OREGON WILD

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22 March 2013

TO: BLM_OR_MD_Mail@blm.gov
CC: skellehe@blm.gov

Subject: Pilot Thompson Project EA (Middle Applegate Watershed) — comments

Dear BLM:

Please accept the following comments from Oregon Wild concerning the Pilot Thompson Project EA (Middle Applegate Watershed) dated March 22, 2013. These comments are intended to supplement the thoughtful comments submitted on our behalf earlier today by George Sexton of Klamath Siskiyou Wildlands Center. Oregon Wild represents over 10,000 members and supporters who share our mission to protect and restore Oregon's wildlands, wildlife, and water as an enduring legacy. Our goal is to protect areas that remain intact while striving to restore areas that have been degraded. This can be accomplished by moving over-represented ecosystem elements (such as logged and roaded areas) toward characteristics that are currently under-represented (such as roadless areas and complex old forest).

The proposed alternative 2 involves:

- ~2,300 acres of treatment
- Located in spotted owl critical habitat
- ~1,200 acres of commercial logging
    - 83 acres of logging in riparian reserves (50 ft no-treatment buffer, no gaps) with one stream/skid trail crossing
    - 824 acres variable density thinning (15% skips/gaps)
    - 319 acres intermediate density management (15% skips)
- ~1,200 acres of non-commercial treatment outside of commercial logging units
- 0.62 miles of new road construction (some permanent, some temporary)
- 45 miles road use and improvement
- 3.3 miles road renovation
- 2.55 miles road decommissioning
- 2 new landings

The EA complains about the failure of BLM's recent "thinning only" timber program ("a thinning-only harvest regime cannot be sustained in the long term. Other problems associated with a thinning-only regime include reduced variety of material generated, lower market value products, greater production costs per unit of output, and questions about their contribution to ecological goals"). BLM fails to acknowledge that dry forest restoration must focus on thinning. BLM must also acknowledge that Johnson & Franklin's 2009 report on ecological forestry called for "substantial investments" in restoration. "Ecological forestry" is not supposed to be done for profit. It's supposed to be done for ecological benefits. The financial costs may well exceed the financial return, but the ecological return should make it worthwhile.

Our primary recommendations for this project:

- Protect all large trees, as well as all old trees regardless of size. Some old trees are not very large but still serve valuable ecological functions. They should be recognized and protected.
- Since this project is in critical habitat for the northern spotted owl, it is important to retain and recruit primary constituent elements (PCEs) of owl habitat. The EA did not explain the need to manage for abundant dead wood (one of the specified PCEs) in owl critical habitat. This will require retention of all large and most medium sized trees.
- Make sure that there is enough spotted owl habitat across the landscape (to recover the owl in light of the barred owl and climate uncertainty) before degrading more suitable owl habitat;
- Avoid building new roads. Focus treatments near existing roads; Leave inaccessible areas as part of the untreated or reserve areas that serve a different (but still important) set of ecological values;
- Avoid log hauling during the wet season;
- Retain more hardwoods. They are important for biodiversity, and new information indicates their importance for spotted owls;
- Where "gaps" are prescribed make them small and mimic natural structure/ function/process by retaining significant structure within gaps.
- We support the prescribed 15% untreated "skips" embedded within logging units in order to mitigate for the loss of dense forest cover and loss of long-term snag recruitment.
- Do more to protect soil – the most fundamental forest resource – instead of focusing on economic efficiency.
- Do not allow heavy equipment in the riparian reserves, especially the proposed skid trail/stream crossing.
- Logging in riparian reserves should focus on culturing individual legacy trees – heavy thinning within 2X the radius of the dripline of old trees. Extensive thinning in riparian reserves will likely capture too much mortality and violate the ACS requirement to maintain natural rates of wood recruitment.
- We are intrigued by the modified riparian prescription in Alt 3, but not all the trees need to be felled toward the stream. There are functions provided by logs that fall along the contour such as trapping sediments. Also, not all conifer trees

need to be felled, as implied by the brief description of the prescription on EA page 2-43.

Optimal Mix of Treated and Untreated

Finding the optimal mix of treated and untreated areas, both across the landscape and within units, will help meet and harmonize three inter-related silvicultural objectives of this project

- Accelerate development of structural complexity such as larger tree structures and decadence.
- Develop spatial heterogeneity within stands (e.g. fine-scale structural mosaic).
- Create conditions that are favorable for the initiation, creation, and retention of snags, down wood, large vigorous hardwoods, and understory vegetation diversity in areas where these are lacking.

EA p 2-23. Excessive focus on large trees will sacrifice snags and dead wood, and vice versa. Use NEPA to show how you will find the optimum of both.

Recognize that dead wood values are sacrificed in thinned areas due to the effect of "captured mortality," while other late successional values, such as rapid development of large trees and understory diversity may be delayed in unthinned areas, so an important step in the restoration process is to identify the most optimal mix of treated (thinned) and untreated (unthinned) areas. We think this should be a conscious and well-documented part of the NEPA analysis, not just an accidental byproduct of what's economically thinnable. Tools like DecAID might be used to identify goals for large and small snags that need to be met over time and at the geographic scale of home-ranges of focal species. This can help identify the scale and distribution of untreated "skips."

Thinning benefits some aspects of late successional forest conditions such as large trees and vegetation diversity, but thinning also has adverse effects on other aspects of late successional forests such as dead wood recruitment, biomass accumulation, wildlife cover, soil quality, and microclimate conditions. In order to achieve all the objectives for optimal late successional forest conditions, restoration projects must contain both thinned and unthinned patches. Finding the right mix should not be an accident based mostly on operational feasibility, but should be a conscious decision based on quantitative analysis showing how best to achieve optimal late successional conditions. Since thinning has a long-term negative effect on reducing recruitment of dead wood, it should be treated as a limiting factor and used to drive the search for an alternative with the most appropriate mix of treated and untreated stands.

It is useful to apply the concept of "habitat complementation" based on proximity of different life stages and life needs. Recognize that the thoughtful juxtaposition of thinned and unthinned areas can provide habitat benefits greater than large homogeneous areas of either thinned or unthinned. There is a synergy to creation of a mosaic of thinned and unthinned sands that is greater than the sum of its parts. With this recognition, an important purpose of the NEPA document and the ultimate decision is to seek and find the most optimal mix of treated and untreated areas. Instead of an 80/20 mix of treated/untreated areas, consider a variety of combinations such as 60/40, 50/50, 40/60, and 20/80. Note that both the absolute proportion and the spatial pattern of treated and untreated must be considered.

Consider the ecological costs and benefits of both thinned areas and unthinned areas. Thinned areas grow big trees (but fewer of them), while unthinned areas recruit more dead wood habitat structure in the short and long-term. In order to accomplish real ecological restoration in young stands we need to plan for and implement both thinned areas and unthinned areas.

Determining the appropriate scale of thinned and unthinned areas is a critical decision which requires clear objectives and quantitative analysis. One necessary component of such an analysis is to determine how many green trees are needed at what density in order to recruit sufficient snags over time (both short and long-term) to achieve 50-80% DecAID tolerance levels across the project area.

It is important to integrate the analysis of road access and the optimal mix of treated and untreated areas. Since road construction has serious adverse impacts on soil, water, weeds, and wildlife, and because some areas will contribute to ecological goals while not being thinned, the agency should just allocate inaccessible areas to the untreated portion of the mix. This will lead to complementary benefits - avoided road impacts, and ecological benefits associated with dense forest and long-term dead wood recruitment.

Concerns about the analysis of dead wood habitat

The EA (p 2-39) states that one of the objectives is to "Objective 3: Provide Wildlife Trees & Habitat for Cavity Dependent Species." We support this objective, but the methods prescribed to achieve the objective are inadequate. The bullets below this objective focus on existing snags and dead wood, while ignoring the most significant impact of commercial logging which is to significantly reduce the population of green trees from which FUTURE snags will be recruited. It is important to ensure continuous recruitment of dead wood. Real mitigation for the effects of "captured mortality" as a result of logging requires retention of untreated patches where snags will be recruited at natural rates. The size of these skips should be the subject of careful analysis, not left as a byproduct of operational considerations.

