvest restoration alternative that implements prescribed burning, culvert replacement, large woody debris (LWD) recruitment, and road obliteration alone, without commercial timber harvest. The Forest Service should have considered this alternative, and failed to present any reasoned explanation in the DEIS as to why it was not considered. The fact that soil compaction caused by post-fire logging can impede the rate of recovery of mature forest relative to replanting alone without post-fire logging should have by itself indicated to the Forest Service the need to fully analyze such an alternative. Also, the DEIS does not adequately explain why periodic prescribed fire—as opposed to post-fire logging—could not be used to manage post-fire hazardous fuels. There is ample evidence in the literature that such an alternative would achieve the restoration goals of the project in a cost efficient manner without creating any of the ecological and economic damage of treatments that include commercial logging.

In all projects involving "stewardship" goals, the Forest Service Handbook and Manual explicitly require consideration of alternatives without commercial logging:

"Where timber harvest is proposed primarily for the purpose of achieving forest stewardship purposes... a full range of alternatives, including practical and feasible non-harvest options, must be analyzed in the environmental analysis process." FSM 2432.22c.

Consideration of such a non-harvest alternative is especially important in situations, such as the Toolbox, where demand for the wood products that will be generated under the logging alternatives is questionable, and where logging is financially inefficient, and saturating the market with below cost, subsidized timber may drive down the value of timber harvested from regional private lands:

"If the forest has no timber program or if there [is] no demand for the timber being harvested, these vegetation management projects should be accomplished through other means, such as controlled burning. Timber harvest must be the most financially efficient way of achieving the necessary vegetation management, that is, it produces the least net cost..." FSH 2409.18.26.1.2

Further, the Forest Service is required to analyze such an alternative under NEPA. Because commercial logging, as proposed in the Toolbox causes undesirable impacts on the environment, the agency must include an alternative that does not include such impacts:

"Develop other alternatives fully and impartially. Ensure that the range of alternatives does not prematurely foreclose options that might protect, restore, and enhance the environment. Consider reasonable alternatives even if outside the jurisdiction of the Forest Service. 40 CFR 1502.22

As the Beschta Report (1995) clearly states,

"Human intervention on the post-fire landscape may substantially or completely delay recovery, remove the elements of recovery, or accentuate the damage. In this light there is little reason to believe that post-fire logging has any positive ecological benefits, particularly for aquatic ecosystems. There is considerable evidence that persistent, significant adverse environmental impacts are likely to result from post-fire logging." Beschta 1995.

Obviously, if leading scientists raise such concrete doubts, then the DEIS should have considered an alternative that would not result in such impacts. Such an alternative must be fully developed even if implementing such an alternative would not meet current policy:

"Reasonable alternatives which may require a change in existing law or policy to implement shall be formulated if necessary to address a major public issue, management concern, or resource opportunity identified during the planning process. 36 CFR §219.12,f [5].

Just such a situation exists with the Toolbox; there is a major public issue (commercial timber harvest and impacts to soils and water quality), a management concern (forest health, lower road density, etc.), and little to no market value. According to law and forest service

direction, the agency must formulate a no-harvest alternative that addresses the restoration needs of the Toolbox Fire Complex.

- V. *Species Viability (Violations of NFMA, ESA and APA): The Toolbox project will jeopardize the viability of species that find optimal habitat in interior forests and naturally disturbed areas. Further population monitoring data have not been presented for several MIS species in the Toolbox DEIS or B.E.*

NFMA requires that the Forest Service provide for a diversity of plant and animal communities. 16 U.S.C. § 1604(g)(3). The Agency is required by NFMA's implementing regulations to maintain populations of native animals through monitoring the impacts of Forest Plans, including specific management actions, on management indicator species (MIS). 36 C.F.R. § 219.12(a)(6). The Toolbox project includes commercial salvage harvest, ground-disturbing activities associated with timber harvest, road construction activities as well as realignments, and other vegetative manipulation. These activities are likely to jeopardize the viability of species that find optimal habitat in forests with well-developed structures, and forests naturally disturbed by fire, disease and insect pathogens. Included here are forests that are disturbed by fire and the natural insect infestations that follow fire in a functioning ecosystem. The structural attributes created by fire, particularly the abundance of snags and LWD, are of critical importance to the viability of many species including the northern goshawk, mule deer, pileated woodpecker, American marten, red-naped sapsucker, snag and downed wood dependent species, black-backed woodpecker and Neotropical migratory birds.

For many of these species the Forest Service has no up-to-date population data describing population numbers, locations, and trends, nor monitoring data on which the agency can rely to determine that the actions proposed in the context of Toolbox will maintain numbers and distribution of these species sufficient for insuring long-term viability.

