Bark Volunteer
November 3, 2008

Jim Roden
Clackamas River Ranger District
595 NW Industrial Way
Estacada, OR
comments-pacificnorthwest-mthood-clackamasriver@fs.fed.us

Rethin PA Questions

1. In Rethin units composed of units from a previous thins that had undergone different original thins (i.e., Rethin 44, 43, etc.) will the Rethin prescription reflect those differences? For example (Rethin 44), the Double D unit downhill and to north of 6310-220 which was leave tree marked and thinned more heavily but retained some elements of species diversity than the Double D unit uphill and to the south of the road which in which smaller minor tree components were marked as take trees and removed creating a much lighter and more strongly monocultural stand.
2. If the Rethin prescription is going to vary within units to account for units which are composed of very different stands (i.e., Rethin 44) – how will the prescriptions differ?
3. Maps of great unit detail have been created in the past (i.e., unit maps for Upper Clack Thin) after EAs have been produced. Since these units are being thinned again and EA for them have already been produced, why hasn't the public been provided detailed unit maps (which exist from the first thinning EA)?
4. Maps of great unit detail have been created in the past (i.e., unit maps for Upper Clack Thin). Since these units are being thinned again, why hasn't the public been provided detailed unit maps that include small seeps and wet areas?

   [PA-11] There are some small seeps and wet areas that are too small to show on maps. Riparian features that are not perennial or intermittent streams such as seeps, springs, ponds or wetlands would be protected by the establishment of protection buffers that incorporate the riparian vegetation.
5. Some units have recently created snags that were created by girdling (i.e., Rethin 36). Which units have trees that have been inoculated with heart-rot?
6. Some units have snags that were created in the past with girdling (i.e., Rethin 33). What evidence does the Forest or the Clackamas District have regarding the usage (fulfillment of their biological potential) of those snags?
7. Considering the guidance provided by DecAID advisor, why does the Forest continue to girdle trees to create snags when that the type of snag that approach creates is not the type of snag DecAID notes as providing "valuable habitat for a variety of wildlife?

   [PA-62] Certain live trees would be selected as leave trees that are defective or have the elements of decay as described in the DecAID advisor. Hollow structures are created in living trees by heartrot decay organisms over many years. These hollow structures in living trees provide especially valuable habitat for a variety of wildlife, including cavity users. Trees that have heartrot decay present may include features such as openings in the bole, broken boles with bayonet tops,

large dead tops or branches, punk knots, flattened stem faces, old wounds on the bole, crooks in the bole signifying previous breakage, and the presence of fruiting bodies. Defective trees with deformities such as forked tops, broken tops, damaged and loose bark or brooms caused by mistletoe or rust can also provide important habitat for a number of species.

8. If the Forest or the Clackamas District doesn't have created snag usage evidence or studies, in light of the published studies (see page 16 of these comments) which demonstrate that snags created in that manner have an extremely low utilization rate (i.e., low "biological potential") – how can those snags be considered to resolve the issue of "biological potential" found in both the Northwest Forest Plan (NFP), Mt. Hood Land Resource Management Plan, and DecAID advisor?

9. What is the scale of "time" being used with DecAID? The scale of space is well noted, but I failed to find the time scale being used.

   [PA-60] A critical consideration in the use and interpretation of the DecAID tool is that of scales of space and time. DecAID is best applied at scales of subwatersheds, watersheds, subbasins, physiographic provinces, or large administrative units such as Ranger Districts or National Forests. DecAID is not intended to predict occurrence of wildlife at the scale of individual forest stands or specific locations. It is intended to be a broader planning aid not a species or stand specific prediction tool.

10. Since thinning creates "healthier" stands and acts to capture the mortality associated with competition for resources amongst trees – these stands will be healthier farther into the future. Since the Forest chooses to create snags with little or no biological potential via girdling, how many decades will it take for these stands to develop suitable pileated woodpecker habitat?

11. Since Rethin will both create healthier stands and not aid in the initiation of heart rot so that it would develop over time in the stands, how can the PA state that there is no cumulative impact to pileated woodpecker habitat?

    [PA-74] There would be no meaningful or measurable direct or indirect effect because no habitat would be affected; therefore a cumulative effects analysis is not necessary.

12. If trees over 20" dbh in Riparian Reserves (RR) need to be cut for access, will they be left in place as those trees are in the Late Succession Reserves (LSR)?

    [PA-11] In late-successional reserves, trees would not be cut if they are greater than 20 inches in diameter (at a height of 4.5 feet). If larger trees need to be cut for skyline corridors, skidtrails, landings or temporary roads they would be left in place.

13. In Appendix A of the Upper Clack Thin it was noted that trees over 24" dbh that need to be cut in the RR would be left in place. Is that also true for Rethin?

    [Upper Clack EA A-3] Trees over 24" diameter would be retained where riparian reserves and LSRs overlap if there are any, (s. 2.3.5). The plantations contain trees that average 13" diameter (s. 4.1.2.1).

14. Upper Clack PA comments by myself (Ferranti) noted that thinning acts to "capture" mortality. In no way does this statement infer that thinning will act to eliminate mortality. Due to the similarity between Rethin and Upper Clack Thin, those comments are included by reference.

    > [PA-21] The goal of the proposed thinning is not to eliminate all things that would kill trees or cause decay: that would not be possible.

    Unless otherwise refuted by the EA we can assume that one of the results of the thinning will be RR and LSR that have retarded and reduced levels of decadence and decay (elements of decadence and decay such as CWD and biologically active snags being an essential late-successional characteristic). What are the plans of the Forest to address the issue of their vegetation management plans causing this essential component of the NFP and LRMP to not be attained for decades longer than without the mortality being "captured by thinning?"

15. In the 2007 Clackamas Restoration EA, it was specifically noted that timber sale planning is where snag creation and decadence management type of forest project needs to be incorporated.

    > [CRP2007 EA-43] This restoration EA is focused on stream and road restoration issues. Decadence management is outside the scope of this EA. Your concerns about mitigating the effects of thinning would be better addressed in a thinning EA.