Mischaracterization of the effects of logging on wood recruitment in riparian reserves

The EA erroneously assumes that small wood is not functional, even in small streams. The EA says "It was also assumed that only stands in a mature stage (greater than 21 inches DBH) are capable of providing a source of large wood of sufficient size to encourage channel modification and habitat improvements" This is simply wrong.

Wood serves a variety of purposes in riparian reserves. Pool formation is only one of those functions, and even pool formation is not so simple as BLM assumes. The effectiveness of wood in forming pools is a function of wood AND stream size. BLM's over-generalization of the functional role of small wood leads BLM to under-estimate the value of small wood, and under-estimate the adverse effects of logging in terms of capturing mortality and depriving the riparian reserves of future wood recruitment.

"The effect that wood has on [fish] habitat is related to the size of the piece of wood relative to the channel size and gradient." East Alsea Landscape Management Project – EA Appendix H - Fish BE, 4-18-2011. The NEPA analysis should therefore disclose the effects of logging not only on absolute size of wood but on the size of wood relative to stream size and gradient. Dead wood of all sizes is important to streams and riparian function. In small streams, small wood can even perform the ecological and hydrological functions normally thought to require large wood. If the goal of logging is to create large trees faster, the NEPA analysis should document the size, gradient, and other characteristics of streams adjacent to each logging area and determine the size of wood that can serve key ecological and hydrological functions, then disclose the effects of logging relative to those relevant wood sizes.

Dead wood is important to both aquatic and terrestrial purposes of the riparian reserves network, so the NEPA analysis cannot just focus on recruitment of wood to streams, but must also address the need to recruit optimal levels of snag and dead wood to meet the needs of terrestrial wildlife (primary cavity excavators, secondary cavbity users, amphibians, mollusks, lichen, fungi, etc) which were intended to be benefited by riparian reserves.

We are concerned that thinning captures mortality which reduces and delays recruitment of large wood needed to meet ACSO #8 among others. Thinning is often conducted in riparian areas based on the false assumption that thinning accelerates the recruitment of large trees and therefore large snags, but rigorous analysis using stand simulation software clearly shows that assumption to be false. Note ACSO #8 is based on the aquatic objective more clearly stated in the SAT Report as "Maintain or restore riparian vegetation to provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems." 1993 SAT Report. Ch 5, p 456.

Thinning in stands of trees that are not yet of "pool forming" size may be beneficial, but after trees are of pool-forming size thinning might just capture and remove the mortality that should end up in the stream. (In simplistic terms, a pool-forming tree is one big enough to fall all the way across the stream, so it varies by stream size, but in general it only takes a small tree to a form pool in a small stream). See Roni and Beechie (2002) below.

Rosenfeld & Huato (2003) found that large wood formed pools more reliably than small wood. Wood >24" dbh formed pools 42% of the time, while wood 6-12" dbh formed pools 6% of the time. However, from this one can conclude that the cumulative influence of several pieces of small wood can approach the pool-forming function of large wood. For instance, seven pieces of small wood are just as likely to form a channel-spanning pool as a large piece of wood. Rosenfeld, J. S ., and Huato, L. 2003. Relationship between LWD characteristics and pool formation in small coastal British Columbia streams. North American Journal of Fisheries Management 23:928–938. http://www3.telus.net/jordanrosenfeld/Home%20Page/Publications/Rosenfeld%20and%20Huato%202003.pdf. Similarly, Bilby and Ward (1989) surveyed characteristics of large wood in western Washington streams and found that size of stable pieces of large wood increases with stream size. Their values suggest that streams under 5 m in width require trees of about 30–35 cm in diameter to be useful as fish habitat and to be able to persist as stable LWM in the channel. Streams of about 10 m in width require larger trees of about 45 cm (1.5 ft) in diameter. Bilby, R. E.; Ward, J. W. 1989. Changes in characteristics and function of woody debris with increasing size of streams in western Washington. Transactions of the American Fisheries Society 118: 368-378. These publications show the direct and cumulative value of small wood (which is often captured and exported by logging). This means that the agency cannot ignore or discount the value of small wood recruitment to streams. In sum, NEPA analyses must account for the effects of logging on both the quantity and quality of wood.

Weigh the costs and benefits of logging in riparian reserves.

The agency often claims that logging in riparian reserves is necessary to improve attributes other than large wood. E.g., Pilot Thompson EA: "Thinning would improve the condition of the Riparian Reserves by thinning mid-seral aged stands creating structural and species diversity" However, these alleged benefits are often minor and transitory, and do not outweigh the significant long-term adverse effect of logging on recruitment of dead wood. The agency must focus on the most significant contributions of vegetation toward ACS objectives and the most significant effects of logging on the ACS objectives.

The Northwest Forest Plan and its supporting documentation make clear that the primary value of riparian vegetation is as a source of large wood and shade, not vegetation diversity and canopy layering, as often asserted by the agency to justify logging in riparian reserves. The Pilot Thompson EA even admits "The primary function of Riparian Reserves is to provide shade and a source of large wood inputs to stream channels." Medford BLM 2013. Pilot Thompson EA, p 3-76. http://www.blm.gov/or/districts/medford/plans/files/PT_EA_ForWeb.pdf

The effects of logging on dead wood are significant and long term, adversely affecting a core function of the reserves, while the purported benefits to vegetation diversity are minor and transitory, and affect secondary purposes of the reserves.

> **Large Wood**
> Large quantities of downed trees are a functionally important component of many streams (Swanson et al. 1976; Sedell and Luchessa, 1982; Sedell and Froggat, 1984; Harmon et al. 1986; Bisson et al. 1987; Maser et al. 1988; Naiman et al. 1992). Large woody debris influences channel morphology by affecting longitudinal profile, pool formation, channel pattern and position, and channel geometry (Bisson et al. 1987). Downstream transport rates of sediment and organic matter are controlled in part by storage of this material

behind large wood (Betscha 1979). Large wood affects the formation and distribution of habitat units, provides cover and complexity, and acts as a substrate for biological activity (Swanson et al. 1982; Bisson et al. 1987). Wood enters streams inhabited by fish either directly from the adjacent riparian zone from tributaries that may not be inhabited by fish, or hillslopes (Naiman et al. 1992).

Large wood in streams has been reduced due to a variety of past and present timber harvesting practices and associated activities. Many riparian management areas on federal lands are inadequate as long term sources of wood.

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Riparian Ecosystem Components