Quite obviously, the Forest Service has failed to obtain the necessary data for management indicator species as well as sensitive and TES in this case and instead assumes that enough habitat will remain, in particular the DEIS relies heavily on projected snag densities, to maintain viable populations, using the threshold levels provided by the DecAID tool. This approach, which exclusively relies on habitat estimates, without checking the actual populations, ensures that any changes in population will go undetected and has been unambiguously rejected in federal courts, i.e.:

"The Forest Service is obligated by the plain language of the National Forest Management Act's regulations to acquire and analyze hard population data for its selected management indicator species . . . Under this clear language, it may not rely solely on habitat trend data as a proxy for population data or to extrapolate population trends." Forest Guardians et al. v. United States Forest Service, No. CV 00-714 JP/KPM-ACE.

NFMA does not envision forest planning stopping at the Forest Plan level. In fact, the implementing regulations of NFMA state plainly that "diversity shall be considered throughout the planning process." 36 C.F.R. § 219.26.

Nor has the Forest Service determined the "minimum number" of reproductive individuals that would constitute a viable population. The Forest Service is required by law to determine this minimum number of reproductive individuals before implementing activities that might impact those individuals or populations such as are planned in the Toolbox. The Forest Service cannot permit these activities without knowing the location and number of individuals of these species that would enable determination of whether habitat for each vertebrate is well distributed to facilitate interaction. Until such information is provided the Forest Service cannot know whether it is providing sufficient habitat to support the minimum number of reproductive individuals nor that the habitat is distributed in such a manner as to permit interaction.

Because the Forest Service has no such data for most species adversely affected by the proposed management activities, and because what data there is suggests that such species are declining and otherwise at risk, the Forest Service runs afoul of viability and diversity requirements set forth in forest planning regulations 36 C.F.R. § 219.19 and § 219.26. In addition, the any decision made on the Toolbox and associated activities without the above-described information would be considered arbitrary and capricious and constitute agency action unlawfully withheld or unreasonably delayed in violation of the APA. (5 USC §§ 706[1] & 706[2]).

Black-backed woodpecker, Lewis' woodpecker and other snag dependent species.

The removal of dead and dying trees (future snags), especially large snags and fragmentation of large tracts of unharvested areas will have significant effects on the black-backed and Lewis' woodpecker in the planning area. McIver and Starr (2000) reviewed several studies that documented that post-fire logging caused "significant changes in abundance and nest density of cavity-nesting birds... [m]ost cavity-nesters showed consistent patterns of decrease after logging."

Mortality from natural disturbance serves a critical role in the balance of this ecosystem including providing abundant habitat and food for cavity nesters and insectivores such as the black-backed and Lewis' woodpecker and Neotropical migratory bird species. Commercially removing this material stops this process in its tracks and deprives many species of developing habitat and food sources. Despite these very real negative effects the Forest Service has treated the black-backed and Lewis' woodpecker, with a qualitative analysis in the DEIS, absolutely no quantitative population information has been presented to support the claims of the Forest Service.

Rather than monitoring population numbers and trends in the planning area, the Forest Service relies on DecAid as an "advisory tool." DecAID simply considers snapshots in time, and in the context of salvage this is a critical flaw. When a fire kills most trees then there is a serious lack of future snag and down wood recruitment. DecAID looks at "year 1" after the logging, when it's most critical to look at "year 100" after most of the snags have fallen and the next stand begins recruiting large snags and down wood.

The DEIS misuses the DecAID decision support tool. The DEIS relies on DecAID to analyze impacts on snag dependent species, but the DEIS 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 at specific time intervals and for a specific set of conditions, but dynamic changes in forest and landscape conditions would have to be modeled or evaluated outside the confines of the DecAID Advisor.⁸

"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."⁹

The fact that DecAID also considers snags down to 10 inches in diameter 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. The DEIS has failed to consider the differing fall rates of large vs. small snags.¹⁰

"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.]"¹¹

The DEIS uses the 50% tolerance level for ponderosa pine communities below 5000' elevation and with less than 50% mortality and the DEIS used the 30% tolerance level for ponderosa pine communities with greater than 50% mortality rather than the more conservative 80% species tolerance thresholds. This practice is inconsistent with the eastside screens goal of maintain 100% population potential. In fact, "tolerance level" of the DecAID tool and "viability" as used in the Eastside Screens are not equivalent terms and cannot be interchanged as the DEIS has attempted to do. Removing nearly all of the snags in the larger diameter classes will directly violate the Fremont-Winema LRMP. The LRMP requires that snag densities be met during "each successional stage" and "retained through the full rotation." *LRMP at 104*.

Neotropical Migrant Birds

⁸ 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://www.notes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/HomePageLinks/44C813BC574BDFCC88256B3E006C63DE>

⁹ "DecAID caveats" <http://www.notes.fs.fed.us:81/pnw/DecAID/DecAID.nsf>

¹⁰ Snag Dynamics in Western Oregon and Washington," Janet L. Ohmann, July 26, 2002

<http://www.notes.fs.fed.us:81/pnw/DecAID/DecAID.nsf>

¹¹ Ibid.