    Yet, in this timber sale plan we find the comment:

    > [PA-37] Recent restoration EA's have planned projects have not yet been implemented. These projects include: road decommissioning, road closures, instream large wood and side channel projects, wildlife snag creation and down wood projects, and pre-commercial thinning.

    So, the 2007 Clackamas Restoration EA points to timber sale planning as the appropriate location for wildlife snag creation (i.e., decadence management) while the Rethin timber management document points to restoration EAs as the appropriate spot for planning of snag creation and decadence management. Which type of planning document is appropriate for the examination of snag creation and decadence management?

16. Specifically, which late successional characteristics would be acquired in 20-50 years [PA-24, 25] if the thinning occurs?

17. If the thinning does occur will the Coarse Woody Debris (CWD) characteristic of a late-successional forest occur in 20-50 years?

18. If the thinning does occur will the biologically active snags characteristic of a late-successional forest occur in 20-50 years?

19. Specifically, which late successional characteristics would be acquired in 30-60 years if the thinning does not occur [PA-24, 25]?

20. If the thinning does not occur will the Coarse Woody Debris (CWD) characteristic of a late-successional forest occur in 30-60 years?

21. If the thinning does not occur will the biologically active snags characteristic of a late-successional forest occur in 30-60 years?

22. Is the difference between these stands developing late successional characteristics only a matter of 10 years when you compare the actions of VDT vs. the no action alternative?

23. South Fork Thin A-1: "*The use of the term "temporary road" does not imply that the effects are temporary. The term is used in timber sale contracts for roads that are built by the operator, and obliterated by the operator upon completion. The South Fork analysis does not claim hydrologic recover immediately after obliteration. The analysis uses a model of hydrologic recovery that would show recovery of a temporary road in approximately 35 years (s. 4.2.0.1, s. 4.2.0.2, s. 4.2).*" When discussing the late-successional characteristics that would be achieved in 20-50 years, does that include the hydrologic recovery of temporary roads?

24. When speaking of "short-term impacts" on spotted owls, what is the specific time frame that the phrase "short-term" refers to? Is it 1-2 years? Is it 3-5 years? Is it 10-20 years? What is the specific time frame that phrase refers to?

    [PA-46] While these elements are designed to have long term benefits they may result in short-term impacts.

25. How many cumulative acres of NSO dispersal habitat are being impacted by the cumulative impact of the projects (Cloak, Collawash, South Fork, No Whisky, 2007 Thin, Upper Clack Thin, Rethin, and the future units shown in the 2008 Clackamas Road Decommissioning for Aquatic Restoration) occurring within the Clackamas District?

26. How many cumulative acres of NSO dispersal habitat are being removed by the combined impacts of current projects (Cloak, Collawash, South Fork, No Whisky, 2007 Thin, Upper Clack Thin, Rethin, and the future units shown in the 2008 Clackamas Road Decommissioning for Aquatic Restoration) within the Clackamas District?

27. How many cumulative acres of NSO habitat are being degraded by the combined impacts of current projects (Cloak, Collawash, South Fork, No Whisky, 2007 Thin, Upper Clack Thin, Rethin, and the future units shown in the 2008 Clackamas Road Decommissioning for Aquatic Restoration) within the Clackamas District?

28. Does the term "long term" always refer to 20-40 years or is that specifically in reference to the time frame regarding the expression of decadence within a forest needed by NSO?

    [PA-47] In the long term (20-40 years)…

29. [PA-48] How many acres would no longer be considered "quality dispersal habitat" for the NSO over the next 10-15 years from the cumulative impact of the current projects (Cloak, Collawash, South Fork, No Whisky, 2007 Thin, Upper Clack Thin, Rethin, and the future units shown in the 2008 Clackamas Road Decommissioning for Aquatic Restoration) within the Clackamas District?

    It is estimated that these units would again provide quality dispersal habitat in approximately 10 to 15 years after harvest.

30. Will the cumulative loss of dispersal habitat adversely affect the NSO's ability to disperse when finished with nesting/fledging?

31. Since this is a "rethin" what is meant by "unthinned?"

    [PA-48] While dispersal habitat would be temporarily removed in the LSR, the benefits of thinning would outweigh this temporary loss. Incorporating variable-density thinning (ranging from RD 25-40) with skips and gaps would create a

mosaic of small openings with unthinned, moderately thinned and heavily thinned patches.

32. There are different words being used in this section describing NSO habitat and these words have not been defined. Does "minimum habitat characteristics" refer to dispersal habitat?

    [PA-48] The stands would develop the minimum habitat characteristics necessary for spotted owl habitat within 40 years and they would become quality spotted owl habitat within 60 years.

33. There are different words being used in this section describing NSO habitat and these words have not been defined. Does "quality spotted owl habitat" refer to suitable habitat?

    [PA-48] The stands would develop the minimum habitat characteristics necessary for spotted owl habitat within 40 years and they would become quality spotted owl habitat within 60 years.

34. If thinning would provide late-successional characteristics in 20-50 years, what are the characteristics being referred to in NSO habitat that take 60 years to achieve with thinning?

    [PA-48] Thinning would result in stands more quickly growing into late-successional forests than if no treatment occurred. The stands would develop the minimum habitat characteristics necessary for spotted owl habitat within 40 years and they would become quality spotted owl habitat within 60 years.

35. If most of the thinning for this project is "within the mean home range," what is the cumulative impact on activity centers from all of the current Clackamas District projects (Cloak, Collawash, South Fork, No Whisky, 2007 Thin, Upper Clack Thin, Rethin, and the future units shown in the 2008 Clackamas Road Decommissioning for Aquatic Restoration)?

    [PA-48] …most of the units are within the mean home range (1.2 mile radius) of historic or predicted activity centers.

36. Table 4.4.3.1 Past, Present and Foreseeable Future Projects and Actions has listed the following about future projects:

    [PA-51] Exclude. No site specificity. Can not be modeled at this time. The appropriate time to conduct a cumulative effects analysis would be in a future EA after a firm proposal is developed.

    Since the 2008 Clackamas Road Decommissioning for Aquatic Restoration map clearly shows future units and since the types of timber sales done by the Clackamas District for a number of years has been very similar (Cloak, Collawash, South Fork, No Whisky, 2007 Thin, Upper Clack Thin, Rethin) the modeling for cumulative impact would be appropriate. Why isn't it included?