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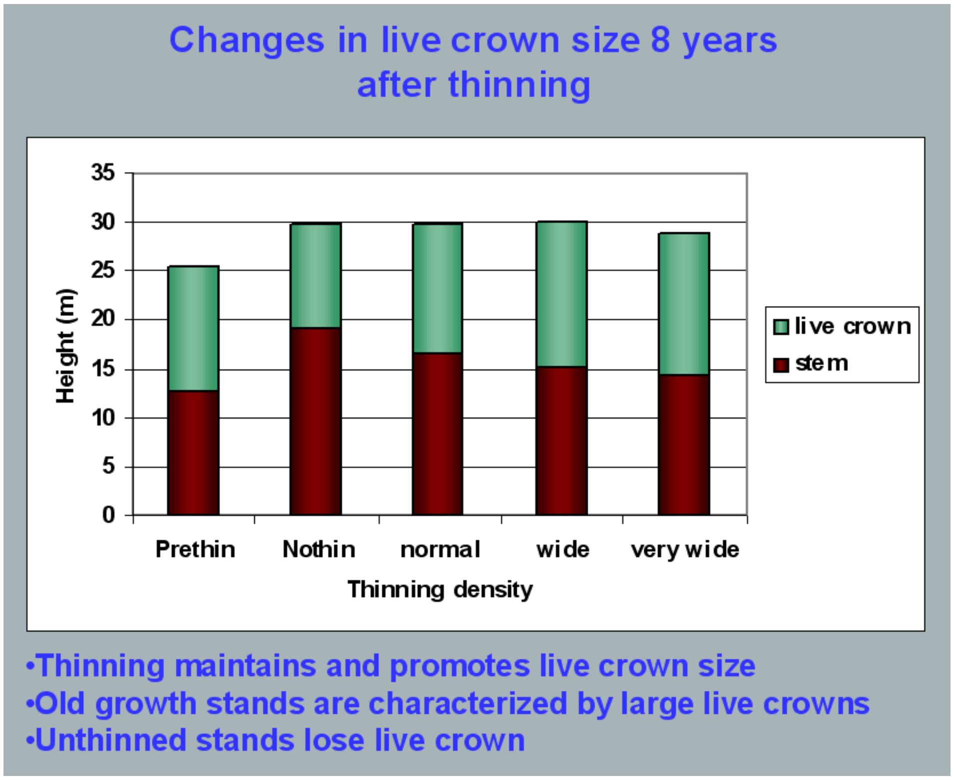
Riparian vegetation regulates the exchange of nutrients and material from upland forests to streams (Swanson et al. 1982; Gregory et al. 1991). Fully functional riparian ecosystems have a suite of characteristics which are summarized below. Large conifers or a mixture of large conifers and hardwoods are found in riparian zones along all streams in the watershed, including those not inhabited by fish (Naiman et al. 1992). Riparian zone-stream interactions are a major determinant of large woody debris loading (House and Boehne 1987; Bisson et al. 1987; Sullivan et al. 1987). Stream temperatures and light levels that influence ecological processes are moderated by riparian vegetation (Agee 1988; Gregory et al. 1991). Streambanks are vegetated with shrubs and other low-growing woody vegetation. Root systems in streambanks of the active channel stabilize banks, allow development and maintenance of undercut banks, and protect banks during large storm flows (Sedell and Beschta 1991). Riparian vegetation contributes leaves, twigs, and other forms of fine litter that are an important component of the aquatic ecosystem food base (Vannote et al. 1980).

1993 FEMAT Report, pp V-13, V-25.

The effects of thinning on crown development are not very significant.



Aquatic/Riparian Ecosystem Dynamics and Associated Management Implications - Recent Findings. Powerpoint, 32.6M. This topic was presented at the Regional Interagency Executive Committee meeting on January 7, 2003. http://www.reo.gov/library/presentations/Szaro_present_Aquatic_Rip_Final.ppt

Stimulating the development of a diverse understory is often used as a justification for thinning, but this may not be justified in stands older than about 40 years. A systematic review of 917 Forest Inventory and Analysis (FIA) plots in western Oregon (mostly on non-federal lands) found, "Contrary to expectations of canopy closure, mean canopy cover by age class rarely exceeded 85 percent, even in unthinned productive young conifer forests. Possibly as a result, effects of stand age on understory vegetation were minimal, except for low levels of forbs found in 20- to 40-year-old wet conifer stands. … Although heavily thinned stands had lower total cover, canopy structure did not differ dramatically between thinned and unthinned stands. Our findings suggest potential limitations of simple stand succession models that may not account for the range of forest types, site conditions, and developmental mechanisms found across western Oregon." McIntosh, Anne C.S.; Gray, Andrew N.; Garman, Steven L. 2009. Canopy structure on forest lands in western Oregon: differences among forest types and stand ages. Gen. Tech. Rep. PNW-GTR-794. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 35 p. http://www.fs.fed.us/pnw/pubs/pnw_gtr794.pdf (Accessed 7/31/2012). This seems to indicate that the benefits of thinning may be best realized in dense stands younger than 40 years old. This study also showed that in wet conifer stands the mean Canopy Height Diversity Index and the mean Simpson's Diversity Index of tree heights leveled off at about age 65. This study also looked at canopy conditions after three levels of thinning intensities (heavy, light, and none). "Mean cover of the lower canopy layer was nominal for all three thinning intensities. … There were no evident trends between understory cover and thinning history; both shrub and forb cover were fairly similar among the three thinning intensities. … The lack of a strong effect of crown closure on understory cover may be related to our finding that mean crown cover did not exceed 85 percent. … We expected greater cover of understory vegetation in thinned than in unthinned stands but did not detect significant differences in this analysis."

Logging is not beneficial to wood recruitment in riparian reserves

The EA (p 3-94) says "This treatment may improve large wood inputs as the remaining trees will have improved growing conditions and would grow larger and faster, thus enhancing the large wood component adjacent to stream channels." This is incorrect. BLM needs to provide site specific analysis to support such a strange assertion (that removing wood, adds wood).

The ACS says that logging must not "retard" attainment of ACS objectives, so the EA must disclose (based on quantitative analysis) whether logging will likely retard recruitment of desired levels of dead wood compared to not logging. It is quite likely that logging will capture mortality and reduce long-term recruitment of functional dead wood.

New science brings into question the ecological value of commercial logging as a restoration tool in riparian reserves in the Coast Range and western Cascades of Washington and Oregon.

> … our data suggest that mature, late-successional conifer dominated forests have well developed structural characteristics in terms of abundant large trees in the overstory, abundant large snags, and a well-developed understory of shade-tolerant trees. We modeled the growth of young conifer stands to assess whether a common restoration treatment [thinning to 150 trees per hectare] would accelerate development of structural characteristics typical of reference conditions. We found that left untreated, the stands followed a trajectory towards developing forest structure similar to the average reference condition. In contrast, the restoration treatment followed a developmental trajectory along the outside range of reference conditions.

Pollock, M. M., T. J. Beechie, and H. Imaki. 2012. Using reference conditions in ecosystem restoration: an example for riparian conifer forests in the Pacific Northwest. Ecosphere 3(11):98. http://dx.doi.org/10.1890/ES12-00175.1

In order to retain options for recruitment of large wood in degraded stream systems, scientific recommendations include retention of trees >12" dbh.

> Removal of trees from riparian zones may delay the recovery of fish habitat. At a minimum, the largest trees (that is, those > 12 inches in diameter at breast height) should be left in riparian areas for future sources of in-stream wood. This would apply to all streams, as recommended by Anderson and others (1992). Smaller trees could be removed as part of a program for riparian vegetation restoration.

Gordon H. Reeves and Fred H. Everest. 1994. REDUCING HAZARD FOR ENDANGERED SALMON STOCKS. *in* Everett, Richard L., comp. 1994. Restoration of stressed sites, and processes. Gen. Tech. Rep. PNW-GTR-330. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 123 p. (Eastside forest ecosystem health assessment; volume IV.). http://www.fs.fed.us/pnw/pubs/pnw_gtr330.pdf (p 23).

In January 2013, the Science Review Team Wood Recruitment Subgroup reported their "Key Points" regarding the effects of commercial thinning on wood recruitment in riparian reserves:

> … In general, there is very little published science about the effects of thinning on dead wood recruitment and virtually none on thinning effects on wood recruitment in riparian zones. We conducted some limited simulation modeling to illustrate some of the relationships between thinning and dead wood recruitment. The simulations (and comparison of models) were not comprehensive or a rigorous analysis of thinning effects and should be viewed as preliminary. Below we provide 15 key points from our efforts:
>
> Key Points
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> …
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> 3. Accurate assessments of thinning effects requires site-specific information. The effects of thinning regimes on dead wood creation and recruitment (relative to no-thinning) will depend on many factors including initial stand conditions, particularly stand density, and thinning prescription—it is difficult to generalize about the effects of thinning on dead wood without specifying the particulars of the management regime and stand conditions.
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> 4. Conventional thinning generally produces fewer large dead trees. Thinning with removal of trees (conventional thinning) will generally produce fewer large dead trees across a range of sizes over the several decades following thinning and the life-time of the stand relative to equivalent stands that are not thinned. Generally, recruitment of dead wood to streams would likewise be reduced in conventionally thinned stands relative to unthinned stands.
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> 5. Conventional thinning can accelerate the development of very large diameter trees. In stands that are conventionally thinned, the appearance of very large diameter dead trees (greater than 40") may be accelerated by 1 to 20 years relative to unthinned plantations, depending on thinning intensity and initial stand conditions. Trees of such sizes typically begin to appear 5 to 10 decades after thinning 30 to 40 year old stands. [This alleged benefit is small, remote, speculative, and vastly outweighed by the significant near-term loss of functional wood in smaller size classes.]
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> 6. Nonconventional [i.e., non-commercial] thinning can substantially accelerate dead wood production. Stands thinned with prescriptions that leave some or all of the dead wood may more rapidly produce both large diameter dead trees in the short-term and very large diameter dead trees (especially greater than 40") in the

long-term, relative to unthinned stands. Instream wood placement gets wood into streams much sooner than by natural recruitment, and can offset negative effects of thinning on dead wood production.

