SNYTHESIS OF COMMENTS MADE BY SCIENTISTS REGARDING THE BISCUIT DRAFT ENVIRONMENTAL IMPACT STATEMENT

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EXECUTIVE SUMMARY

This executive summary is a synthesis of comments submitted by 15 scientists on the Biscuit Draft Environmental Impact Statement (DEIS). Full comments made by scientists are available at www.wwfus.org/klamathsiskiyou/WPbibliography.html. Scientists commenting on the DEIS have extensive backgrounds in remote sensing and ecological modeling, soil science, forest health, endangered species, systems analysis, fisheries management, fire ecology, geomorphology, and ecosystem restoration. Most (9) of them have Ph. Ds and are affiliated with academic or research-based institutions; others (6) are with conservation organizations. Because of similarities in many of the comments, they were grouped into 12 broad categories that individually and collectively demonstrate fundamental flaws in the DEIS, including:

- omission of relevant and important science;
- inappropriate justification of salvage logging within late-successional reserves;
- insufficient avoidance of impacts to endangered species like the northern spotted owl;
- inappropriate justification for large-scale tree planting;
- over-reliance on hardwood abatement strategies for conifer regeneration;
- inappropriate classification of fire regimes and effects of post-fire logging on fuels;
- data quality problems related to numerous mapping and modeling errors that overestimate salvage availability and underestimate impacts to sensitive lands (particularly roadless areas);
- excessive live tree logging due to numerous mapping errors in delineating salvage units and collateral logging effects of helicopter and cable yarding;
- insufficient justification for salvage logging to contain insect outbreaks;
- problems with the placement and efficacy of fuel management zones;
- ineffective invasive species containment measures related to post-fire management actions; and
- flaws in the design of the "learning opportunities" experiments.

Taken in their entirety, the numerous errors and assertions raise data quality concerns that likely inflated projected salvage volumes at the expense of ecosystem values and the area's recovery. The DEIS proposes to intervene primarily in the most sensitive locations of the Biscuit landscape, severely burned areas, with over two-thirds of the volume coming from old-growth reserves and roadless areas. Many cumulative and long-term impacts to fish and wildlife species are anticipated, yet grossly understated in the DEIS, from activities that include:

- 29,086 acres of commercial post-fire logging; 12,179 acres in Inventoried Roadless Areas,700 acres in meadows, and logging in riparian areas and other set asides;
- 309 miles of fuelbreak construction;
- prescribed burning initiated on 91,000 acres;
- artificial planting of 50,246 acres;

- artificial seeding of 6,757 acres; and
- reopening of over 40 miles of old mining routes.

The scale of post-fire treatments proposed in the DEIS is unprecedented in the management of public lands and is therefore of great concern to scientists. The Siskiyous, in particular, are widely regarded as an area of global biodiversity significance (www.worldwildlife.org/klamathsiskiyou) and have been the subject of decades of scientific interest. This same area within which the Biscuit Fire burned was proposed as a National Monument, *Siskiyou Wild Rivers*, by conservation groups in 2000 because of its extraordinary ecological values. The area has the largest block of roadless areas along the Pacific Coast from Mexico to Canada, the highest concentration of rare plants of any national forest in the nation, three Wild and Scenic Rivers and five eligible Wild and Scenic Rivers, several Research Natural Areas, Botanical Areas, and Late-Successional and Riparian Reserves.

This magnificent landscape has been sculptured through the renewal process of fire for centuries. As stated by scientists, "fire continues to be one of the most important factors shaping the region's biological diversity as it operates synergistically with the physical variability of the region." The varied climate and steep topography of the area results in fire frequencies and severities that are highly variable. This mixed-severity fire regime is dominated by a mosaic of plant communities in different stages of post-fire recovery. Stand-replacing fire is common over a significant portion of the area and necessary to maintain certain fire-adapted plant communities (e.g., knobcone and lodgepole pine, chapparal). The detrimental ecological impacts of proposed ecosystem manipulations in a landscape renowned for biological diversity are significant in scope, and many could be irreversible. These impacts were often overlooked, under appreciated, or mistakenly assumed to be beneficial, or reversible via mitigation measures proposed in the DEIS as discussed below.