37. Did the USFWS 2006 Bi-Op include the timber sale project units shown in the 2008 Clackamas Road Decommissioning for Aquatic Restoration?

38. How much variability is it possible to create within stands that already have a wide tree spacing such as found within the Bonanza units of Rethin?

39. What is the current RD found in the already thinned area of Rethin unit #36?

40. What will the RD be in those areas that will have been thinned twice in Rethin #36 after the thinning?

Rethin PA Comments

The Rethin project contains a number of good elements, from the variable density thinning to the riparian buffers. This project is the type that the Clackamas River Ranger District needs to help restore the ecosystem functions and processes that were disrupted by decades of native forest liquidation. This project is an important step. Unfortunately, these projects inadequately address the role of decadence in the forest ecosystem. It is not that the project completely ignores that component, what it does is either not enough or it actively avoids addressing the issue. Both of these approaches act to retard or prevent the attainment of Forest management goals and objectives.

Decadence Management in Plantation Thin Projects

Decadence management, the management of death and decay in forest stands, presents a difficult topic for Forest employees traditionally focused on green tree rotation and harvest. In traditional harvesting-centered vegetation management, trees infected with pathogens were to be culled, forest stands with trees displaying decadence were to be cleared, and fallen trees were likely given little thought at all except where they interfered with timber movement.

The concept of ecosystem management in the Pacific Northwest was significantly altered with the Northwest Forest Plan (NFP). Decadence management became codified in a number of areas. While the approach found in the NFP differed from those found in the National Forest Management Act (NFMA), NFMA too sought elements of ecosystem management via monitoring of indicator species and with various specific codes found within the Mt. Hood National Forest Plan (LRMP, such as biological potential snag density).

Current plantation thin units lack necessary structural diversity. Variable density thinning and other elements (i.e., minor tree retention) will address the lack of vertical structural diversity in the green tree component of the plantation as well as providing a diversity to the horizontal green tree spacing. But, those structural elements due to tree death and decay are also missing and the current plan inadequately addresses them. Specifically, decadence management is needed to address two important structural elements found in a forest ecosystem which are missing or severely depressed in the plantation, standing dead and dying trees (snags/decadent trees) and large (as define p. 12 PNW-GTR-229) downed wood over 24" at the large end (coarse woody debris or CWD).

In stands regenerating due to a natural disturbance one finds large quantities of both snags and CWD, so their absence at this point in plantation stand regeneration is unusual, unnatural, and outside the range of historic variation. In addition, the "released" trees left after the thinning will not have to compete as strongly for the elements they need to grow (i.e., water, sunlight, nutrients). These trees will be healthier than those typically found in naturally regenerating stands, allowing them to resist those factors that would lead to the creation of snags/decadence (resistance to disease) and CWD (snags naturally falling, blow-down, etc.). In essence, the thinning will "capture" the mortality normally found in a forest and place it onto a logging truck. These unnaturally healthy stands will further aggravate the dearth of snags/decadence and CWD bringing these areas well outside the range of natural variability. These plantation stands current

lack of structural diversity is being addressed too exclusively by the Rethin in terms of vertical green tree structure, this approach is laying the groundwork for decades of impaired forest ecosystem functions and processes.

The captured mortality and intentional avoidance of decadence management will have specific and negative consequence across a broad range of forest ecosystem characteristics. For example, the simplification of forest structure due to the lack of these elements will also lead to plantations devoid or largely missing microclimate diversity and microclimate maintenance; a simplification of habitat diversity; a loss of habitats over time (habitat maintenance); maintenance of species diversity due to the simplification of microclimate and habitat; a loss of mycorrhiza platform which means corresponding losses to vegetation productivity and nitrogen fixing (already diminished due to the industrial forest conversion which skipped the nitrogen fixing roles of pioneer trees and shrubs). None of these issues are trivial and all are fundamentally important to proper functioning ecosystem processes and functions (i.e., ecosystem management).

This lack of ecosystem management violates a variety of provisions found within Forest Service procedure (i.e., management of TES species), the Mt. Hood Land and Resource Management Plan (i.e., indicator species management, CWD levels, etc.), and the NFP (Aquatic Conservation Strategy). In addition to the current plan to retain the small number of trees that have broken tops and/or elements of wood decay two additional management steps could insure compliance with these plans. Specifically, trees over 24" within LSR and RR should not be cut and when they do need to be cut they should be left on the forest floor as CWD. Secondly, some trees within the LSR and RR should be inoculated with native heart-rot pathogens to encourage the growth of naturally occurring snags that have been shown to be significantly superior to snags created by girdling or topping.

Management of Reserves

A cardinal issue found within Forest Ecosystem Management Report (FEMAT) and the NFP involves differing management approaches and objectives for Reserves (Late Successional and Riparian) and the Matrix. Management plans for Reserves would benefit from the differing management objectives found in a "Reserve decadence management" approach being implemented during and after a timber sale. While the Clackamas River Ranger District of the Mt. Hood National Forest has made substantial and impressive progress in their approach to Matrix management, there remain substantive problems with the active management for Reserves. These issues are not about passive vs. active management, but limited restorational objectives that can be achieved within a timber sale with the addition of two steps. This project could act to bring clarity to the restoration goals within the Reserves and achieve the objective(s) (i.e., increased horizontal and vertical structural diversity) of the active management.

Decadence management represents an important accompanying component to the other implemented management actions; it would complement the VDT and act to further enhance the Reserves restoring their essential ecosystem functions and processes. Reserve restoration demands an assiduous and holistic approach in which an appropriately planned thinning project can plan an important part. This project has the potential to significantly enhance more than just one or two late-seral characteristic structures (larger trees, diversity of tree sizes, all with diverse spacing), but truly act to restore the robustness of late-seral ecosystem processes, riparian processes, species diversity, and all structural characteristics (living and non-living) within the

Reserves. In order to achieve the restoration goals found in the NFP (and the biological potential goals found in the Mt. Hood LRMP), appropriate decadence management is essential.