…

10. Thinning can increase the amount of pool-forming wood under certain conditions. Thinning can increase the amount of pool-forming wood only when the thinned trees are smaller in diameter than the average diameter of pool-forming wood (which varies with stream size). [The Pilot Thompson EA provides no analysis to show whether this exception applies.]

…

15. Healthy, diverse forests contain many dead trees. Numerous terrestrial forest species require large dead or dying trees as essential habitat. Some directly, others indirectly; to support the food web within which they exist. Abundant large snags and large down wood on the forest floor are common features of natural forests and essential for the maintenance of biological diversity.

Thomas Spies, Michael Pollock, Gordon Reeves, and Tim Beechie 2013. Effects of Riparian Thinning on Wood Recruitment: A Scientific Synthesis - Science Review Team Wood Recruitment Subgroup. Jan 28, 2013, p 36.

The statement in #5 that "thinning can accelerate development of very large diameter trees" should be kept in proper perspective:

- The alleged gain in very large trees is very minor, compared to not logging;
- The alleged gain in very large trees is overwhelmed by the clear loss of functional wood in smaller size classes, especially along small streams; and
- The alleged gain in very large trees is in the distant future and more speculative; while the loss of smaller functional wood is in the near-term and more certain. Predicting future mortality in thinned stands is difficult. If the trees do not die and fall down there is no benefit in terms of down wood.

The apparent dissonance between the fact that thinning reduces wood recruitment (#4), but also has the potential to increase production of the very large trees (#5) might be resolved by looking to the right mix of different treatments as suggested in #14 – with some riparian reaches left unthinned to provide for recruitment of large amounts of wood in a range of sizes, some areas thinned non-commercially, and some riparian patches thinned to produce those very large trees. Also, the statement in #10 that thinning can increase pool-forming wood depending on stream size, needs more explanation. Most riparian thinning occurs near small streams where small wood can be pool-forming.

Thinning to produce very large wood in the distant future at the expense of more abundant wood recruited over time is not advised. The SAT Report, upon which the ACS is founded, was clear that continuous input of wood is important. “Riparian zones along larger channels need protection to limit bank erosion due to trampling, grazing, and compaction, to ensure an adequate and continuous supply of large wood to channels …” 1993 SAT Repot. Ch 5, p 455.

See also Heiken, D. 2012. Thinking About Dead Wood in Managed Landscapes (powerpoint) https://dl.dropbox.com/u/47741/dead%20wood%20slides%202012.ppt

Risk reduction in riparian reserves

The EA says "There is a high risk of accelerated insect activity and stand replacement fire in Riparian Reserves if left untreated." (EA p 3-6).

Reducing the likelihood of fire is not a valid rationale for thinning in riparian management areas because the adverse effects of logging are certain while the averse effects of fire are uncertain. The location and timing and severity of wildfire is impossible to predict. The agency has to guess where fire might occur during the brief period that treatments might be effective at modifying fire behavior. Most times the agency will guess wrong. Therefore, the riparian reserve stands will suffer the adverse consequences of reduced wood recruitment and likely receive no benefits in return.

Since the density reduction actions needed to modify fire near streams will themselves have adverse effects on aquatic resources (e.g. shade and wood recruitment), the agency must show that the probability and effects of logging plus fire are less adverse than the probability and effects of fire alone. Remember – treatments do not eliminate fire, they just tweak the probability at the margins. And not all fires would be adverse to streams. In fact, fire might be good.

To fully disclose the effects requires a probabilistic assessment. Bottom line – it does not pencil out. Ten to 100 acres must be logged in order to protect one acre from fire. For an analogous analysis see — Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. v 1.0. May 2010. http://dl.dropbox.com/u/47741/Heiken_Log_it_to_Save_it_v.1.0.pdf

Concerns regarding Johnson & Franklin's dry forest strategy.

Johnson & Franklin's ecological forestry reports blend ecological objectives and timber production objectives in such a way that it is impossible to determine to what extent ecological objectives are being sacrificed to meet economic objectives. Highlight such trade-offs is one of the important functions of NEPA analysis.

There are inherent conflicts between Johnson & Franklin's recommendations for dry forests and spotted owl habitat conservation. Owls prefer dense forests. Fuel is habitat, and fuel reduction is habitat reduction. The NWFP recognized a need to maintain some uncharacteristically dense dry forests in order to mitigate for the significant loss of dense old growth forests. Is that goal being abandoned? If so, this is a big policy shift that needs to be subjected to NEPA analysis at the rangewide scale.

NWFP called for active management of fire prone LSRs but with standard that ensure treatments are focused outside of existing suitable habitat; ensure that treatments are in fact needed and will be effective. Johnson & Franklin seem to abandon this approach.

Johnson & Franklin call for only 1/3 of the dry forests on BLM lands to be maintained in dense patches, seemingly ignoring that half these checkerboard lands are privately owned and lack adequate habitat, so it's really 1/6th. Is that enough?

Johnson & Franklin adopt a questionable assumption that the ecological effects of fire are worse than the effects of logging. This leads to them asking the wrong question: How much of the landscape do we treat and how fast? Instead of - Under what circumstances will the net ecological effects of logging plus wildfire be better than the net ecological effects of fire alone? Their recommendations lack a rigorous risk assessment.

Johnson & Franklin and BLM mischaracterize the risk of fire to spotted owls. They incorrectly assume that spotted owls are more threatened by fire than logging. (In fact, owls evolved with fire. Owls are resilient to fire. Fire still occurs in a mix of severities, not far different than the historic mix. Suitable habitat is being recruited faster than it is being lost to fire.) Furthermore, Johnson & Franklin and BLM incorrectly assume that fuel reduction logging can provide net benefits to spotted owls. (In fact, active management unwarranted because the location and severity of future fires cannot be predicted. Extensive treatments will therefore degrade more acres than will benefit. Mathematical reality is being ignored.)

BLM must account for the fact that spotted owl habitat is growing and developing faster than owl habitat is being lost to fire, and for the fact that aggressive fuel treatments will degrade far more owl habitat than will be degraded by fire, so there is not real benefit to spotted owls from fuel reduction logging. See Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. v 1.0. May 2010.
http://dl.dropbox.com/u/47741/Heiken_Log_it_to_Save_it_v.1.0.pdf

The invasion of the barred owl counsel against logging that would degrade spotted owl habitat. Retaining and restoring more suitable habitat favors the coexistence of competing species.

There remains a lot of uncertainty about how to manage and restore mixed conifer forests. Norm and Jerry picked an arbitrary line between moist and dry, lumping mixed forests in with dry forests in order to allow more active management in older mixed conifer forest. Johnson & Franklin say it's justified because of climate change, but this hasty conclusion needs scientific review. If the fire regime is expected to shift toward stand replacing, why not treat like other stand replacing regimes and protect "stands" instead of just "trees?"