SCIENTISTS COMMENTING ON THE DEIS (AFFILIATIONS LISTED AS THEY APPEARED IN THE COMMENTS)

Dr. Dominick A. DellaSala, Forest Ecologist, World Wildlife Fund
Dr. Daniel Doak, Professor of Ecology & Evolutionary Biology, Univ. of California, Santa Cruz
Dr. Jerry Franklin, Professor of Forest Science, University of Washington
Dr. Chris Frissell, Fisheries Biologist, Pacific Rivers Council
Dr. Timothy Ingalsbee, Fire Ecologist, American Lands Alliance
Dr. Erik Jules, Assistant Professor in Dept. Biological Sciences, Humboldt State Univ.
Dr. Dennis Odion, Plant Geography Specializing in Fire Ecology, Native Plants Society
Dr. James Strittholt, Landscape Ecologist, Conservation Biology Institute
Dr. William Weaver, Geomorphologist, Pacific Watershed Associates
Danny Hagans, Geology, Geomorphology, Erosion Control, Pacific Watershed Associates
Ken Crocker, Systems Analyst (no affiliation given)
Eric Fernandez, GIS specialist, Oregon Natural Resources Council
Matthew Kauffman, Biologist, Dept. Environmental Studies, Univ. California, Santa Cruz
Mark Madsen, Data Analysis/Decision Support Systems (no affiliation given)
Priya Shahani, Ph.D. Candidate-Ecology & Evolutionary Biology, Univ. of California, Santa Cruz

REPORT SYNTHESIS

The Biscuit Fire in southwest Oregon and northwest California was the nation's largest wild fire in 2002. While the perimeter of the fire encompassed nearly ½ million acres, the fires' effects ranged from little to no change in soils and vegetation to severely burned areas but in proportions that are likely typical of how this area burned historically. This same area was proposed as a National Monument, *Siskiyou Wild Rivers*, by conservation groups in 2000 because of its extraordinary ecological values. Fire has shaped the ecology of this area for centuries and continues to play a major role in maintaining the health and diversity of this unique landscape. In response to the fire, the Forest Service has proposed an aggressive post-fire logging and "restoration" proposal (www.biscuitfire.com). The agency's preferred alternative calls for logging of over ½ billion board feet, including over two-thirds of the volume coming from late-successional reserves, inventoried roadless areas, and sensitive watersheds. Fifteen scientists submitted comments to the Forest Service on this proposal and their comments were summarized (along with their names next to the comment) as follows.

OMISSION OF RELEVANT AND IMPORTANT SCIENCE

- The DEIS assumes that natural late-successional forests can be replicated through forest engineering approaches based largely on fundamentally flawed assumptions and assertions presented in the Sessions report (**Drs**. **Odion, Strittholt, DellaSala**).
- Post-fire salvage logging benefits were overstated and impacts of salvage logging and plantation conversion on fire severity largely ignored (**Drs**. **Franklin, Strittholt, DellaSala**). A review of 21 scientific papers on post-fire logging indicates salvage logging is usually damaging to the environment, often severely; yet the DEIS inappropriately presents it as beneficial to ecosystem recovery.
- Sufficient evidence exists that persistent, significant adverse environmental impacts are likely to result from salvage logging, based on many past cases of salvage projects, plus growing knowledge of ecosystem functions and land-aquatic linkages. The same conclusion is detailed in the forthcoming, peer-reviewed Conservation Biology article, *Postfire Management on Forested Public Lands of the Western USA* (Dr. Robert Beschta et al. *in press*); yet mitigation measures presented in the DEIS largely ignore peer-reviewed studies (**Dr. Weaver, Dr. Frisell, Hagans**).
- Virtually every credible and independent assessment of salmonid population and habitat condition has concluded that roadless areas are essential to persistence and rebuilding of native salmonid populations; yet, salvage in Inventoried Roadless Areas is inappropriately considered as a post-fire recovery strategy (**Dr. Weaver, Dr. Frisell, Hagans**).
- The DEIS did not even reference a widely circulated, peer reviewed, paper commissioned and published by the Ecological Society of America that specifically addresses the use of ecological principles in managing National

Forest Land. Nationally recognized experts in ecology, forestry, and fire sciences prepared this peer-reviewed paper (**Dr. Odion**).

- Numerous peer-reviewed studies on fire regimes and analyses in the nearby Klamath Mountains, importance of roadless areas as refugia for Port Orford cedar, and the global significance of the region were not referenced (**Drs. Strittholt, DellaSala, Odion, Jules**).