It is typical for mid-seral forests, as they mature, to slowly lose their woody non-living elements such as characteristic legacy snags and large downed wood to decay. The relatively younger and structurally more simplistic forests found in many post-thinning Reserves have smaller trees and lower incidents of disease so there is a time-lag in the creation of new snags and replacement of downed wood.[1]

It is of vital importance to the restoration of habitat and ecosystem processes to avoid the danger that thinning appears to create, namely a significant and long-term problem with future numbers of snags/dead wood. Thinning with a near-exclusive focus on live trees will depress future recruitment of essential late-seral non-living characteristics. While some negative impacts due to the logging are unavoidable, the extent and duration of the impact can and should be managed. Proper management can reduce the quantity and duration of this negative aspect of the silvicultural prescription.

Regardless of the benefits from VDT to enhance a singular aspect of the Reserves, by implementing a management plan that essentially treats Reserves as matrix units these projects collectively act in a manner that retards or prevents the attainment of various Reserve management objectives (such as those found in the LRMP, NFP, and ACS). Concurrent active management, if planned appropriately, offers significant opportunity to accelerate the attainment of late-seral characteristics for the Reserves beyond those of green-tree focused program currently planned.

As noted by Carey et al. (1999)[2], not only does it appear that "[a]ctive management may be necessary to maintain decadence in the first 150 years of ecosystem development," but that these expressions of decadence within a forest are essential components of its structure and process ("coarse woody debris is of central importance in promoting ecosystem stability, habitat diversity, and long-term productivity"). [emphasis added]

- http://www.fs.fed.us/pnw/pubs/journals/pnw_1999_carey003.pdf

> …Four factors (crown-class differentiation, decadence, canopy stratification, and understory development) accounted for 63% of variance in vegetation structure. Decadence contributed to variation mostly in late-seral forest.
>
> …The 4 structural factors each represented an important ecological process; decadence and canopy stratification apparently had profound influences on other life forms. Carefully timed variable-density thinnings could accelerate crown-class differentiation, canopy stratification, and understory development and increase habitat breadth. *Management of decadence is more problematic and may require various interventions, including inducing decay in live trees, conserving biological legacies from previous stands, and ensuring recruitment of coarse woody debris.*

[1] http://www.fs.fed.us/pnw/pubs/journals/pnw_2002_franklin001.pdf; "Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-fir forests as an example," Franklin et. al, Forest Ecology and Management, 2002

[2] Ecological scale and forest development: squirrels, dietary fungi, and vascular plants in managed and unmanaged forests; Wildlife Monographs – a publication of The Wildlife Society; Carey et al., 1999

> …Coarse woody debris (standing and fallen) was a result of 3 separate phenomena: (1) retention of legacies through catastrophic disturbance, (2) recruitment of fallen trees through suppression- mortality, and (3) development of decadence in live trees over time.
>
> *…coarse woody debris is of central importance in promoting ecosystem stability, habitat diversity, and long-term productivity…*
>
> …Managing decadence is the most challenging aspect of intentional ecosystem management. Our research shows that decadence is more than snags and logs; it is a process that is influential in multiple aspects of ecosystem development from providing cavities for wildlife, to creating gaps in the canopy, to altering forest floor microclimate and structure. Active management may be necessary to maintain decadence in the first 150 years of ecosystem development. *Thinnings without active management for decadence could result in dimunition of decadence, decline in coarse woody debris, and a change in trajectory of forest development away from complexity and resiliency.*

That last line bears repeating:

> Thinnings without active management for decadence could result in dimunition of decadence, decline in coarse woody debris, and a change in trajectory of forest development away from complexity and resiliency.

As clearly discussed in all the recent thinning EAs (Cloak, South Fork, No Whisky, 2007 Thin, Upper Clack Thin, Rethin) the post-thinned Reserve trees will be stronger and healthier resulting in stronger and healthier stands; consequently they will be more resistant to disease. While this may be understandably desirable in the Matrix, it is undesirable in the Reserves because it acts to retard or prevent the attainment of late-seral characteristics (and therefore retards the attainment of various Forest management goals). The essential role of various native pathogens in healthy forest ecosystems has been well documented. The PA spuriously notes (p. 27) that a concern was raised that "all things that would kill trees or cause decay" would be eliminated. That is a poorly phrased straw-man argument. The issue is that the VDT within the plantations located within the Reserves will "capture" the mortality and these Reserves will have significantly reduced incidence of, and effects from, decadence for many decades following the thinning. Consequently, the current plan outlined in the Rethin will significantly retard the attainment of late-seral characteristics within the Reserves.

Management of the Reserves found in the NFP revolves around objectives that differ from the management objectives for the Matrix. Restoration silviculture (via VDT) allows for an active management approach with projects that are very similar between the two areas, but it does not eliminate the different objectives. In order for the project level planning to appropriately pursue restoration and accelerated achievement of late-seral characteristics within the Reserve the project level planning needs to clearly address where the objectives allow for similar approaches (i.e., VDT) and where the approaches will need to diverge (i.e., decadence management).

The presence of disease is extremely important to the continued health and diversity of the forest ecosystem. Healthy and vigorous stands are a primary goal in maximizing timber production; conversely it is the loss of timber to disease that is a key indicator of a healthy Reserve forest ecosystem. It is the initiation of disease and the results of disease – decay – that are missing both from plantations and from the currently planned restoration silvicultural pathway for these

Reserves. Managing the Reserves in a manner that explicitly acknowledges its need for decadence is an essential component of Rethin.

Decadence Management: Coarse Woody Debris (CWD – downed wood greater than 24" diameter at the large end) and Reserves

Current status of CWD in Managed Stands

Every Monitoring report from 1999 through to the most recent contains a comment very similar to this:

> Wildlife biologist on the Forest believe that we are meeting the standards and guidelines for snag retention on timber harvest units but we are falling below that guideline for down and woody material.

While the 1998 report was a little more blunt:

> Our down woody conditions are far below our Standards and Guidelines.

Recent planning documents have also taken note of the dearth of CWD in these plantation-thinning units (Cloak, appendix E)

> Large down logs are also lacking in these units due to past logging and fuel treatment practices.