There is not a great deal of scientific consensus on management of these complex forests. Logging can exacerbate fuel hazard. Fire severity actually decreases with time since fire because canopy cover helps suppress growth of ladder fuels, especially in SW Oregon.

Concerns about the FWS notions about "active management" in suitable owl habitat.

The EA says that they intend to apply FWS recommendations for "active management" from the Revised Spotted Owl Recovery Plan. These recommendation are not scientifically sound and must be subjected to careful NEPA review before being applied. "Active management" (aka logging) is very likely to adversely modify spotted owl habitat, because it reduces canopy cover, reduces stand complexity, reduces existing snags, significantly reduces future recruitment dead wood, reduces hiding cover needed for flying squirrels. Evidence is distinctly lacking for habitat benefits from logging to counter the numerous adverse effects from logging.

When logging intended to benefit habitat will also reduce the quality of habitat, the NEPA analysis must include some evaluation of ecological costs and benefits — e.g., the probability that logging will degrade habitat vs. the probability that fuel reduction treatments will interact favorably with fire and thus benefit habitat. This evaluation requires an estimate of the probability of future wildfire. To assume, as many analyses do, a 100% chance of future wildfire over-estimates the likelihood of treatments will interact with fire, thus over-estimating the ecological value of fuel treatments, and under-estimating the ecological effects of logging on habitat. See Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. v 1.0. May 2010. http://dl.dropbox.com/u/47741/Heiken_Log_it_to_Save_it_v.1.0.pdf (Accessed 8/1/2012).

There is a strong interest among the federal land management agencies to conduct widespread logging in suitable spotted owl habitat in order to reduce the effect of fire. The agencies view fuel reduction logging as beneficial to owl habitat because modeling shows that fire behavior is moderated by fuel reduction, but proponents never seem to conduct a careful evaluation of the relative probability, and the relative harms, of logging versus wildfire. Strangely, the probabilistic aspects of this issue have been largely ignored in the owl science literature, but recently explored in the forest-carbon literature which recently showed that although thinning can modify fire behavior, logging to reduce fire effects is likely to remove more carbon by logging than will be saved by modifying fire. Mitchell, Harmon, O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications. 19(3), 2009, pp. 643–655 http://www.fs.fed.us/pnw/pubs/journals/pnw_2009_mitchell001.pdf (Accessed 8/1/2012). The reason for this seemingly counterintuitive outcome is a result of the "law of averages." As explained by Cathcart et al 2009 —

> The question is—if the implementation of fuels treatments within the Drews Creek watershed had the beneficial effect of reducing the likelihood of wildfire intensity and extent as simulated in this study, why is the expected carbon offset from fuels treatment so negative? The answer lies in the probabilistic nature of wildfire. Fuels treatment comes with a carbon loss from biomass removal and prescribed fire with a probability of 1. In contrast, the benefit of avoided wildfire emissions is probabilistic. The law of averages is heavily influenced that given a wildfire ignition somewhere within the watershed, the probability that a stand is not burned by the corresponding wildfire is 0.98 (1 minus the average overall conditional burn probability …

> Thus, the expected benefit of avoided wildfire emissions is an average that includes the predominant scenario that no wildfire reaches the stand. And if the predominate scenario for each stand is that the fire never reaches it, there is no avoided CO2 emissions benefit to be had from treatment. So even though severe wildfire can be a significant CO2 emissions event, its chance of occurring and reaching a given stand relative to where the wildfire started is still very low, with or without fuel treatments on the landscape.

Jim Cathcart, Alan A. Ager, Andrew McMahan, Mark Finney, and Brian Watt 2009. Carbon Benefits from Fuel Treatments. USDA Forest Service Proceedings RMRS-P-61. 2010. http://www.fs.fed.us/rm/pubs/rmrs_p061/rmrs_p061_061_079.pdf (Accessed 8/1/2012).

Both carbon and spotted owl habitat tend to accumulate in relatively dense forests with intermediate or longer fire return intervals. Thus, we can likely read these studies and replace the word "carbon" with the word "spotted owl habitat" and the results will likely hold.

In an effort to advance the discussion and help the agencies conduct better risk assessments in the NEPA context we have prepared a white paper in an attempt to clarify the critical considerations in a probabilistic risk assessment that compares the risk of logging versus wildfire. Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. v 1.0. May 2010. http://dl.dropbox.com/u/47741/Heiken_Log_it_to_Save_it_v.1.0.pdf (Accessed 8/1/2012). This report is most relevant in SW Oregon but the proposed evaluative framework is applicable in the east Cascades, northern California, and elsewhere.

To justify such fuel reduction logging in suitable owl habitat on ecological grounds requires several findings: (1) that wildfire is highly likely to occur at the site of the treatment, (2) that if fire does occur it is likely to be a severe stand-replacing event, and (3) that spotted owls are more likely to be harmed and imperiled by wildfire than by logging at a scale necessary to reduce fire hazard. Available evidence does not support any of these findings, which raises serious questions about the need for and efficacy of logging to reduce fuels in western Oregon and other forests lacking frequent fire return intervals.

The probabilistic element of the risk equation demands careful consideration. Both logging and fire have meaningful consequences, so the issue really boils down to a comparative probabilistic risk assessment where risk is characterized by two quantities: (1) the magnitude (severity) of the possible adverse consequence(s), and (2) the likelihood (probability) of occurrence of each consequence.

Framework for Assessing the Risk of Wildfire vs Fuel Reduction Logging			
	Likelihood of event	Magnitude of harm	Net Benefit
Wildfire	LOW: Stand replacing wildfire is not common in western Oregon. Fire suppression policy prevails.	LOW: The majority of wildfire effects are not stand replacing. Fire is a natural process to which native	Fire is likely less harmful to habitat than fuel reduction

	The chance that any given acre of forest will experience wildfire is low.	wildlife are adapted. There is still a deficit of natural fire processes on the landscape.	logging.
Logging	HIGH: To be effective in controlling fire, logging must be very extensive, and sustained. Many more acres would need to be logged than would burn.	HIGH: Widespread logging will have significant impacts on canopy, microclimate, understory vegetation, down wood, and long-term effects on recruitment of large trees and snags.	Fuel reduction logging is likely more harmful to habitat than wildfire.

The white paper is organized around these risk evaluation parameters.

In spite of what we often hear, that federal forests are not at imminent risk of destruction by wildfire. Fire return intervals remain relatively long, due to both natural factors and active fire suppression policies. Wildfire severity also remains moderate. Most wildfires are NOT stand replacing. Most fires are in fact low and moderate severity.

The location, timing, and severity of future fire events cannot be predicted making it difficult to determine which forests will benefit from treatment - consequently fuel treatments must be extensive and many stands will be treated unnecessarily, thus incurring all the costs of fuel logging, but receiving none of the beneficial effects on fire behavior.

Furthermore, logging for purposes of fuel reduction has impacts on owl and prey habitat that remain under-appreciated, especially the reduction of complex woody structure, and the long-term reduction in recruitment of large snags and dead wood. Fuel reduction logging also has complex effects on fire hazard with potential to increase fire hazard, especially when fuel reduction efforts involve removal of canopy trees.

When all this evidence is put together, it becomes clear that "saving" the spotted owl by logging its habitat to reduce fuels often does not make any sense.

Similar conclusions were reached by The Wildlife Society (TWS) peer review of the 2010 Draft Recovery Plan for the Spotted Owl. The draft plan called for extensive logging to reduce fire hazard ("inaction is not an option"). TWS used state-and-transition model to evaluate the effects of opening dry forests to reduce fire hazard versus the effects of wildfire.

> The results of running the model with 2/3rds of the landscape treated leads to open forest becoming predominant after a couple of decades, occupying 51 percent of the forested landscape, while mature, closed forest drops to 29 and 24 percent of the Klamath and dry Cascades forests, respectively (Appendix A, Figure 5, shows the Cascades). Treatments that maintain open forests in 2/3rds of the landscape put such a limit on the amount of closed forest that can occur, even if high severity fires were to be completely eliminated under this scenario, there would only be 35 percent of the landscape occupied by closed forests. In contrast, to the extensive treatment scenario, treating only 20 percent of the landscape reduces mature, closed canopy forest by about 11 percent (Appendix A, Figure 6).