The U.S. Forest Service, in other regions, is consistently using NTMBs as a sensitive class of species for which to manage. This is due to growing concerns with habitat fragmentation and population declines. The Toolbox Project will likely have a significant adverse effect on NTMBs due to salvage of dead and dying trees. Despite this fact, the DEIS fails to address NTMBs other than a brief narrative indicating some NTMBs will benefit from the fires and logging and some will experience detrimental effects with no supporting documentation in violation of the Migratory Bird Treaty Act. By law, the Forest Service must take steps to reduce or eliminate intentional or unintentional "takes" of migratory birds and incorporate migratory bird impacts into its NEPA analysis. These requirements appear frequently in the Migratory Bird Treaty Act (16 U.S.C. § 703-711) and the President's Executive Order of January 11, 2001.

VII. Compliance with the LRMP (Violations of NFMA and LRMP): The Toolbox is in violation of several standards and guidelines adopted in the Fremont-Winema National Forest Land and Resource Management Plan and its Amendments #1 & 2.

The Toolbox Post-fire logging proposal will further diminish riparian quality in violation of INFISH.

In 1995, Inland Native Fish Strategy (INFISH) amended the MNF Land and Resource Management Plan (MLRMP). INFISH provides direction for the protection of riparian habitat in ecosystems containing native fish. INFISH establishes a set of Riparian Management Objectives (RMOs) to protect Riparian Habitat Conservation Areas (RHCAs). These Objectives contain quantitative standards used to achieve eight management goals. *INFISH Decision Notice, A-2 to A-13*. The goals are to "maintain and restore" water quality, stream channel integrity and instream flows, and support population of well-distributed fish stocks. *Id.* at A-1 to A-2. The watersheds surrounding the Toolbox Post-fire logging proposal project area currently fails to meet RMOs in several categories

Although the Forest Service finds stream channels and riparian areas to be sensitive to even slight changes, the DEIS finds the project will only slightly impact sediment, water quality, temperature, or water quantity. As a result, the Forest Service concludes that the project will not adversely affect INFISH RMOs. As discussed *infra*, the Forest Service failed to adequately provide sufficient information for sedimentation, water quality, and water quantity. As such, the agency cannot claim with any validity that RMOs will not be affected. The agency cannot ensure that it is meeting the goals prescribed in INFISH of "maintain[ing] and restor[ing]" water quality, stream channel integrity, and instream flows, and support population of well-distributed fish stocks without providing adequate support in determining the project effects. *INFISH Decision Notice, A-1 to A-2*.

The Toolbox Post-fire logging proposal violates the Eastside Screens

The Eastside Screens include fairly complex standards including: 1) the 21" diameter cap for snags and green trees, 2) the prohibition on harvest in LOS stage stands below HRV, 3) the connectivity and fragmentation standard, and 4) and the down log standard.

The interim wildlife standard (IWS) requires two scenarios to follow based on HRV, but only one is applicable to the Toolbox Project. Late and old structural (LOS) stages can be either "Multi-Strata with Large Trees" or "Single Strata with Large Trees," and can occur separately or both may occur within a biophysical environment.

Salvage sales with green volume OUTSIDE OF CURRENTLY MAPPED OLD GROWTH, are exempt from the interim ecosystem standard (HRV consideration) but must still meet the direction provided in Scenario A, items 1-4. Particularly critical is the agency's duty to determine if LOS stages fall below HRV. Despite undue discretion provided the agency in characterizing HRV, if one or both of the LOS stages falls below HRV, there "should" not be any net loss of LOS from the biophysical environment. *Timber harvest is not allowed in within LOS stages that are below HRV.* The agency must have the information to make the LOS stage determinations and it must be presented in the EIS.

1. If LOS stages are within or above HRV, timber sales can occur in a manner "to maintain or enhance" LOS within that biophysical environment.
2. Outside of LOS, timber sale activities may occur with the intent "to maintain and/or enhance LOS components." All trees greater than 21" DBH must be maintained (not cut). Vegetation structure that does not meet LOS conditions will be manipulated to move it towards LOS conditions. "Open, park like conditions" will be maintained where they occurred historically, while maintaining "some amount" of seedlings, saplings, and poles for the development of future stands.
3. Connectivity of LOS stands must be maintained and fragmentation reduced. LOS stands and LRMP designated old growth/MR habitats are to be connected with each other in a contiguous network pattern by at least two different directions inside a watershed. Stands designated as connectivity corridors are defined as stands in which medium DBH to larger trees are common and canopy closures are within the top 1/3 of site potential. These stands "should be at least 400 ft. wide at the narrowest point. The next best stands can be designated for connectivity corridors if there are no stands meeting the description. Length of corridors "should" be as short as possible. Timber harvest can occur in corridors as long as the corridor stand criteria can still be met and some amount of understory is left in patches or scattered for stand density and cover requirements. In non-LOS stands surrounded by LOS stands, group selection or even-aged regeneration is prohibited and single tree selection should only proceed if it moves the stand towards LOS conditions "as soon as possible."
4. All timber harvest activities will maintain snags and green replacement trees 21" DBH or greater at *100% potential population levels of primary cavity excavators.* The 100% potential standard "should" be determined using the best available science on species requirements as applied through current snag models. Pre-activity down logs may only be removed when they exceed the quantities listed in the Eastside Screens document.