The lack of CWD isn't a big surprise considering the type of old-forest liquidation and conversion to industrial plantation that occurred for the last 70+ years. Recent planning documents from the Clackamas Ranger District describe the CWD that is found in plantation units very similar to the ones that are included in this plan (South Fork Thin, Collawash Thin):

> There is a moderate amount of snags and downed wood in the proposed treatment stands, although much of it is small diameter wood. The stands average 3-4 snags/Ac and 3-4 downed logs/Ac (decay classes 1-5) however, the majority of the downed wood is not in desired decay classes 1, 2, or 3 and the distribution is scattered.

Past CWD management differences between Late Successional Reserves (LSR) and Riparian Reserves (RR).

In the 2007 Thin, Upper Clack Thin, and Rethin trees within the LSR trees over 20" would not be cut, and if they needed to be cut they would be left in place to help address the lack of this ecosystem component within the LSR. This is an excellent idea as far as it goes – which isn't far enough. In the RR and Matrix, large trees would be cut and there is little attempt to address the lack of CWD (p. 19 "if funding becomes available). Worse yet, where the RR and LSR land designations overlap, the RR would not take the more conservative LSR practice of leaving large trees but would instead follow the Matrix practice of removing the large trees rather than leaving them as CWD. This is in direct opposition of the practice found in the NFP where the more restrictive designation had precedence where land allocations overlapped, and it specifically and intentionally continues the impoverishment of the RR that violate the Aquatic Conservation Strategy (ACS) by specifically acting to retard and/or prevent the attainment of ACS goal #8.

Importance of CWD

It is important to view CWD as an investment in the future since decay takes decades, large downed green trees today will decay over many decades providing a host of ecosystem benefits throughout the process. These benefits include, but are not limited to: structural diversity; microclimate diversity and maintenance; habitat diversity and maintenance; maintenance of species diversity; mycorrhiza platform; and nitrogen fixing. None of these issues are trivial and all are fundamentally important to proper functioning ecosystem processes and functions (i.e., ecosystem management).

CWD is required for proper functioning of the forest ecosystem and the consequences of its lack are felt far from the forest where it originates (PNW GTR-229):

> Large, fallen trees in various stages of decay contribute much-needed diversity of ecological processes to terrestrial, aquatic, estuarine, coastal beach, and open ocean habitats in the Pacific Northwest. Intensive utilization and management can deprive these habitats of large, fallen trees. This publication presents sound information for managers making resource management decisions on the impact of this loss on habitat diversity and on ecological processes that have an impact on long-term ecosystem productivity.

Structural Diversity Provided by CWD

The maintenance and reintroduction of structural diversity has become increasingly important to the ecosystem management goals found of the Clackamas River Ranger District. The need to improve the structural diversity is found in the streams themselves since they too lack CWD and the District recognizes that this impairs aquatic ecosystem functions and processes. From the 2007 Clackamas Restoration EA Decision Notice:

> *Streams can be improved by replacing lacking elements or by repairing existing features. Projects include the installation of logs or boulders in streams and rivers and the creation of side channels.*

Just as the lack of CWD in streams has had a negative impact on the aquatic ecosystem function and processes, so too have the forest ecosystem functions and processes been negatively impacted by previous projects that brought structural homogeneity to the forest. Like the Forest management projects that are being implement to bring structural diversity back to forest waterways, so too have recent Forest management projects sought to bring structural diversity back to the terrestrial forest ecosystem.

You will find this statement in many of the recent projects implemented by the District (e.g., 2007 Thin EA, South Fork Thin EA, No Whisky Thin EA, Upper Clack Thin EA, Rethin PA):

> This action is needed because these plantations lack certain elements of diversity...There is a need for greater variability of vertical and horizontal stand structure.

This homogenization of forest structure found in forest stands that have been converted to plantation includes limited variability of forest floor structure. This lack of structural variability in plantation units is exceedingly well documented on both Forest Monitoring Reports and in timber sale EAs. The lack of this specific ecosystem component found in mature and late-seral

forests, namely large CWD defined as downed wood greater than 24" diameter at the large end, prevents the attainment of mature and late-seral stand conditions.

Currently most thinned Reserves are too healthy to provide sufficient snags and downed wood (i.e., No Whisky EA-61). In other words, tree mortality has been "captured" by the logging. As a forest moves from mid-seral into and through a late-seral/mature condition the structural elements most elusive are those associated with dead and dying trees. While multiple EAs assure that this is for the "short to moderate term," this assurance runs counter to current scientific literature and the thinning plans as currently written. Plantations currently have low levels of pathogen infection by design – plantations were created for the development of timber via healthy stand development. Stressed trees that survive the logging will have greater access to sun, soil nutrients, and water. This will keep them healthy and viable for decades longer until the canopy closes and competition for those resources return. This means there will be very few trees falling to the forest floor and adding to the CWD found there. Since it takes decades for decay to breakdown a fallen tree to the point where it provides good habitat for listed TES species (i.e., Oregon slender salamander) you have a compounded problem -- decades for a tree to fail and fall to the forest floor and further decades for it to decay to a point where it can be used.

Forest Ecosystem Processes and Functions Provided by CWD

This lack of CWD in an array of decay classes has a large impact on a variety of forest ecosystem processes and functions. The diminution of the ecosystem complexity has direct and measurable impacts on animal species (PNW-GTR164):

> *Large, fallen trees in various stages of decay contribute much-needed diversity to terrestrial and aquatic habitats in western forests. When most biological activity in soil is limited by low moisture availability in summer, the fallen tree-soil interface offers a relatively cool, moist habitat for animals and a substrate for microbial and root activity.*
>
> *...dying and dead wood provides one of the two or three greatest resources for animal species in a natural forest . . . if fallen timber and slightly decayed trees are removed the whole system is gravely impoverished of perhaps , more than a fifth of its fauna. (quoting Elton 1966, p. 279)*
>
> *A broadened philosophical view of management-a forest versus a commodity-is necessary if certain structurally related functions, such as retention of water and cycling of nutrients in large, fallen trees, are to be options in managed forests of the future. (Maser and Trappe 1984)*

The diminution of the forest floor structural diversity has direct impacts how the forest ecosystem functions because of its unique role (PNW-GTR229):

> *The forest floor is the interface between the belowground and the aboveground components of the forest. As a center of intense physical, chemical, and biotic activity, it both influences and reflects ecosystem functions. In turn, ecosystem functions reflect the array and quality of processes resulting from structural diversity.*

Decadence Management, CWD Prescription

Avoid cutting all trees over 24" within Reserves and those trees that do need to be cut are to be left on the ground to help bring the plantation back into the range of natural variation for CWD.