INAPPROPRIATE JUSTIFICATION FOR SALVAGE LOGGING IN LATE-SUCCESSIONAL RESERVES

- Salvage of large snags and logs is antithetical to the goal of recovery of fully functional late-successional forest habitat and inappropriate within the Late Successional Reserves; yet the DEIS claims the opposite (**Dr. Franklin**).
- The Late-Successional Reserve network was designed to accommodate large, intense natural disturbances and allow for natural recovery processes. This is one reason that the FEMAT report and Northwest Forest Plan provide for conservative direction with regards to salvage in reserves and direct that activities should enhance or at least not interfere with natural recovery processes (**Dr. Franklin**).
- The Northwest Forest Plan states that while priority should be given to salvage in areas where it will have a positive effect on late-successional forest habitat, salvage operations should not diminish habitat suitability now or in the future (ROD, p. C-13). According to **Dr. Jerry Franklin**, salvage logging will not only have a negative effect on late-successional habitat but it will "diminish habitat suitability" now and in the future.
- Salvage logging of large snags and down boles does not contribute to recovery of late-successional forest habitat; in fact, the only activity more antithetical to the recovery process would be removal of surviving green trees from burned sites. Large snags and logs of decay resistant species, such as Douglas-fir and cedars, are critical as early- and late-successional wildlife habitat as well as for sustaining key ecological processes associated with nutrient, hydrologic, and energy cycles (**Dr. Franklin**).

INSUFFICIENT AVOIDANCE OF IMPACTS TO ENDANGERED SPECIES

- Unfortunately, the DEIS does not acknowledge some important new knowledge with regards to the ecology of the northern spotted owl (NSO) in the Klamath-Siskiyou region, either in the literature review or in analyzing effects of various alternatives (**Dr. Franklin**).
- In a recent study of NSO habitat fitness in relation to landscape conditions, A. Franklin et al. (2000) show that a mosaic of older forest interspersed with other, early successional vegetation types promoted high fitness for NSOs. Landscapes dominated either primarily or exclusively by older forest or primarily by early successional vegetation provided lower levels of fitness than successional mosaics, based on estimates of survival and fecundity. Hence, landscape mosaics of mature and old forest and early successional habitats dominated, including

brush fields, would be the appropriate recovery targets for restoration programs focused on NSO habitat (**Dr. Jerry Franklin**).

- In revising the DEIS new knowledge regarding the NSO, as well as documented current and projected impacts of the Barred Owl, need to be taken account. In this process there needs to be careful consideration of the impacts of: (1) salvage on development of the debris-rich, late-successional conditions characteristic of the forested NSO (and northern flying squirrel) habitat; and (2) establishment of conifer plantations which modify the amount and distribution of hardwood-dominated early successional habitat in which the woodrat resides (**Dr. Franklin**).

INAPPROPRIATE JUSTIFICATION FOR LARGE-SCALE TREE PLANTING

- Because the forest engineering approach in the DEIS considers species growing with regenerating conifers to be undesirable, severe impacts to the native, post-fire flora are downplayed or misportrayed as largely beneficial (**Dr. Odion**).
- Extensive reforestation by planting is proposed within the late-successional reserves. Slow re-establishment of forest cover is common following natural stand-replacement disturbances in the Pacific Northwest, however. This circumstance provides valuable habitat for early-successional species, particularly animals that require snags and logs and diverse plant resources, and for many ecosystem processes (**Dr. Franklin**).
- Fifty years for natural re-establishment of forest cover is not a particularly long period; many 19th and early 20th century burns are still not fully reforested. In fact, naturally disturbed habitat that is undergoing slow natural reforestation—without salvage or planting—is the rarest of the forest habitat conditions in the Pacific Northwest (**Dr. Franklin**).
- The DEIS rationalization that natural forest development following fire will be unreliable is based on the argument that there would not be sufficient seed sources (e.g., DEIS page I-6). This argument was presented qualitatively; however, a separate quantitative analysis refutes it. Ninety-five percent of all areas that had high severity fire are within 200 m of green trees (**Drs. Odion, Strittholt, DellaSala**).
- The planting of dense even-aged conifer stands that would follow logging will lead to an array of highly combustible foliar fuel, which also conflicts directly with the fire hazard goals of the DEIS. These differences likely explain why the areas that were logged after the 1987 Silver Fire burned severely (68%) in the Biscuit, compared to natural vegetation (26%). The extensive planting and management of even-aged forests proposed by the DEIS will create large areas prone to crown fire rather than surface fire (**Madsen, Dr. Odion, Dr. Franklin, Dr. Strittholt, Dr. DellaSala**).
- Planting should be done in irregular patterns and variable densities to duplicate the spatial heterogeneity that is characteristic of natural regeneration and only when there is evidence of insufficient seed source. Establishment of

dense uniform stands is inappropriate, else why would we be engaged in major programs of variable density thinning in existing plantations in LSRs throughout the Pacific Northwest! Of course, establishment of dense, uniform plantations on sites characterized by Fire Regimes I and II is inappropriate, since it would simply recreate the potential for the next uncharacteristic stand replacement fire (**Dr. Franklin**).