One justification for the extensive treatment scenario promoted in the 2010 DRRP is that it is needed because of increased fire hypothesized to occur under climate change. By doubling the rate of high severity fire by 2050 with 2/3rds of the landscape treated, closed canopy forest is reduced to 25 percent in the Klamath compared to 60 percent without treatment and 23 percent in the dry Cascades compared to 54 percent without treatment.

Under what scenario might treatments that open forest canopies lead to more closed canopy spotted owl habitat? The direct cost to close forests with treatments that open them is simply equal to the proportion of the landscape that is treated. This reduction in closed canopy forest can only be offset over time if the ratio of forest regrowth to stand-replacing fire is below 1 (5-8 times more fire than today), and shifts to above 1 with the treatments (and most or all standreplacing fire in treated sites is eliminated, as modeled here). Another scenario that allows closed forests to increase would be if treating small areas eliminated essentially all future stand replacing fire, not only in treated areas, but across the entire landscape. This scenario obviously relies on substantially greater control over fire than is currently feasible, and it would increase impacts of fire exclusion if effective.

…

In sum, to recognize effects of fire and treatments on future amounts of closed forest habitat, it is necessary to explicitly and simultaneously consider the rates of fire, forest recruitment, and forest treatment over time, which has not yet been done by the Service.

…

The potential impacts of fuel treatments on spotted owls are not considered. … We also know little about the impacts of fire, yet this has been treated as a major threat, leading to proposing more fuel treatments. However, it is uncertain at this time which is a bigger threats, fires or treatments to reduce risk of fires. … If the plan intends to use the best available science to describe ongoing impacts to spotted owl habitat, information and literature about disturbances to reduce fuels should be included.

… there has been no formal accounting of how closed canopy forests can be maintained with the widespread treatments that are being proposed.

The Wildlife Society 2010. Peer Review of the Draft Revised Recovery Plan for Northern Spotted Owl. November 15, 2010. http://www.fws.gov/oregonfwo/Species/Data/NorthernSpottedOwl/Recovery/Library/Documents/TWSDraftRPReview.pdf (Accessed 8/1/2012).

In early 2012, FWS released their proposed rules for spotted owl critical habitat and an announcement of their intention to encourage widespread "active management" within suitable, critical habitat. Fed. Reg. March 8, 2012. http://www.gpo.gov/fdsys/pkg/FR-2012-03-08/pdf/2012-5042.pdf. (Accessed 8/1/2012). This brought out critics in the scientific community who call for more rigorous analysis of the consequences before widespread adoption of logging as a means of habitat management.

[W]e are concerned that the decision to move forward with untested "active management" of federally owned forest lands at the landscape level prior to validation through the scientific peer-review process represents a potentially serious lapse in the application of the scientific process. This decision may conflict with the DOI's scientific integrity policy as well as the mandates of several environmental laws …

…

The Department of the Interior's Fish and Wildlife Service (FWS) considers active forest management as including those techniques that involve aggressive forest thinning and associated forest canopy reductions in dry forests and modified regeneration harvests in mature moist forests. Given that the primary driver of the spotted owl's decline has been the destruction of old-growth forest habitat by logging, which will be the means used to achieve the anticipated forest thinning and regeneration harvests, we are especially concerned about the potential habitat impacts of adopting untested "active management" forestry technique. Accordingly, we request that the DOI prepare an Environmental Impact Statement (EIS) under NEPA to provide a rational, scientific approach for the testing of active management forestry in order to ensure that such techniques are validated through the peer-review process prior to their utilization at any commercial or landscape scale in the spotted owl's critical habitat.

…

The Presidential Memorandum accompanying the proposed critical habitat designation also noted: "on the basis of extensive scientific analysis, areas identified as critical habitat should be subject to active management, including logging in order to produce the variety of stands of trees required for healthy forests. The proposal rejects the more conservative viewamong conservation biologists that land managers should take a 'hands off' approach to such forest habitat in order to promote this species' health." We are concerned that this memorandum overstates the quality and quantity of scientific research on the potential benefits of active forest management, especially in the Pacific Northwest on a federally threatened species. In particular, we are unaware of any substantial or significant scientific literature that demonstrates that active forest management enhances the recovery of spotted owls.

…

after a full scientific peer-review of the data collected, the FWS and DOI would be able to make a fully informed decision regarding short- and long-term management of critical habitat. We believe that such an approach is clearly warranted given that the spotted owl is a closed canopy dependent species and active management may degrade habitat for the owl and encourage further expansion of the barred owl. Notably, recent evidence has shown spotted owl extirpation rates related to barred owl invasions are highest for spotted owls with low levels of old growth habitat in nesting areas or high levels of forest fragmentation[fn]. Scaling up logging activities throughout the Pacific Northwest, particularly on BLM lands in western Oregon where "active management" is ostensibly going to be integral to pending resource management plan revisions, is therefore premature and not representative of the best available science.

Society for Conservation Biology, The Wildlife Society, American Ornithologists Union. 4-2-2012 letter to Secretary of Interior Salazar. http://www.eenews.net/assets/2012/04/02/document_gw_01.pdf (Accessed 8/1/12) [fn] *citing* Dugger, K.M., R.G. Anthony, and L.S. Andrews. 2012. Transit dynamics of invasive competition: barred owls, spotted owls, habitat, and the demons of competition present. Ecological Applications (2011) Volume: 21: 2459-2468.

Even back in 1990 scientists were calling for research to determine if logging was compatible with owl conservation. That research has not been done. The Interagency Scientific Committee said "Allow silvicultural treatments that have been tested or demonstrated through experimentation to facilitate the development of suitable habitat, such as planting trees." 1990 ISC Report, p 325.

Also, in 2011 the GEOS Institute submitted a draft white paper to the FWS which was attached to their comments on Appendix C of the Owl Recovery Plan, which found ….

> the FIA data illustrate a broad pattern of forest resilience to current fire regimes in the Pacific Northwest. In fact, forests would have to experience a more than threefold increase in fire in the Klamath and nearly an eightfold increase in the Cascades before positive net growth in relation to fire would cease.
>
> The rapid regrowth rate of forests makes them resilient to substantially enhanced rates of burning. In addition, forest growth rates are increasing in the Pacific Northwest (Latta et al 2010), while fire trends are unclear … Because so much more fire would need to occur before net forest loss would begin to occur, managers have more time to monitor long-term fire and climate trends and test long-term treatment impacts in an adaptive management context.
>
> As long as net growth of forests outpaces losses to high-severity fire, treatments that cause habitat to be downgraded will diminish habitat for closed, late-successional species, such as spotted owls, even if treated areas experience no high-severity fire. Habitat loss or degradation is expected to add to effects of barred owl on spotted owls and vice versa (Dugger et al., in press). Habitat impacts will also be greater than modeled here if thinned forests burn, if mid-successional forests do not transition to late successional forests in 20 years, and if it takes longer for recruitment of large snags, down logs and mid canopy trees, and following regeneration patch cuts proposed (e.g., Johnson & Franklin 2009) to restore habitat contiguity. These tradeoffs with maintaining closed forest habitat features often have not been recognized by advocates of widespread fuel treatments (e.g., Stephens & Ruth 2005, Agee & Skinner 2005) …
>
> The no-treatment scenario, which produced the most future late-successional habitat, would likely increase late-successional forests more than our results indicate. Late-successional forests may increase more because mid-successional forests may not have twice the high-severity fire rate found in late-successional forest, as we assumed for our model. Also, our assumption that no high-severity fire would occur in treated areas is unlikely. There is currently a low probability that treated stands will burn at all (Rhodes & Baker 2008); however, if these stands do burn, treatments would not be effective in reducing wind-driven fire under extreme conditions (Finney et al 2003, Cruz & Alexander 2010), …

> … Where maintaining late-successional forests for this species is paramount, especially with barred owl invasion, forests will currently need to be protected from active management that causes habitat to be lost or downgraded at least until monitoring of spotted owls in response to such activities on smaller scales is available. Options involving no-regrets active and passive management that offer habitat improvements, protection from human-caused fire and post-fire logging, and accommodation of naturally occurring fire, can, however, be safely implemented to pursue goals of maintaining habitat for the spotted owl (Hanson et al 2010).