As the plan currently stands it overtly recognizes the lack of CWD in the LSR:

> The existing condition for plantations is well below these levels. Achieving these goals with this proposed action is not considered a viable option.

It is astonishing that it then goes on to explicitly exclude the addition of leaving large trees that must be felled for sale administration on the ground in RR located within a LSR.

After thinning the remaining green trees left in the stands will grow larger faster, they will also not be competing for limited sun, water, and nutrients so they will remain vigorous for many decades longer than typically found in an unmanaged forest. These stands, consisting of a cohort of aberrantly healthy trees that won't succumb to death and decay at the same rate found in a functioning mature and late-seral forest for many decades, will significantly retard the attainment of mature and late-seral stand conditions. Even when some of these aberrantly healthy trees are infected with one of the many native pathogens, their superior health will retard the progress of decadence within them. So too will these aberrantly healthy cohorts be wind-firm and physically robust, delaying weather related disturbance to the stand. When they finally fall to the forest floor, only then will the stocking of CWD begin. These stands where mortality has been "captured" by logging will have tree decadence delayed 30-50 years. Additional decades will be needed after tree failure and it comes to rest on the forest floor for the varius decay processes to unfold. This will further set the clock back on the attainment of appropriate amounts of CWD in an characteristic array of decay classes.

Large CWD is missing from these plantation units. Large CWD plays an essential role in ecosystem processes and functions. Large CWD plays an important role in various programmatic management plans. VDT thinning will create healthier forests that delay the onset of levels of decadence found within a range of historic variation. This in turn will retard the attainment of levels of large CWD by many decades, degrading and retarding the attainment of many management plans by a significant number of decades. This can be significantly mitigated with the retaining on-site of all trees 24" and greater within both LSR and RR.

Avoid cutting all trees over 24" within Reserves and those trees that do need to be cut are to be left on the ground to help bring the plantation back into the range of natural variation for CWD.

Active Decadence Management: Snag and Decadence Creation

Decadence management is an important aspect of post-plantation forest ecosystem restoration. As noted by Rose et. al. (2001)[3] (p.580, 581):

> …The ecological importance of decaying wood is especially evident in the coniferous forests of the Pacific Northwest. In this region, the abundance of large decaying wood is a defining feature of forest ecosystems, and a key factor in ecosystem diversity and productivity

[3] Wildlife-Habitat Relationships in Oregon and Washington, "Decaying Wood in Pacific Northwest Forests," p580-623

> …Large accumulations of decaying wood provide wildlife habitat and influence basic ecosystem processes such as soil development and productivity, nutrient immobilization and mineralization, and nitrogen fixation.
>
> …New research over the past three decades has emphasized the significance of decaying wood to many fish and wildlife species, and to overall ecosystem function. The importance of decaying wood to ecosystem biodiversity, productivity, and sustainability is a keynote topic in two recent regional ecosystem assessments in Oregon and Washington. [FEMAT 1993 Chapters III and IV; PNW-GTR-405]
>
> …Intensive forest management regimes have substantially altered the abundance and composition (species, size, decay class) of decaying wood in forest ecosystems in the Pacific Northwest. Managed forests, on average, have lower amounts of large down wood and snags than do natural forests.
>
> …the density of cavity trees selected and used by cavity-nesters is higher than provided for in current management guidelines.
>
> …Effective approaches to managing decaying wood require that dead wood components of wildlife habitats be viewed within the context of the larger interacting ecosystem.

Effective management of decadence in the forest has been demonstrated to not be a simple matter of mechanical snag creation as currently planned. "In the LSR units, three to seven trees per acre would be girdled…" (p. 19). In short, concentrating on the development of decadence within living trees has shown to be appreciably superior to simple mechanical tree death if snag usage is to be linked with "biological potential" and other Forest Plan management goals. Primarily this is due to the significant role of the pileated woodpecker, the primary cavity excavator of our Pacific Northwest forests. This species has been described as a "keystone species"[4] due to its pivotal role as a habit modifier in the forests of the Pacific Northwest because it is the only animal "…capable of creating large cavities in hard snags and decadent live trees." [emphasis added]

> A wide array of species, *including many that are of management concern in the Pacific Northwest*, use old pileated nest and roost cavities. In addition, pileateds provide foraging opportunities for other species, accelerate decay processes and nutrient cycling, and may facilitate inoculation by heart-rot fungi *and mediate insect outbreaks*. Because of the potential keystone role of pileated woodpeckers in Pacific Northwest forests, it may be appropriate to give special attention to their habitat needs in forest management plans and monitoring activities.

In mid-seral plantation Reserves, a primary management objective is to restore late-seral/mature forest characteristics and processes. Active management that pursues a more complete set of late-seral and mature forest characteristics than live tree spacing (as is the focus during a thinning project) should be an imperative due to its direct impact on "a wide array of species, including many that are of management concern in the Pacific Northwest." Setting a short-term numerical target for immediate mechanical snag creation, while potentially tempting due to its simplicity, should be avoided due to its lack of effectiveness in truly accelerating the restoration

[4] http://www.fs.fed.us/psw/publications/documents/gtr-181/023_AubryRaley.pdf; The Pileated Woodpecker as a Keystone Habitat Modifier in the Pacific Northwest; Aubry and Raley; PSW-GTR-181; 2002

of the "biological potential" of late-seral characteristics in a forest. Decadence management that concentrates on elements of wood decay within living trees is more appropriate due to its importance to management species of concern and the lengthy timelines needed for this essential late-seral/mature forest characteristic to develop.