- The DEIS does not contain any explanation of the impacts of reseeding on native herbaceous plant populations. Many rare and endemic plants exist in the areas selected for reseeding (meadows, savanna and ridge tops, pp II-30 – II-31). Reseeding large numbers of native or non-native plants will shift the species compositions in these areas, possibly to the detriment of localized plant populations. The Forest Service has not provided adequate disclosure on the effects on reseeding in these areas (**Madsen**, **Drs. Strittholt, DellaSala, Odion, Franklin**).

OVERRELIANCE ON HARDWOOD ABATEMENT STRATEGIES FOR CONIFER REGENERATION

- The desirability of conifers over deciduous or meadow plants makes sense for growth and yield in Matrix lands that have been previously logged or were scheduled for logging in the near future. However, this is not the case for riparian reserves, late-successional reserves or animal habitat. Natural succession would be the indicated management approach for forest vegetation, water quality, fisheries, soil productivity, habitats of concern, roadless areas and some fire hazard reduction which are listed as key issues on pp ES-2 – ES-4 (**Madsen**).
- The assumption that species dominance shifting to hardwoods is negative for the listed issues, and that replanting of conifers is a positive for these issues, should be changed (**Madsen**, **Drs. Odion, Strittholt, DellaSala, Franklin**).
- Given a statement in paragraph 8 and echoed in other areas of the DEIS that hardwood species are a part of the normal plant associations, and specifically that "…they grow in height much faster than natural or planted conifers *for the first several years*," the conclusion that a massive reforestation is indicated does not follow (**Madsen**).
- Given the qualifier "for the first several years" indicates that the Forest Service has concluded that after that time period, conifer growth matches or exceeds hardwood growth. We already know that apex forest in much of the fire area is a unique mixed conifer-hardwood forest. This implies that a natural post-fire regeneration establishes hardwoods which are then topped over by conifers as the conifers grow past the maximum hardwood growing heights (**Madsen**).
- On p III-225 the DEIS states that "The canopy in riparian areas is most often multi-layer with hardwoods comprising the important mid-layer component." Given the importance of hardwoods in providing stream shade per this statement in the DEIS, the indication is not for replanting of conifers on most sites. Instead,

natural forest succession from hardwoods to conifers or to mixed conifer-hardwood forest is indicated as the faster path to stream shading (**Madsen**).

INAPPRORPIATE CLASSIFICATION OF FIRE REGIMES AND EFFECTS OF POST-FIRE LOGGING ON FUELS

- Except in plantations and logged areas and probably back-burned areas (due to synergism with main fire), fire effects in the Biscuit complex were well within the natural range of variation and were even cited as such in the DEIS but contradicted in later descriptions and mapping of fire regimes (**Drs. Odion, DellaSala**).
- By counting back-burned areas, and by considering greater than 75 percent mortality to be high severity, rather than the conventional 90-100 percent, the analysis in the DEIS exaggerates the amount of high severity fire. Actual fire severity was a mixture of low, medium and high (**Dr. Odion**).
- Fire frequency in the Western Siskiyous has been documented to be periodic and unpredictable. A critical examination of evidence indicates that there is no basis for the premise that half of the Biscuit Fire area historically experienced "frequent low severity fires" (DEIS page II-7). This implies a regime where fire occurs more than once per decade (**Dr. Odion**).
- The DEIS adopts a model of fuel dynamics known from formerly open ponderosa pine forests of the Southwest U.S. These forests used to burn frequently, an order of magnitude or more than forests in the western Klamath-Siskiyou. In the absence of fire, the open forests in the southwest have filled in and this has increased fire severity. The vegetation of the western Siskiyous is not the same (**Drs. Strittholt, DellaSala, Franklin, Odion**).
- At the turn of the century when fire was more frequent in the western Klamath-Siskiyous, more combustible early successional vegetation was present. This has now matured to forests that shade out combustible understory species. As a result of these and other processes, fire severity in the western Klamath-Siskiyou was found to be lowest in the landscape where fire had been previously absent the longest (**Dr. Odion**).
- Fire risks and fuels hazards actually increase dramatically following commercial logging projects due to slash accumulations. Research by Forest Service scientists reveals that in dry forest types similar to the Biscuit fire area, slash can adversely affect fire behavior for up to 30 years (**Dr. Odion**).
- The best available science has discovered that one of the agency's preferred methods for slash treatment, lop and scatter, has the most detrimental effects on rate of fire spread, fireline intensity, and fire severity of all other fuels treatments methods (**Dr. Ingalsbee**).
- The last paragraph on page III-49 states "Fuel loadings will continue to increase as snags continue to fall…" Fuel load does not increase as snags fall. The fuel load remains constant since the snags are a non-growing portion of the landscape. Increases in live plant growth increase fuel load. Further, fallen snags are large diameter fuels and generally do not ignite easily nor do they burn intensely when subjected to further fire (**Madsen**).