SPECIES	PIECES/ACRE	DIAMETER SMALL END	PIECE LENGTH (TOT. LENGTH)
Ponderosa pine	3-6	12"	>6' (20-40')
Mixed conifer	15-20	12"	>6' (100-140')
Lodgepole pine	15-20	8"	>8' (120-160')

In order for the agency to plan its timber harvest activities, where it will locate connectivity corridors, and where it can conduct PFSL in a watershed, it must know where the LOS and old growth/MR stands are and what the conditions of the stands in between and surrounding them are. The project record should contain the documentation and process for having established these conditions. It is not apparent from the Toolbox DEIS that these conditions have been analyzed and established for the planning area.

It is not clear from the DEIS that the Forest Service has designated the connectivity corridors and complied with the fragmentation standard for any patches of LOS below HRV surrounded by old growth/MR or above HRV stands of LOS stage. The discussion of connectivity corridors in the Toolbox DEIS does not confirm that LOS stands and LRMP designated old growth/MR habitats are connected with each other in a contiguous network pattern by at least two different directions inside a watershed nor is it clear that stands designated as connectivity corridors are defined as stands in which medium DBH to larger trees are common and canopy closures are within the top 1/3 of site potential. *DEIS at 3-222*. Finally it is not clear from the DEIS that these stands are at least 400 ft. wide at the narrowest point. *DEIS at 3-222 to 3-223*.

Finally, the DEIS fails to determine whether or not in non-LOS stands surrounded by LOS stands, group selection or even-aged regeneration will be prohibited or that single tree selection will only proceed if it moves the stand towards LOS conditions "as soon as possible." *DEIS at 3-223 to 3-224*. Instead, the reader is provided with a narrative assurance that "none of the alternatives would have an effect on patch size or fragmentation of habitats." *DEIS at 3-224*. Such an affirmation is comforting but fails to address the standards in the Eastside Screens.

VII. NFMA and NEPA Violations regarding impacts on soil and soil productivity

The Statute And Implementing Regulations

The National Forest Management Act ("NFMA") prohibits the Forest Service from carrying out management activities that cause permanent impairment of the soil.¹² The NFMA is most relevant to timber harvest planning and dictates that the Forest Service perform inventories, plan in accordance with the National Environmental Policy Act ("NEPA"), consider the physical and economic suitability of the lands, provide for diversity of plant and animal communities and follow certain harvesting guidelines and practices.¹³

¹² National Forest Management Act of 1976, 16 U.S.C. §§ 472a, 512b, 1600, 1611-1614 (1194) (amending Forest and Rangelands Renewable Resources Planning Act of 1974, Pub. L. No. 93-178, 88 Stat. 476).

¹³ Lacy, Peter M. 2001. *Our sedimentation boxes runneth over: Public lands soil law as the missing link in holistic natural resource protection*. 31 *Envtl. L.* 433 (2001).

The NFMA requires the Forest Service to “insure that timber will be harvested from National Forest System lands only where—soil, slope, or other watershed conditions will not be irreversibly damaged.”¹⁴ Finally the NFMA directs that timber will be harvested only where “protection is provided for streams, stream-banks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat.”¹⁵

The statute’s implementing regulations require that “[all] vegetative manipulation [must] [a]void permanent impairment of site productivity and ensure conservation of soil and water resources.”¹⁶ Also that “[a]ll management prescriptions shall... Conserve soil and water resources and not allow significant or permanent impairment of the productivity of the land.”¹⁷

The Forest Service Manual and Handbook

Outside of the individual forest plans, the most comprehensive definitions of soil quality standards are found in the Forest Service Manual (“FSM”) and in the Forest Service Soil Management Handbook (“FSH”). Title 2500 of the FSM specifies standards and guidelines for watershed management, a category that includes soil quality. The two objectives of Title 2500 are “[t]o protect and, where appropriate, enhance soil productivity, water quality and quantity, and the timing of waterflows” and “[t]o maintain favorable conditions of streamflow and a continuous protection of resources from the National Forest System watersheds.”¹⁸

The Forest Service’s policy on watershed management is to “[i]mplement watershed management activities on the National Forests in accordance with the general objectives of multiple-use and the specific objectives of in the Forest land management plan for the area involved,” and to “[d]esign all management activities of other resources to minimize short-term impacts on the soil and water resources and to maintain or enhance long term productivity, water quantity, and water quality.”¹⁹

Both policies are significant, the first because it directs the Forest Service to engage in land management practices that are consistent with the land resource management plans for specific forests, and the second because it directs the Forest Service to avoid developing land management practices that will result in a degradation of long-term productivity.