Reserves need active management introducing pathogens in order for these areas to setup a system so that in time these Reserves will be able to inherit the pathogens necessary for proper ecosystem functioning from the currently infected trees. Heart-rot is a significant component of late-seral forest ecosystems and necessary for the attainment of the "biological potential" of late-seral characteristics, these characteristics (decadent live trees, hollow snags, etc.) remain an important aspect of active Reserve management for the Clackamas Ranger District (as noted in the No Whisky Appendix E):

> Enhance riparian reserves by accelerating the development of mature and late successional stand conditions

It isn't just forest diversity that needs native pathogens to play their key role; it is over-all forest ecosystem functions and processes. Consider the keystone complex (essential forest functions) that is filled by native pathogens, ecto-mychorrizal truffles, pileated woodpeckers, and flying squirrels. The presence of pathogens within a tree begins the process of creating habitat for keystone species (woodpecker and squirrel) that play essential roles in distributing the truffle spores in "a web of mutual support." As noted in PNR Science Findings #20 and reinforced in PNR Science Findings #57 and PNR Science Findings #60 in a discussion regarding the ecosystem keystone species the pileated woodpecker and its role in the keystone complex. [emphasis added]

> Because the hollowing process is quite specific, it has to begin early in the life of a stand, and start on a living tree, according to Parks; an *already dead tree not previously infected with heart-rot fungi will not become hollow*. (PNR 20)
>
> "One of the reasons roost sites may be more limiting for pileateds than nest sites, is because hollow trees are relatively rare in forests; *they are created only by the process of heartwood decay occurring in live trees over a long period of time*," Raley explains. (PNR 57)
>
> Management can have diverse effects on truffle diversity and abundance. In general, *managing for biocomplexity*—multiple tree species, understory diversity, decaying trees—*at fine scales contributes to biodiversity and ecosystem resilience*. (PNR 60)

The present course of active management of Reserves needs to include fungal infection since these pathogens act to create structural differentiation over time. This increase in structural heterogeneity increases species diversity and provides the necessary habitat for ecosystem keystone species. Active and passive management of native pathogens is particularly important in thinned Reserves as the remaining trees will be more resistant to disease (currently infected trees will see the disease course slowed due to the tree having greater access to sun, nutrients, and water) and the initiation/spread of new decadent trees will be delayed – even though decadent trees (and the snags they eventual create) remain vital to the proper operation of the Reserve ecosystem.

Beyond the obvious nesting needs of the northern spotted owl and other species associated with the Northwest Forest Plan (common merganser, silver-haired bat, fisher, American marten, the

bufflehead, flammulated owl, and Vaux's swift), pileated cavities provide denning sites for the equally important tree squirrels.

- http://www.fs.fed.us/pnw/sciencef/scifi60.pdf[5]

The flying squirrel is a centerpiece in what's called a keystone complex, a web of animals and food, predators and prey, that is especially important in defining the ecosystem.

"A keystone species such as the flying squirrel is easy to define: it's a species that has a disproportionate influence on the ecosystem relative to its abundance within that ecosystem," Andy Carey, a research biologist with the Pacific Northwest Research Station in Olympia, WA, explains. "A keystone complex is a more complicated idea that recognizes a number of essential components that are building blocks of an ecosystem and supporters of its processes."

- http://www.fs.fed.us/pnw/pubs/journals/pnw_1995_carey001.pdf[6]).

An understanding of the factors governing sciurid abundance in the Pacific Northwest is essential for prescribing forest management practices for second-growth forests where recovery of Spotted Owl (*Strix occidentalis*) populations and enhancement of biodiversity are objectives….

Patterns of abundance of the sciurids in old- and managed forests suggests that silvicultural manipulation of vegetation and creative snag or den-tree management could be used in a management strategy to accelerate the development of Spotted Owl habitat in areas where old growth is lacking.

Within the west-side forests of the Pacific Northwest the "keystone ecological functions" of the pileated woodpecker and the various squirrel species (in addition to being an important element in the diet of northern spotted owls) necessitate that the implementation of restoration management remains focused on their needs. The reason decadence management needs to focus on the needs of the pileated woodpecker is because not all management actions have the same level of success for the pileated woodpecker (keystone species in a keystone complex) and consequently on "biological potential" and management species of concern. A number of snag creation studies have shown that for creating snags that would be used by pileated woodpeckers, simple girdling or topping are not effective:

- http://www.eglimpse.org/Assets/APNpdf/Deadwood%20Symposium/CHAPTERELEVENMANAGEMENT/056_Boleyn.pdf[7] (of 1,267 snags, 85% were topped & 11% were girdled or inoculated, 1.5% of created snags showed pileated excavations)
- http://www.fs.fed.us/psw/publications/documents/gtr-181/014_Shea.pdf[8] ("Six years after pheromone-baiting, 44 percent of the trees in both diameter classes had full cavities compared to no cavities in the girdled treatment groups…")

---

[5] Squirrles cannot live by truffles alone: a closer look at a Northwest keystone complex; PNW-Science Findings, #60, 2004

[6] Sciurids in Pacific Northwest managed and old-growth forests; *Ecological Application*s. 5(3), 1995, pp. 648-661, © 1995 by the Ecological Society of America

[7] Created Snag Monitoring on the Willamette National Forest; Bolyn, Wold, Byford; PSW-GTR-181; 2002

[8] Girdled versus Bark Beetle-created Ponderosa Pine Snags: Utilization by Cavity-dependent Species and Differences in Decay Rate and Insect Diversity;Shea, Laudenslayer, Ferrell, Borys; PSW-GTR-181; 2002.

While the majority of snag creation studies lump pileated woodpecker usage together with other woodpecker use,[9, 10] doing so acts to obscure the specific relevancy of management actions on habitat needs of the pileated woodpecker and therefore on the keystone complex and the "biological potential" of the created snags and consequently on land management goals and management species of concern. As noted by Rose et. al. (2001):

> Woodpeckers, sapsuckers, and nuthatches are highly specific in their selection of tree species for nesting and roosting, and this selectivity is attributed to the presence of decay fungi.