- Page III-77 states that "Salvage logging would reduce the amount of fuel that could sustain future, high-intensity wildfires." This is incorrect. High-intensity wildfires are fed by large amounts of small diameter fuels, as would be contributed by heavy brush or stands of young, evenly aged trees. Salvage logging would also allow for denser brush stands to develop by reducing shading effects and increasing surface temperatures. The document should be corrected to indicate that salvage logging will have negative effects in these regards, not positive effects (**Madsen, Drs. Franklin, Strittholt, DellaSala**).
- The DEIS portrays large woody biomass (tree boles, snags, logs, branches) as a fuel problem. However, such large pieces of wood are generally unconsumed by fire. For example, only 5 percent of tree boles of all size classes were consumed by severe crown fire. Moreover, when large wood burns, it does so by smoldering, which does not contribute to flame height or rate of spread, the variables considered in rating fire hazard, and the calculation of fire intensity. Yet the DEIS states that the contribution of large wood would be to "increase future fire intensity." In fact, fine fuels drive flaming combustion and fire intensity. For example, 100 percent of foliage, a high-energy fuel, may be consumed in a crown fire, while larger particles are consumed to a much lesser extent and that decreases as a function of their size (**Drs. Odion, Franklin, Strittholt, DellaSala**).
- Post-fire logging in Oregon has been found to leave about 12 tons per acre of fine fuels. When mixed on the ground with coarser branch material, the resulting fuelbed can burn with severe soil heating as indicated by fuel models 12 and 13 that describe fire in logging slash (**Dr. Odion**).
- If trees are left, they fall gradually over many decades, and there is no such fuelbed that develops (**Drs. Odion, Franklin**).
- Coarse woody debris requirements for forests in this area are largely met by periodic large severity fires that provide the main source of dead wood for ecosystem functions for at least a century. The Forest Service is using faulty models to determine how much wood is in excess of ecosystem requirements not taking into account the pulse in dead wood is largely related to high severity fires that provide this resource for proper ecosystem functions (**Dr. Franklin**).

DATA QUALITY PROBLEMS RESULTING IN NUMEROUS MAPPING AND MODELING ERRORS

Mapping Errors

- A separate GIS analysis of proposed salvage units indicates instead of 29,086 total acres proposed for logging, a more realistic assessment is 31,828 acres; a difference of 2,742 acres or nearly 10% (**Fernandez**).
- The DEIS claims there will be 12,179 acres of Inventoried Roadless Area logging; however, separate mapping analysis shows that actually14,748 acres of roadless areas are included in the units; a difference of 2,569 acres (21%) (**Fernandez**).

- There are 144 units mapped in the DEIS that are 0.006 acres (269 sq. ft.). The feasibility of marking 144 units this small is unrealistic, particularly considering unit sizes marked by timber crews generally range from 10 to 40 acres (**Fernandez**).
- Many errors exist in vegetation models developed from use of plant association groups obtained from unrelated areas and satellite images at very coarse mapping scales, making logging estimates unreliable – in some cases error rates were as high as 1 in 4 (25%) and 1 in 1.5 (67%) with units misclassified in the wrong vegetation class (e.g., some were classified as heavily burned but upon further inspection were actually only lightly burned) (**Madsen**).
- There is no spectral signature information available for vegetation in this area, which means identification of species or plant association groups is unreliable (**Madsen**).
- Canopy cover estimates of 80% as reported in the DEIS implies an error rate of 1 in 5, which is very high for determining reliable tree mortality estimates (**Madsen**).
- Vegetation change 2 (mixed burn) appears to have an accuracy of approximately 50% based on comparison with aerial photos and, more importantly, on-ground validation. Statements from the Forest Service confirm that there are problems with veg-change 2 and it needs rework (**Madsen**).
- The veg-model was never calibrated to a statistically derived sampling of test plots that were surveyed on the ground, containing individual species and mixed-species forest. There are doubts as to how well the model can accurately detect changes in mixed conifer-hardwood forest (**Madsen**).
- Vegetation change 4 (severe burn) appears to catch 60% change or more, which is not what it is supposed to indicate from the description on page D-2. This means there are sections of veg-change 4 that could contain a significant percentage of live trees (**Madsen**).