Chapter 2550 of the FSM deals specifically with soil management. The Forest Service’s stated policy on soil management is to “[m]anage forest and rangelands in a manner that will

¹⁴ 16 U.S.C. 1604(g)(3)(E)(i).

¹⁵ 16 U.S.C. 1604(g)(3)(E)(iii).

¹⁶ 36 CFR §219.27(b)(5) (2000).

¹⁷ 36 CFR §219.27(a)(1) (2000).

¹⁸ FSM 2502.

¹⁹ FSM 2503.

improve soil productivity. Use appropriate soils information systems in support of all management activities affecting, or influenced by, the soil resource.²⁰

The requirement that soil productivity be improved by management practices is more restrictive than the general policy stated in FSM 2503, for the general policy of maintaining soil quality and preventing long-term impairment of soil productivity has been interpreted by the Forest Service to mean that no more than fifteen percent of the soil area or soil productivity may be impaired, and that fifteen percent impairment will not have significant long-term effects on soil productivity. The improvement of soil resources is further discussed in FSM 2553.02, which states as one of its objectives “[t]o rehabilitate soils that are in an unsatisfactory condition.”

In order to meet its stated policies and objectives, the Forest Service is required to survey and monitor soil quality.²¹ Surveys and monitoring provide knowledge of soils for planning purposes, and are intended to “advise decision-makers when adjustments are needed in land management practices to protect or improve soil productivity.”²² The conditions in the Toolbox planning area indicated by minimal sampling rather than extensive soil surveys, indicates that soils are in need of recovery in the area. The Toolbox post-fire logging activities will simply further impede the recovery process in direct violation of the NFMA and FSM.

The Forest Service Handbook (“FSH”) sets out the agency’s internal requirements for soil resource inventories and soil quality monitoring. The FSH 2509.18 is the Soil Management Handbook, and within are found many of the relevant definitions for soil quality standards on a Service-wide basis. Chapter 1 sets the standards for soil resource inventories, which are intended to “provide information about the use, production capabilities, management opportunities, and limitations of soils.”²³ The Soil Management handbook refers to the National Soils Handbook, the USDA Soil Conservation Service’s Soil Taxonomy (Agricultural Handbook 436), and the Soil Survey Manual as providing mandatory and essential guidelines for all Forest Service soil resource inventories.²⁴

Chapter 2 of the Soil Management Handbook, entitled Soil Quality Monitoring, restates the policy to “[d]esign and implement management practices to maintain or improve the long-term inherent productive capabilities of the soil resource” and to “[p]lan and conduct soil quality monitoring to determine if soil management goals, objectives, and standards as outlined in Forest plans are being achieved.”

Chapter 2.05 defines the relevant terms as follows:

²⁰ FSM 2550.3.

²¹ See FSM 2551 and 2554.

²² FSM 2554.02

²³ FSH 2509.18, Ch. 1.

²⁴ Available online at <http://www.statlab.iastate.edu/soils/nssb>, <http://www.statlab.iastate.edu/soils/soiltax/>, and http://www.statlab.iastate.edu/soils/ssm/gen_coor.html, respectively.

- Soil productivity is the inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measure of biomass accumulation.
- Significant changes in productivity of the land are indicated by changes in soil properties that are expected to result in a reduced reproductive capacity over the planning horizon. Based on the available research and current technology, a guideline of 15 percent reduction in inherent soil productivity potential will be used as the basis for setting threshold values for measurable or observable soil properties or conditions. The threshold values, along with aerial extent limits, will serve as an early warning signal of reduced productive capability. A more stringent basis than 15 percent can be used where appropriate and documented. The Fremont LRMP indicates a 20 percent threshold value. The allowable aerial extent of significantly changed soil is to be established as part of soil quality standards.
- Significant impairment of the productivity of the land includes changes in soil properties which would result in significant changes in the inherent productive capacity that last beyond the planning horizon.
- Soil compaction is a physical change in soil properties that results in a decrease in porosity and an increase in soil bulk density and soil strength.
- Soil puddling is a physical change in soil properties due to shearing forces that alter soil structure and porosity. Puddling occurs when the soil is at or near liquid limit.
- Soil displacement is the movement of the forest floor (litter, duff and humus layers) and surface soil from one place to another by mechanical forces such as a blade used in piling or windrowing. Mixing of surface soil layers by disking, chopping, or bedding operation, are not considered displacement.
- Severely burned soil is a condition where most woody debris and the entire forest floor is consumed down to bare mineral soil. Soil may have turned red due to extreme heat. Also, fine roots and organic matter are charred in the upper one-half inch of mineral soil.
- Surface erosion is the detachment and transport of individual soil particles by wind, water, or gravity.
- Detrimental Soil Disturbance. The condition where established threshold values for soil properties are exceeded and result in significant change. See definition number 2.

Chapter 2.2 describes the standards to be followed in the development of soil quality standards. The Forest Service is directed to "[e]stablish threshold values where soil disturbances become detrimental, that is, result in significant change." The Forest Service should also use "compaction, erosion, puddling, protective plant cover and burning, as applicable, to categorize soil disturbances," and to "define the aerial extent that detrimental soil conditions, which reflect significant change in productivity, may occur."