Geos Institute 2011. "Effects of Fire and Forest Treatments on Future Habitat of the Northern Spotted Owl: A White Paper Produced by the Geos Institute." (draft).

William Baker has told the FWS …

> Recent decadal estimates of high-severity fire rotations are long … Ratios of old-forest recruitment to high-severity area are currently high … Thus, dramatic increase in high-severity fire (e.g., 5-10 times as many huge fires per decade) would need to occur for net declines in old forest to begin. … [Reserveless strategy in the 2008 Recovery Plan is] based on incorrect fire-risk estimates. Fire risk, if anything, is currently low, and dynamism rather slow. Fuel treatments on up to 65-70% of dry forests premature and incompatible with recent science. Widespread fuel treatments based on incorrect notion that forests were generally open and park-like because of low-severity fires (see Hessburg et al. 2007, Williams and Baker, for evidence that this is incorrect).

Baker W. [undated] Fire Risk and Northern Spotted Owl Recovery in Dry Forests. http://www.fws.gov/OregonFWO/Species/Data/NorthernSpottedOwl/Recovery/Library/Documents/DryForestPresentations/Baker_fire_risk_and_NSO.pdf (Accessed 8/1/2012).
Wildfire severity does not appear to be increasing as so often assumed. "[O]n the four national forests of northwestern California … we found no temporal trend in the percentage of high-severity fire during 1987–2008." Miller, J. D.; Skinner, Carl; Safford, H. D.; Knapp, Eric E.; Ramirez, C. M. 2012. Trends and causes of severity, size, and number of fires in northwestern California, USA. Ecological Applications, 22(1), 2012, pp. 184–203. http://www.fs.fed.us/psw/publications/skinner/psw_2012_skinner001.pdf (Accessed 8/1/2012).

Now there is support for Mitchell and Harmon (2009) from Alan Ager and the WESTCARB Project:

> … [A] team of researchers tried to quantify how removing smaller fuels from forests and conducting prescribed burns helps stave off intense wildfires and reduces greenhouse gas emissions. …
>
> "The take-home message is we could not find a greenhouse gas benefit from treating forests to reduce the risk of fire," said John Kadyszewski, the principal investigator for the terrestrial sequestration projects of the West Coast Regional Carbon Sequestration Partnership. WESTCARB, ...
>
> As part of Kadyszewski's work, his team directly compared the carbon stocks in about 6,000 acres of forests in Shasta County, Calif., and Lake County, Ore., before

> and after applying forest management treatments to reduce the risk of severe wildfires, such as prescribed burns and thinning. Then, based on modeled projections, they found that if a wildfire ignited on treated lands rather than untreated lands, there would generally be lower emissions. That was the good news.
>
> But there was a catch: knowing where fires might happen.
>
> Since there is a relatively low risk of fire at any one site, large areas need to be treated -- which release their own emissions in the treatment process. The researchers have concluded that the expected emissions from treatments to reduce fire risk exceed the projected emissions benefits of treatment for individual projects.

Dina Fine Maron 2010. FORESTS: Researchers find carbon offsets aren't justified for removing understory (E&E Report 08/19/2010).

The reason for this seemingly counterintuitive outcome is a result of the "law of averages." As explained by Cathcart et al (2009) —

> The question is—if the implementation of fuels treatments within the Drews Creek watershed had the beneficial effect of reducing the likelihood of wildfire intensity and extent as simulated in this study, why is the expected carbon offset from fuels treatment so negative? The answer lies in the probabilistic nature of wildfire. Fuels treatment comes with a carbon loss from biomass removal and prescribed fire with a probability of 1. In contrast, the benefit of avoided wildfire emissions is probabilistic. The law of averages is heavily influenced that given a wildfire ignition somewhere within the watershed, the probability that a stand is not burned by the corresponding wildfire is 0.98 (1 minus the average overall conditional burn probability …
>
> Thus, the expected benefit of avoided wildfire emissions is an average that includes the predominant scenario that no wildfire reaches the stand. And if the predominate scenario for each stand is that the fire never reaches it, there is no avoided CO2 emissions benefit to be had from treatment. So even though severe wildfire can be a significant CO2 emissions event, its chance of occurring and reaching a given stand relative to where the wildfire started is still very low, with or without fuel treatments on the landscape.

Jim Cathcart, Alan A. Ager, Andrew McMahan, Mark Finney, and Brian Watt 2009. Carbon Benefits from Fuel Treatments. USDA Forest Service Proceedings RMRS-P-61. 2010. http://www.fs.fed.us/rm/pubs/rmrs_p061/rmrs_p061_061_079.pdf (Accessed 8/1/2012).

And we can reliably replace the word "carbon" with virtually any other forest value that depends on dense forests with relatively high accumulations of dead wood, e.g. spotted owls, flying squirrels, goshawk, marten, pileated woodpecker, etc. and we get the same result. To wit ...

> "Since there is a relatively low risk of fire at any one site, large areas need to be treated -- which *[degrades habitat values for dense forests and dead wood]* in the treatment process. The researchers have concluded that the expected *[habitat loss]* from treatments to reduce fire risk exceed the projected *[habitat]* benefits of

treatment for individual projects."

Concerns about fuel reduction assumptions

The EA says "In Pollet and Omi's study, more open stands had significantly less fire severity compared to the more densely stocked untreated stands." BLM does not adequately address the fact that this generalization may not apply everywhere, especially in SW Oregon, where many scientists (even Johnson & Franklin) recognize that density reduction by logging can make fire hazard worse instead of better. The EA does not address the problem with logging that stimulates the growth of future surface and ladder fuels.

Johnson & Franklin (2009) state:

> "Some dry mixed-conifer plant associations have the potential to develop dense shrubby understories when light and moisture are made available by tree thinning; this is particularly the case in Dry Forests that exhibit more even-sized and dense structures. Such understories can provide significant ground fuels for wildfires, thereby negating some of the positive effects of thinning on fire behavior. … in some cases it may be desirable to maintain essentially full overstory cover, treating only ladder fuels, and leaving all dominant and co-dominant canopy trees in place rather than risk enhancing ground fuels (e.g., grasses or shrubs). This may also reduce the potential for invasive understory plants."

Raymond (2004) looked at the effects of the Biscuit fire on areas previously thinned to reduce fuels. She concluded:

> *Management Implications*
>
> Efforts to reduce canopy fuels through thinning treatments may be rendered ineffective if not accompanied by adequate reduction in surface fuels. Surface fuels were a more important control over fire severity than canopy fuels under conditions of extreme drought but moderate wind-speeds. Fine fuel loading was the only fuel structure variable significantly correlated with crown scorch. Despite the reductions in crown fire potential associated with lower CBD, higher CBH and lower tree density, these variables were not significantly correlated with crown scorch. This study shows the need for fire hazard reduction treatments to simultaneously address multiple fuel strata in order to adequately reduce fire severity.
>
> This study also suggests the need to establish acceptable levels of fire severity following wildfires in mixed-severity fire regimes. Does the fire severity in the untreated stands (about 50% mortality) exceed desired future conditions? Are the costs and effort of fuel treatments justified? These are management questions that depend on more than just fire hazard reduction. The acceptable level of fire damage in a mixed-severity fire regime such as the mixed-evergreen forest of southwestern Oregon will vary for areas with different management objectives (e.g. wildlife habitat, timber production, recreation). Fuel treatment options should be considered within the context of other management objectives.