Modeling Errors

- The erosion analysis is fundamentally flawed and is based on a model that has an accuracy of plus or minus 50% ("at best"), has variations of more than 2 orders of magnitude depending on the severity of fire for a given site, and whose variation is amplified further when variability in climate is added. The DEIS states that adjustment factors ranging from 0.14 to 0.91 need to be applied to the output of the erosion model in order to make the results align with measured values. This represents a difference between measured and predicted erosion values of over 700% (**Crocker**).
- The incredible increase in sediment delivery clearly demonstrates the disregard for sensitive soils in the model, as well as the watersheds and aquatic ecosystems that will bear the huge and long lasting cost of this increased sedimentation (**Hagans**, **Drs. Weaver, Frisell**).
- Vegetation change alone is simply not sufficient for analysis. Vegetative change at most is 65% accurate and very likely far less based on the other sources of error already identified (**Madsen**).

- The descriptions of alternative 4 appearing on p ES-8, II-17 – II-19, II-27, II-41 state explicitly that there will be no logging in Inventoried Roadless and Late-Successional Reserves. The errata from the Forest Service for this DEIS discloses that 70% of the timber volume constituting approximately 73.5 MBF of timber. This is a massive discrepancy in the DEIS and appears that it may have been a deliberate manipulation (**Madsen**).
- There is something wrong with the vegetation model if it does not show a transition to other vegetation classes in ten years, and suddenly changes its output to show opposite trends in another five years. There is also something wrong if the model changes from low risk to high risk across broad areas while leaving the moderate risk largely unchanged (**Madsen**).
- Map III-1 appears to be inaccurate. It does not properly represent many of the igneous and schist intrusions that occur throughout the southeastern portion of the landscape, such as around Tennessee Mountain or north of Oregon Mountain. This may be due to it being at 1:330,000 scale. If this was used in place of more detailed maps then analyses will be flawed (**Madsen**).
- On page III-9 paragraph one states "When standing, fired killed trees lose needles and fine branches, 90% of the shade can be lost." This estimate of lost shade is far too high and is probably an extrapolation of the loss of canopy cover for a single tree. The correct statistic for loss of shade when conifers lose needles and fine branches in the few years after a fire ranges (approximately) from 30% to 70%, depending on species, stand density, seral stage and how much crowning occurred (**Madsen**).

EXCESSIVE LIVE TREE LOGGING DUE TO UNIT BOUNDARY MAPPING ERRORS AND COLLATERAL LOGGING DAMAGES

- The DEIS states there will be no logging of green trees; however, vegetation Change Class 2 represents forests that have "mixed green and dead trees" post fire. Based on ground truthing, numerous portions of vegetation class 2 shows that salvage units in vegetation class 2 experienced only a low intensity ground fire, and low to no large tree mortality (**Madsen, Fernandez**). Stands that experience low intensity fire with low to no large tree mortality should be mapped as Vegetation Change 1– thus this is a mapping error. This is also a spotted owl issue because according to some studies owls may continue to inhabit burned areas, as Dr. Franklin notes above, but they need live trees for nesting.
- There are 9,234 acres of salvage units that are in vegetation change 2, many of which should be dropped from consideration of salvage as they experienced very low tree mortality. In addition, vegetation Change Class 1 in the DEIS represents areas with "little or no change" as a result of the Biscuit fire. According to the DEIS there are 2,363 acres of salvage units in vegetation change 1 (**Fernandez, Madsen**).