Regional Supplements to the FSM and Soil Management Handbook provide further insight into the application of soil quality standards. R-1 Supplement 2509.18-94-1 provides a number of useful definitions that incorporate the concept of "detrimental." For example, the definition for "Detrimental Compaction" states that "[s]oil compaction that adversely affects hydrologic function and site productivity is detrimental." 2.05. Similarly, "Detrimental Puddling" and "Detrimental Displacement" are defined by adverse effects on hydrologic function and/or site productivity. "Hydrologic Function" is defined as "the ability of the soil to absorb, store and transmit water, both vertically and horizontally," and "Soil Productivity" is "the inherent capacity of a soil to support the growth of specified plants, plant communities, and soil biota... often expressed by some measure of biomass accumulation." The Supplement defines "Severely Burned Soil" as "all surface litter is consumed and the mineral soil has been blackened more than 1 inch deep. Oxidized soil (reddish color) is also indicative of severely burned soil."

Satisfying the NFMA and its Implementing Regulations and Directives

"There are few, if any, activities conducted on National Forest System lands that do not have the potential to affect soil resources in some way."²⁵

In order for the Forest Service to make informed decisions that comply with the statutory language of the NFMA and its various implementing regulations and directives, the Responsible Official must be provided with soil resource information "that is of sufficient quality and detail." The Forest Service has failed to provide such information in recent years and yet continues to plan and implement projects such as the Toolbox post-fire logging proposal.

In fact, the USDA Office of Inspector General found that the "Forest Service's administrative controls over the preparation of environmental documents and implementation of mitigation measures applicable to timber sales have not been effective."²⁶ The finding that mitigation measures were not always implemented or incorrectly implemented led the OIG to conclude that water quality and soils can be adversely affected and evidence that deterioration of the environment had occurred was present.

In addition, the OIG found that the "Forest Service used common standards and guidelines contained in the Forest Land and Resource Management Plans... instead of site specific analysis and mitigation measures... and [that] all relevant data was not collected and

²⁵ USDA Forest Service, R6. *Draft: Preparing Soil Resource Analyses for Inclusion in NEPA Documents*, p.4

²⁶ USDA Office of Inspector General, 1999. *Forest Service timber sale environmental analysis requirements* Washington, D.C. Evaluation Report No. 08801-10-At. January 1999. p. 1

presented to the public”²⁷ The report specifically mentions soils as a resource area where deficiencies and omissions were involved. The OIG concludes: “[b]ased on our reviews, we concluded that the environmental assessments did not identify or discuss some severely erosive and/or sensitive soils occurring in the timber sale areas.”²⁸

The Forest Service failed to implement many different mitigation measures in part, because of failure to monitor whether or not “actual implementation” occurred. Because “[d]istricts had not always properly implemented mitigation measures designed to prevent soil erosion... some excessive soil erosion was occurring.”²⁹

Further, a 1999 Government Accounting Office (GAO) report found that:

“the Forest Service continues to approve projects that do not provide adequately for monitoring. Moreover, the agency generally does not monitor implementation of its plans as its regulations require.”³⁰

To remedy these defects and meet the intent of the NFMA, the Forest Service in Region 6 has recommended that the agency must be capable of demonstrating through “the prescription development and environmental analysis process” that it:

- Has knowledge of and understands characteristics of the various kinds of soils found within planned project areas;
- Has knowledge of how those soils have been affected by past management activities;
- Can logically predict and display effects of any proposed activity;
- Has the knowledge and ability to prescribe effective restoration and/or mitigation measures as part of an overall management plan; and,
- Can respond to soil resource questions and display information in a professional and understandable manner.³¹

In order for the Forest Service to demonstrate its knowledge of the various site-specific soils and their properties it is recommended that the environmental documentation include a description of baseline soil conditions including: documented field visits and soil inventory information (e.g. Terrestrial Ecological Unit Inventory, Landtype, Landtype phase, Landtype Association, Soil Inventory Resource Inventory, etc.).³²

Site specific management objectives have also been recommended that are based on an analysis of the baseline soil conditions, evaluation of risk, and assessment of impacts of past management activities.³³ It is critical that blanket application of threshold values not be applied,

²⁷ Id. p. 9 & 14

²⁸ Id. p. 16

²⁹ Id. p. 36

³⁰ General Accounting Office, 1997.

³¹ USDA Forest Service. *Draft: Preparing Soil Resource Analyses for Inclusion in NEPA Documents*. p. 4

³² Id. p. 6-8

³³ Id. p. 12

"[b]lanket application of threshold values contained in Regional or Forest Plan standards and guidelines for soil resource protection is no longer acceptable... These threshold values are to be considered as minimum standards and should be used to evaluate performance in general terms... They should not be considered as a substitute for conducting proper field investigations, synthesis of information, and establishment of appropriate soil management objectives and prescriptions."²⁴

For example, Forest Service must disclose, for the planning area, the percentage of existing detrimental soil disturbance from past timber harvest, fire suppression activities, livestock grazing, off-road vehicle or snowmobile use, firewood cutting, and other human disturbances. It cannot only provide percentages of "Severely Burned" conditions in the cutting units following the fire. The Toolbox DEIS fails this test.