Crystal L. Raymond. 2004. The Effects of Fuel Treatments on Fire Severity in a Mixed-Evergreen Forest of Southwestern Oregon. MS Thesis. http://www.fs.fed.us/pnw/pubs/journals/pnw_2005_raymond002.pdf (Published as Fuel treatments alter the effects of wildfire in a mixed-evergreen forest, Oregon, USA Crystal L. Raymond and David L. Peterson; Can. J. For. Res. 35: 2981–2995 (2005)).

A recent study of crown damage related to the Biscuit fire showed that

> The most important predictors of total crown damage were the percentage of pre-fire shrub-stratum vegetation cover and average daily temperature. … The median level of damage was 32% within large conifer cover and 62% within small conifer cover. Open tree canopies with high levels of shrub-stratum cover were associated with the highest levels of tree crown damage, while closed canopy forests with high levels of large conifer cover were associated with the lowest levels of tree crown damage.
>
> > …
> >
> > [Random forest analysis] RFA explained 45% of variation in total crown damage. Shrubstratum cover was, by far, the most important predictor variable (Fig. 4); increasing shrub-stratum cover was associated with increasing crown damage (Fig. 5). Average temperature and burn period were similarly important and were ranked second and third, respectively. Large conifer cover was ranked fourth and was associated with decreasing total damage.
> >
> > …
> >
> > Furthermore, the ability of conifers to resist fire damage increases with age, as the height to the base of the crown rises and the insulating capacity of the bark increases. This is consistent with the fact that, within the Biscuit Fire, median crown damage within large conifer cover was 32%, compared to 62% within small conifer cover.
> >
> > …
> >
> > In addition, mixed-sized conifer cover experienced levels of damage that were intermediate between small and large (median = 52%), which suggests that multi-storied conifer stands did not increase the level of damage by increasing vertical fuel continuity. Instead, it seems likely that the small tree component of the mixed-sized stands was damaged, while the large tree component was not.

Jonathan R. Thompson, Thomas A. Spies 2009. Vegetation and weather explain variation in crown damage within a large mixed-severity wildfire. Forest Ecology and Management 258 (2009) 1684–1694. See also, Jonathan R. Thompson. 2008. Patterns of Crown Damage within a Large Wildfire in the Klamath-Siskiyou Bioregion. PhD dissertation. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/9025/Thompson_Dissertation_FINAL.pdf (Accessed 8/2/2012).

In areas with relatively high productivity that can support shrubs, canopy removal via thinning is very likely to stimulate the proliferation of shrubs and create the very conditions that favor more severe crown damage during fire. This study also challenges the very popular notion that dense forests are a fire hazard.

Johnson et al (2009) simulated thinning in a densely stocked stand of Ponderosa pine with an understory of Douglas-fir and grand fir.

> The predicted fire type after treatment is surface fire for all thinning options, but the more open stands are characterized predominantly by fuel model 2, so flame lengths increase and potential BA mortality remains above 20 percent regardless of surface fuel treatment. The 200 and 300 TPA ... treatments have a more closed canopy and fire behavior is influenced less by grass fuels, so flame lengths and potential BA mortality are lower than the more open stands.
> ...
> The 200 TPA treatment has the greatest long-term effect on crown fire potential, with a predicted surface fire type for 50 years with pile-and burn or no surface fuel treatment and 40 years with prescribed fire treatment. The 50 TPA (124 TPH) treatment had the most short-lived effect on crown fire potential, with regeneration causing a drop in canopy base height in 30 years regardless of surface fuel treatment.

Morris Johnson, David L. Peterson, and Crystal Raymond 2009. Fuel treatment guidebook: illustrating treatment effects on Fire hazard. Fire Management Today 69(2) http://www.fs.fed.us/fire/fmt/fmt_pdfs/FMT69-2.pdf (Accessed 8/2/12) p 32-33.

Models show that maintaining canopy cover is a useful way to reduced fire hazard, while removing canopy increases fire hazard.

> Compared with the original conditions, a closed canopy would result in a 10 percent reduction in the area of high or extreme fireline intensity. In contrast, an open canopy has the opposite effect, increasing the area exposed to high or extreme fireline intensity by 36 percent. Though it may appear counterintuitive, when all else is equal open canopies lead to reduced fuel moisture and increased midflame windspeed, which increase potential fireline intensity.

Rutherford V. Platt, Thomas T. Veblen, and Rosemary L. Sherriff. 2006. Are Wildfire Mitigation and Restoration of Historic Forest Structure Compatible? A Spatial Modeling Assessment. Annals of the Association of American Geographers, 96(3), 2006, pp. 455–470.
http://www.colorado.edu/geography/class_homepages/geog_4430_f10/Platt%20et%20al_Wildfire%20Mitigatnion_AnAAG_2006.PDF

Concerns about NEPA compliance

BLM refused to consider alternatives such as diameter limits because "The intent of this project is not to compare treatment methods, but to demonstrate one type of treatment method, the application of Drs. Jerry Franklin and Norm Johnson's principles. This action would not meet the purpose and need for this project." (EA p 2-44). This is a pretty clear NEPA violation. The whole point of NEPA is to take the blinders OFF, to look beyond the proposed action and consider alternatives that might be even better than the proposed action.

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 action upon the quality of the human environment." 40 C.F.R. § 1500.2(e). NEPA also requires the USFS to "study, develop, and describe appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by section 102(2)(E) of 40 C.F.R. § 1501.2 (c)." *Id.*

The purpose of the multiple alternative analysis requirement is to insist that no major federal project 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 U.S. 332 (1989) (agency must consider alternative sites for a project). The Ninth Circuit has concluded that "the existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Alaska Wilderness Recreation & Tourism v. Morrison*, 67 F.3d 723, 729 (9th Cir.1995).

Other courts have stated that in order to comply with NEPA, "the discussion of alternatives 'must go beyond mere assertions' and provide sufficient data and reasoning to enable a reader to evaluate the analysis and conclusions and to comment on the EIS." *Citizens Against Toxic Sprays v. Bergland*, 428 F. Supp. 908, 933 (D. Or. 1977). A detailed and careful analysis of the relative merits and demerits of the proposed action and possible alternatives is of such importance in the NEPA scheme that it has been described as the "linchpin" of the environmental analysis. For this reason, the discussion of alternatives must be undertaken in good faith; it is not to be employed to justify a decision already reached. *Id.*

The agency often says that removing medium and large trees is often necessary to ensure a viable timber sale even though the same medium and large trees need to be retained for late successional forest habitat characteristics, dead wood recruitment, to suppress the growth of ladder fuels, and to maintain a cool-moist microclimate that helps mitigate fire hazard. These conflicts were brought to light in PNW Science Findings. http://www.fs.fed.us/pnw/sciencef/scifi85.pdf (Accessed 8/15/2012) ("requiring landscape treatments to earn a profit negatively impacted both habitat and fire objectives"). When economic objectives conflict with ecological objectives and fire hazard objectives, the agency is obligated to consider NEPA alternatives such as reallocating funds within the agency's existing budget or asking Congress for additional appropriations to allow the agency to better balance competing objectives. See Center of Biological Diversity v. Rey, (9th Circ, May 14, 2008) http://web.archive.org/web/20081018102407/http://www.ca9.uscourts.gov/ca9/newopinions.nsf/BBADBE769F43A66D88257449005521AE/$file/0716892.pdf

Misc

The NEPA analysis is biased against no action – saying that if the area is not logged the conditions would remain in their current degraded condition. This is misleading. Natural processes of growth, mortality, succession and disturbance would cause many dynamic changes over the coming years. In particular, habitat associated with dead wood in both uplands and riparian areas would see great improvements. This is not accurately disclosed in the EA.

Note: If any of these web links in this document are dead, they may be resurrected using the Wayback Machine at Archive.org. http://wayback.archive.org/web/

Sincerely,

Doug Heiken