INSUFFICIENT JUSTIFICATION FOR POST-FIRE LOGGING TO CONTAIN PRESUMED INSECT OUTBREAKS

- Insect outbreak predictions were made following the 1987 Silver Fire, which is within the Biscuit Fire boundary. There was no bark beetle epidemic after this fire even though there was no management or salvage designed specifically to prevent it. According to the text on ES-4, paragraph 6 current monitoring revealed no outbreak during 2003 (**Madsen**, **Drs. Strittholt, Dr. DellaSala**).
- Salvaging to prevent insect outbreaks also works against the goals of wildlife management. Many bird and mammal species feed on insects, and removal of dead or dying trees in order to prevent an outbreak that is unlikely to occur will reduce the amount of food available for those animal populations, disturb the habitat of all the wildlife in the areas in question, and cause other problems due to the introduction of plant pathogens and noxious / invasive weeds (**Madsen**, **Drs. Strittholt, DellaSala**).

PROBLEMS WITH THE PLACEMENT AND EFFICACY OF FUEL MANAGEMENT ZONES (FMZs)

- The DEIS failed to analyze and disclose significant controversy within the fire science and management community over the construction, use, and maintenance of fuelbreaks-- "Fuel Management Zones" or FMZs in the DEIS (**Dr. Ingalsbee**).
- There is a lack of empirical evidence that FMZ fuelbreaks facilitate "safe, effective," fire suppression. FMZs will result in a build up of flammable shrubs and provide entry ways for invasive exotics and ORVs. The increased presence of ORVs on the landscape presents additional fire risks not addressed in the DEIS (**Madsen**, **Dr. Ingalsbee**).
- Under the severe weather conditions that accompany most large fire events, fuelbreaks may not offer safe sites for firefighters to confront crowning headfires (**Dr. Ingalsbee**).
- There is a vigorous debate within the fire management community over the merits of linear fuelbreaks versus area-wide fuels treatments. Fuelbreaks are prone to breaching both from spotting and rapid surface fire spread in flashy fuels characteristic of thinned stands and disturbed soils. Indeed, in simulated fire modeling, fire did not even reach the fuelbreak because rate of spread and intensity was significantly lowered in the prescribed under-burned units. On the other hand, model analysis confirms that in both the 295 feet and 1,280 feet wide linear fuelbreaks, fire easily breached the fuelbreaks through spotting and/or rapid surface fire spread (**Dr. Ingalsbee**).
- An inherent challenge with extensive fuelbreak systems is the need for periodic maintenance to retard the growth of flammable shrubs and saplings that can thrive in the increased sunlight and exposed soils of logged sites. Without proper

maintenance, fuelbreak sites can convert from a timber fuel model to a grass or brush fuel model, resulting in increased fireline intensity and rate of spread compared to the newly-constructed fuelbreak or even the original uncut forested stand (**Drs. Ingalsbee, Odion**).

- A more preventative strategy to help reduce the frequency and intensity of needed maintenance treatments would be to maximize canopy retention in "shaded fuelbreaks" and minimize soil disturbance during fuelbreak construction in order to curb new growth of shrubs and saplings (**Drs. Odion, Ingalsbee**).
- The DEIS states that "providing for firefighter and public safety are the first priorities of fire managers" (DEIS, II-5) and that locating FMZs "near communities" is the highest priority for primary, secondary, and tertiary FMZs (DEIS, II-5,6). Yet, the location of FMZs far away from homes and communities will not enhance their survivability in the event of wildfire. Research conducted by Forest Service fire researcher, Jack Cohen, clearly reveals that fuels treatments beyond the 200 foot radius "home ignition zone" surrounding homes is both inefficient and ineffective in reducing home losses from wildfire (**Dr. Ingalsbee**).
- The effect of vehicular accessibility on fire frequency is well-documented in fire management literature. In general, the consensus appears to be a five to ten-fold increase in reported fire frequency for areas that are roaded or accessible to ORVs. Because of this fact, FMZs are likely to increase the frequency of fires in the Biscuit Fire area. The DEIS mentions that some of the FMZs created during fire mitigation in 2001 are being used as ORV corridors, and that this constitutes a problem and conflict with a number of key issues (**Madsen**, **Dr. Ingalsbee**).
- The FMZs are planned largely as "shaded fuel breaks" according to pp II-2 – II-6. This planning appears to be based on the use of shaded fuel breaks in forests that have a higher grass than chaparral content. In this landscape, there is a very high chaparral and deciduous hardwood understory component to the forests. Therefore, the fuelbreaks will be rapidly overrun by fire-adapted chaparral species (**Madsen**, **Dr. Ingalsbee**).
- Fuel breaks will act as fire corridors, conducting fire rapidly across the landscape. Due to the plant composition, these plants product high flame heights, which will conduct fire into the canopy of the forest adjacent to the fuelbreaks, thus creating a higher likelihood of crown fires (**Madsen**).
- This forest is subject to electrical storms in the summer months, which implies a frequent fire return interval in these areas. Many of the ridgetops and mountain tops reflect this in the higher occurrence of knobcone pine. The DEIS states that one of the preferred placements of FMZs is along ridgetops, which contain a fire-adapted plant association (**Dr. Ingalsbee**).