The Forest Service then must display, for the planning area, the anticipated percentage of total detrimental soil disturbance that would exist in these same cutting units *after* salvage logging activities. The Forest Service should disclose the reduced soil productivity due to the Toolbox Fire Complex, and also adequately discuss the soil productivity implications for the cumulative effects of the fire plus proposed salvage logging and thinning activities. In the case of the Toolbox DEIS such information has not been presented.

The criteria for assessing areas of detrimental burning are defined in Forest Service Handbook, FSH 2509.13, Chapter 20 – Burned-area Survey, Section 23.32a. Section 23.32a lists five site indicators to use in identifying fire intensity. These five indicators are: 1) depth and color of ashes; 2) size and amount of live fuels consumed; 3) litter consumption; 4) plant root crowns damaged; and 5) soil crusting, or baking of the soil surface.

Because many of the Standards are at least in part numerical, failure to disclose numerical values for erosion, compaction and soil productivity results in a failure to demonstrate consistency with the NFMA.

If the FS uses the 15% Standard, then the meaning of "soil productivity" in the terminology of NFMA is largely ignored. The Forest Service claims that "[s]oil quality is maintained when erosion, compaction, displacement, rutting, burning, and loss of organic matter are maintained within defined soil quality standards."²⁵ But even if the Forest Service were to meet the 15% standard in all Activity Areas forestwide, and even if the soil conditions of land outside Activity Areas could reasonably be ignored, the forest service still cannot assume that there has been no "significant or permanent impairment of the productivity of the land" as NFMA requires.

Soil productivity can only be assumed to be maintained if it turns out that the soil standards work. To determine if they work, the Forest Service would have to undertake objective, scientifically sound measurements of what the soil produces (grows) following management activities. Instead the Toolbox DEIS simply states that field visits were made and

²⁴ Id. p.12

²⁵ FSM 2500-99-1. Region 1 Supplement.

areas sampled previously "showed vigorous plant growth" DEIS at 2-233. No definition for showed or vigorous is provided calling into question the observations.

It is reasonable to expect that in order for the Forest Service to assure that soil productivity is not being significantly impaired, to assure that the forest is producing a sustained yield of timber, for one example, tree growth must not be significantly reduced by soil-disturbing management activities. Grier and others (1989), in a Forest Service General Technical Report, adopted as a measure of soil productivity: "the total amount of plant material produced by a forest per unit area per year." And they cite a study where "a 43-percent reduction in seedling height growth in the Pacific Northwest on primary skid trails relative to uncompacted areas" for example. And in another Forest Service report, Adams and Froehlich (1981) state:

"Measurements of reduced tree and seedling growth on compacted soils show that significant impacts can and do occur. Seedling height growth has been most often studied, with reported growth reductions on compacted soils from throughout the U.S. ranging from about 5 to 50 per cent."

Adams and Froehlich (1981) also provide reasons why impacts beyond the directly compacted 15% of an area must be considered in any reasonable definition of soil productivity:

"Since tree roots extend not only in depth but also in area, the potential for growth impact also becomes greater as compaction affects more of the rooting area. In a thinned stand, for example, you can expect the greatest growth impacts in residual trees that closely border major skid trails or that have been subject to traffic on more than one side of the stem."

In other words, when an Activity Area reaches 15% detrimentally impacted soils via compaction, tree growth **outside the skid trail**, or beyond the 15% compacted area, is affected.

To recognize that these standards must be validated, Forest Supervisors must:

- Assess ... whether (soil quality standards) are effective in maintaining or improving soil quality;
- Evaluate the effectiveness of soil quality standards and recommend adjustments to the Regional Forester; and
- Consult with soil scientists to evaluate the need to adjust management practices or apply rehabilitation measures.

This all implies that monitoring must be undertaken. The Forest Management Handbook at FSH 2509.18 directs the Forest Service to do validation monitoring to "Determine if coefficients, S&Gs, and requirements meet regulations, goals and policy" (2.1 - Exhibit 01). Furthermore, recognizing that loss of soil productivity is defined not merely in terms of the absence of meeting the 15% standard. "Soil Function" is defined thus:

Primary soil functions are: (1) the sustenance of biological activity, diversity, and productivity, (2) soil hydrologic function, (3) filtering, buffering, immobilizing, and detoxifying organic and inorganic materials, and (4) storing and cycling nutrients and other materials.

And "Soil Quality" is defined as:

"The capacity of a specific soil to function within its surroundings, support plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation."