What is it about the pileated woodpeckers that need specific management actions that are different from those of other, less "keystone" woodpecker species? It appears that the specific driver needed for snags to be of interest to pileated woodpeckers and consequently useful for other management species of concern is the presence of heartwood rot. As noted by Bull, 2002:

- http://www.fs.fed.us/psw/publications/documents/gtr-181/016_Bull.pdf[11]

> …Hollow trees are a unique structural feature in forests. Heart-rot fungi decay the heartwood in these trees while the tree is alive (Bull and others 1997). Ninety-five percent of pileated woodpecker roost sites in northeastern Oregon were in hollow trees, and 5 percent were in vacated nest cavities (Bull and others 1992).
>
> …A strong relationship exists between the kind of decay in a tree and what species can use it, particularly for nesting and foraging.

As noted in PNR Science Findings #20 and reinforced in PNR Science Findings #57 in a discussion regarding the pileated woodpecker:

- http://www.fs.fed.us/pnw/sciencef/scifi20.pdf[12]

> Because the hollowing process is quite specific, it has to begin early in the life of a stand, and start on a living tree, according to Parks; an already dead tree not previously infected with heart-rot fungi will not become hollow.

- http://www.fs.fed.us/pnw/sciencef/scifi57.pdf[13]

> "One of the reasons roost sites may be more limiting for pileateds than nest sites, is because hollow trees are relatively rare in forests; they are created only by the process of heartwood decay occurring in live trees over a long period of time," Raley explains.

Also noted by Rose et. al. (2001):

> …strong excavators, such as Williamson's sapsuckers, pileated woodpeckers, and black-backed woodpeckers, select trees with a sound exterior sapwood shell and decaying heartwood to excavate their nest cavities.

---

[9] Long-term monitoring of wildlife leave trees in clearcut harvest units on the Siuslaw National Forest, Northwest Oregon, 1987-2000; Schreiber; Unpublished report. Siuslaw National Forest files. 29pp.; 2000.
[10] Cavity-nester habitat development in artificially made Douglas-Fir snags; Brandeis, Newton, Cole; The Journal of wildlife management; vol. 66; 2002
[11] The Value of Coarse Woody Debris to Vertebrates in the Pacific Northwest; Bull; PSW-GTR-181; 2002
[12] Dead and dying trees: essential for life in the forest; PNW-Science Findings; #20, 1999
[13] Coming home to roost: the pileated woodpecker as ecosystem engineer; PNW-Science Findings, #57, 2003

> …The soften heartwood of trees colonized by heart-rot fungi provides suitable conditions for excavating a nest chamber, and the living sapwood functions to maintain the tree's structural integrity.

Beyond the needs of the pileated, heart rot fungi have an important role in forest development independent of their interaction with pileated woodpeckers:

- http://www.fs.fed.us/r10/spf/fhp/top20/Heart-rot.pdf[14]

> Heart rot fungi may also facilitate the change from the maturing even-aged stage (i.e., understory reinitiation, to use Oliver and Larson's (1990) terminology) that is in transition to the true old- growth stage. Mortality of dominant trees may be necessary for this transition or at least it speeds the rate of change.

Active Management within the Reserves needs to explicitly pursue an objective of restoring native pathogens (fungus, parasitic vegetation, etc.) as part of the restoration operations.

An additional advantage of using heart-rot inoculation is the slow speed of the fungus growth. This allows the tree to continue growing, this is of great importance when inoculating trees in the 12"-20" dbh size range typically found in mid-seral plantations. This continued growth of the infected tree is vital because in order for pileated excavations to occur and be of value they need trees at least 20" dbh – a tree in short supply in most mid-seral Doug-fir plantations.

Clearly girdling will not achieve a snag that satisfies the "biological potential" due to the inferior nature of a mechanically created small dead tree.

> "Neither alternative would achieve the 60% biological potential level considering snags alone but would meet it when wildlife trees and created snags are considered. Currently most of the trees are not large enough to produce snags of the desired size, (22 inches diameter, FW-234) but FW-235 allows the retention of smaller trees if the treated stand is too young to have trees of sufficient size. In these cases, snags and green leave trees retained should be representative of the largest size class present in the stand.

Further, recent research has shown that once established the excavating and sounding behavior of the pileated woodpeckers will act to further spread the fungal spores, making subsequent snag creation activities in the same project area unnecessary (assuming an original inoculation was successful). Removing the need for multiple similar projects in the same area is a clear advantage over mechanical snag creation that would need to be revisited again. The financial incentive to work towards an ecosystem that manages itself is obvious. In addition, inoculation expenses appear to be similar to those for mechanical snag creation[15] without the safety concerns involved with topping trees, and the rewards can be fully realized in those management areas where further active timber management will be limited or is not anticipated such as Riparian Reserves and Late Successional Reserves. If topping of trees is going to be pursued, it should be *in addition to heart-rot inoculation* and following the guidelines developed in the Siuslaw National Forest described by Rose et. al. (2001):

---

[14] Are Heart Rot Fungi Major Factors of Disturbance in Gap-Dynamic Forests?; Northwest Science, Vol. 69, No. 4, 1995

[15] http://www.ingentaconnect.com/content/saf/wjaf/1998/00000013/00000003/art00006; Creating Snags and Wildlife Trees in Commercial Forest Landscapes; Western Journal of Applied Forestry; Volume 13, #3

> Trees topped above two branch whorls survive and develop new tops. Continued diameter growth in these trees provide higher values as wildlife snags. Large crooks formed in these trees also provide platform nest sites and create future breaking points to form a tall snag.

Girdling trees should not be performed since it kills the tree outright and weakens the structural integrity of the snag making it more likely to fall. As noted by Lindenmayer and Franklin (2002):[16]

> Girdling is problematic, however, because (1) sap rot occurs before heart rot, and (2) treefall can occur before there is sufficient top and heart rot to make the snag useful for cavities.

While implementing heart rot inoculation in previously thinned areas will maximize the restoration effectiveness of those previous thinning projects, The Clackamas River Ranger District has chosen not to pursue that course. Instead it has explicitly stated that heart rot inoculation would not be appropriate during restoration projects but during thinning projects (2007 Clackamas Restoration Projects EA, p. 43). Coupling variable density thinning projects in Reserves with heart rot inoculation will allow those areas whose management objective is the accelerated development of late seral characteristics to have the best chance for success.

Sincerely,
Charlie Ferranti

[16] Conserving Forest Biodiversity: a comprehensive multiscaled approach; Lindenmayer and Franklin, Island Press, 2002