INSUFFICENT CONTAINMENT STRATEGIES REGARDING SPREAD OF INVASIVE SPECIES

- There is a real likelihood that salvage logging will result in the introduction of *Phytophora lateralis* into currently uninfected watersheds (**Madsen**, **Dr. Jules**, **Kauffman**).
- The mitigation measures proposed to limit the spread of *P. lateralis* are largely unproven and the DEIS does not provide enough detail regarding mitigation to determine at what level they might reduce the risk of disease spread (**Dr. Jules, Kauffman**).
- We have observed new infections over recent years in areas where federal agencies were presumably attempting to reduce disease spread. How can it be possible to keep infections out with thousands of vehicle trips into and out of the Recovery Area? (**Dr. Jules, Kauffman**).
- Many factors that increase the risk of *P. lateralis* spread will increase proportional to the amount of salvage logging that occurs in the Recovery Area, including 1) movement of infested soils, 2) increase surface water flow and erosion, 3) increased civilian traffic, 4) increase log hauling, 5) increased use of native-surface roads 6) increase traffic and road use near IRAs, 7) increased movement of soil on logging equipment, 8) increased road maintenance (**Dr. Jules, Kauffman**).
- In short, we believe that the efficacy of sanitation is unproven and suspect. First, there is no data to show that it reduces the risk of *P. lateralis* spread. Second, sanitation still leaves sites with POC remaining at risk below the zone of sanitation. Third, sanitized sites are ideal for recruitment of young POC that are then susceptible to the disease (**Dr. Jules, Kauffman**).
- The DEIS relies heavily on planting resistant trees, a technique that has not been shown to work (**Dr. Jules, Kauffman**).

FLAWS IN THE DESIGN OF THE "LEARNING OPPORTUNITIES" MODULE

- Eight main concerns were raised with the DEIS design of a logging experiment these largely deal with the need for large control units (no management) that need to be part of a rigorous scientific experiment; they are needed whether or not the 'no action' management path is being considered as an alternative, to provide an appropriate baseline for understanding the outcomes of the experimental manipulations (**Dr. Doak, Shahani**).
- The "Learning Opportunities" described on p II-10 are not academically valid. The effects of salvage and replanting are already known to be largely negative to a natural ecosystem, as is large-scale post-fire disturbance. It appears that the Forest Service is using these as justification for logging (**Dr. Doak, Shahani**).

- There is no valid reason to carry out these experiments in this forest. Instead, the Forest Service should focus on the impact of these operations within existing tree plantations in this and other forests (**Madsen**).

SCIENTISTS COMMENTING ON THE DEIS (AFFILIATIONS LISTED AS THEY APPEARED IN THE COMMENTS)

Dr. Dominick A. DellaSala, Forest Ecologist, World Wildlife Fund
Dr. Daniel Doak, Professor of Ecology & Evolutionary Biology, Univ. of California, Santa Cruz
Dr. Jerry Franklin, Professor of Forest Science, University of Washington
Dr. Chris Frissell, Fisheries Biologist, Pacific Rivers Council
Dr. Timothy Ingalsbee, Fire Ecologist, American Lands Alliance
Dr. Erik Jules, Assistant Professor in Dept. Biological Sciences, Humboldt State Univ.
Dr. Dennis Odion, Plant Geography Specializing in Fire Ecology, Native Plants Society
Dr. James Strittholt, Landscape Ecologist, Conservation Biology Institute
Dr. William Weaver, Geomorphologist, Pacific Watershed Associates
Danny Hagans, Geology, Geomorphology, Erosion Control, Pacific Watershed Associates
Ken Crocker, Systems Analyst (no affiliation given)
Eric Fernandez, GIS specialist, Oregon Natural Resources Council
Matthew Kauffman, Biologist, Dept. Environmental Studies, Univ. California, Santa Cruz
Mark Madsen, Data Analysis/Decision Support Systems (no affiliation given)
Priya Shahani, Ph.D. Candidate-Ecology & Evolutionary Biology, Univ. of California, Santa Cruz