Page-Dumroese et al. 2000 (an earlier version of which is cited in FSM 2500-99-1) emphasize the importance of validating soil quality standards using the results of monitoring: Research information from short- or long-term research studies supporting the applicability of disturbance criteria is often lacking, or is available from a limited number of sites which have relative narrow climatic and soil ranges. ... Application of selected USDA Forest Service standards indicate that blanket threshold variables applied over disparate soils do not adequately account for nutrient distribution within the profile or forest floor depth. These types of guidelines should be continually refined to reflect pre-disturbance conditions and site-specific information. (Abstract.)

Furthermore, even if it were reasonable to assume that the Forest Service need only maintain soil conditions so that no more than 15% of Activity Areas be in a detrimentally disturbed condition, the Forest Service has not actually included measures of all the kinds of soil disturbance that meet the definition of "detrimentally disturbed."

Adams and Froehlich (1981) state: "While general field observations can be useful in recognizing severe compaction problems, measurement of actual changes in soil density permits the detection of less obvious levels of compaction." It is these "less obvious levels of compaction" that are missed by the lack of monitoring in the Toolbox planning area and the Fremont-Winema National Forests in general. There is simply no way that the Fremont National Forest has enough soil bulk density and other compaction monitoring data collected at the adequate soil depths and in enough sites to be able to assure that the logging activities will not significantly or permanently impair the productivity of the soil.

Another problem with the Forest Service's lack of soil monitoring is that there has been no measure of soil productivity reductions due to loss of soil nutrients from logging activities, including removal of boles, branches, and from site preparation methods such as burning. From Grier and others (1989):

"The potential productivity of a site can be raised or lowered by management activities causing a permanent or long-term increase or decrease in the availability of nutrients essential for plant growth.

...Any time organic matter is removed from a site, a net loss of nutrients from that site also occurs. In timber harvesting or thinning, nutrient losses tend to be proportional to the volume removed.

...Slash burning is a common site preparation method that can affect soil chemical properties tremendously. A great deal of controversy is often associated with using fire because of the wide variety of effects, some of which are definitely detrimental to site quality and some of which are beneficial."

An environmental impact statement must present a "reasonably complete discussion of possible mitigation measures." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351 (1989).

Without sufficient soils monitoring and field verification in the Toolbox project area, the Forest Service cannot make supportable predictions that the project will comply with Forest Plan Standards. Courts have held that sufficient monitoring and inventorying of forest resources is vital to making sound, forest management decisions and ultimately protecting the forest resources.

Again, the Forest Service has legal mandates to do far more than they have for protecting soils. Section 6 of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, states:

"(g) As soon as practicable, but not later than two years after enactment of this subsection, the Secretary shall in accordance with the procedures set forth in section 553 of title 5, United States Code, promulgate regulations, under the principles of the Multiple-Use, Sustained-Yield Act of 1960, that set out the process for the development and revision of the land management plans, and the guidelines and standards prescribed by this subsection. The regulations shall include, but not be limited to-

"(3) specifying guidelines for land management plans developed to achieve the goals of the Program which-

"(E) insure that timber will be harvested from National Forest System lands only where-

"(i) soil, slope, or other watershed conditions will not be irreversibly damaged;

NFMA implementing regulations of the Act states, at 36 C.F.R. § 219.27:

(a) Resource protection. All management prescriptions shall--

(1) Conserve soil and water resources and not allow significant or permanent impairment of the productivity of the land;

(b) Vegetative manipulation. Management prescriptions that involve vegetative manipulation of tree cover for any purpose shall--

(5) Avoid permanent impairment of site productivity and ensure conservation of soil and water resources...

Salvage Logging Exacerbates Post-Fire Soil and Water Conditions

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. For example, Swank et al. (1989) demonstrate that logging roads and landings caused 100 times more erosion than undisturbed sites, and logging caused 7 times more erosion than undisturbed sites in southwestern Oregon.

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 1997a).

BMPs do not eliminate the persistent erosional impacts of post-fire logging. USFS and USBLM (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 harvests 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; CWW, 1996). USFS and USBLM (1997a) found that losses in soil productivity were correlated with logging and roads within the ICBEMP project area.

Similarly, Helvey (1980 & 1985) and Potts et al (1985) concluded that sedimentation increases after a large fire, but increases significantly more after post-fire salvage logging.

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 fire) causes much less negative impacts on soils (USFS and USBLM, 1997a).

Several studies cited in McIver & Starr (2000) regarding increased erosion and sedimentation caused by post-fire salvage logging indicated there was "ground cover" from slash—yet ground-based salvage logging still increased erosion and sedimentation over and above the levels caused by the fire itself. (McIver & Starr, p. 19).

USFS and USBLM (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 undisturbed until organic matter levels have recovered (USFS and USBLM 1997a, emphasis provided). Avoidance of increased erosion is key to restoring soil productivity (Beschta et al., 1995; USFS and USBLM 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 barring of soils by fire.

The USFS and USBLM (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 all 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 soil 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 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 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.

Submitted this 17 day of November 2003.

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