May 9th, 2018

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Mt. Hood National Forest
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RE: North Clack Integrated Resource Project scoping comments

Dear Jim,

As you are aware, Bark's mission is to bring about a transformation of public lands on and around Mt. Hood into a place where natural processes prevail, where wildlife thrives and where local communities have a social, cultural, and economic investment in its restoration and preservation. Bark has over 25,000 supporters[1] who use the public land forests surrounding Mt. Hood, including the areas within the North Clack project area, for a wide range of uses including, but not limited to: clean drinking water, hiking, nature study, non-timber forest product collection, spiritual renewal, and recreation. We submit these scoping comments on behalf of our supporters. We request that you actively engage with the substance of these comments and use both the scientific and site-specific information herein to create a better restoration project for the North Fork Clackamas watershed.

IMPACTS TO EXISTING AND FUTURE DEAD WOOD

Standing dead trees (snags) are important resources for vertebrate and invertebrate species in forested ecosystems worldwide. A total of 49 snag associated animal species potentially occur in the North Fork Clackamas

[1] Supporters in this case is defined as significant donors and petition-signees which Bark has identified as being active users of Mount Hood National Forest.

watershed alone. In the Douglas-fir and western hemlock forests of the Pacific Northwest, over 100 vertebrate species utilize snags for some part of their life cycle. Approximately 20 percent of all bird species in the Pacific Northwest depend on snags for nesting and feeding and the abundance of snag-dependent birds is correlated with the density of suitable snags[2]. Studies show that, "cavity users typically represent 25 to 30% of the terrestrial vertebrate fauna in the forests of the Pacific Northwest."[3]. This study goes on to note that a "lack of cavity sites is the most frequently reported threat to "at-risk" species in the Pacific Northwest."

The FS has in the past asserted that thinning improves residual tree health and that it may take longer for the residual trees to die (reducing snag density) in the Proposed Action scenarios compared with No Action. Research has also shown that thinning lowers snag density relative to un-harvested stands.[4] Interestingly, while the agency recognizes that timber harvest has undisputed negative effects on snag density, it often claims that thinning will produce more structural diversity in the future. These claims do not present a complete understanding of ecological processes regarding future snag recruitment, especially in never-logged forests.

Until recently, few studies have examined the effects of variable density thinning (VDT) at longer time scales. A study of 14-year growth response of residual trees in thinned and un-thinned VDT sub-treatments in five young mixed-conifer stands located on the Olympic Peninsula in western Washington revealed that thinning was ineffective at stimulating growth of upper canopy trees. In this size class neither diameter growth nor crown length increased significantly compared to trees in un-thinned patches.[5] This research does not provide support the FS's common claim that thinning will accelerate growth of residual trees, leading to larger snags in the distant future. Please read this report and incorporate its findings into the PA for North Clack.

Thinning of maturing forest has been shown to significantly delay attainment of Mt. Hood National Forest (MHNF)'s snag objectives.[6] The LRMP requires that

[2] Boleyn, P., Wold, E., and Byford, K., Created Snag Monitoring on the Willamette National Forest, USDA Forest Service Gen. Tech. Rep. PSW-GTR-181. 2002

[3] Bunnell, F.L., Kremsater, L.L., and Wind, E. 1999. Managing to sustain vertebrate richness in forests of the Pacific Northwest: relationships within stands. Environmental Review, 7: 97-146.

[4] Windom, M. and Bates, L. 2008. Snag density varies with intensity of timber harvest and human access. Forest Ecology and Management 255(7) pp. 2085-2093.

[5] Willis, John L.; Roberts, Scott D.; Harrington, Constance A. 2018. Variable density thinning promotes variable structural responses 14 years after treatment in the Pacific Northwest. Forest Ecology and Management. 410: 114-125. https://doi.org/10.1016/j.foreco.2018.01.006.

[6] USDA Forest Service. 2007. Curran Junetta Thin Environmental Assessment. Cottage Grove Ranger District, Umpqua National Forest. June 2007. Using data from stand exams modeled through FVS-FFE (West Cascades

dead wood be maintained to support 60% of maximum biological potential of cavity nesting species (FW-215). According to the FS, this standard often cannot be met because of the purpose and need for the project (FW-32/33) and the on-the-ground conditions present within the stands (FW-215/219). In that case, the LRMP requires that any new timber harvest project include wildlife tree prescriptions to compensate for the deficiency (FW-217).

Commercial thinning may prevent or delay development of essential features of old forest ecosystems, features important to spotted owls, salmon, and their prey. In 2016, the FS and the Bureau of Land Management (BLM) released an annotated bibliography compiling studies that examined the impacts of thinning in mature forest stands[7] which was recently reviewed by Paul Reed, a PhD student at the University of Oregon.[8] Overall, the bibliography addressed a variety of characteristics of old-growth forest structure. While there is some evidence that thinning could positively affect aspects of late-successional development, significant and consistent evidence of this type is generally lacking. This is especially true regarding the mid & long-term impacts of thinning on the abundance and size of snags and downed wood. These old-growth structural features are largely overlooked though available data suggests that thinning does not do an adequate job managing for these features. According to Reed, because of the lack of compelling evidence, it is appropriate to implement a precautionary approach towards managing and thinning mature forest stands.

Large snags (as well as dense forest surrounding them) are critical habitat requirements of Westside indicator species like flying squirrels and spotted owls[9], and are currently in short supply due to past and present management. According to the North Fork Clackamas Watershed Analysis, due to past management there has been a lack of snags leading to a "snag lag" (for large snags specifically) which could continue until approximately 2026.

In response to the significant loss of large and old trees, the Interior Columbia Basin Ecosystem Management Project SDEIS included the following statement in its standards and objectives, which although written for the Eastside, is relevant to Westside forests with limited large snags:

Maintain and/or restore large shade-intolerant trees and snags in densities that are consistent with the range of historical conditions. … Large trees is a relative term dependent on species and site. Large trees are a future source of large snags,

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variant) the Umpqua NF found that the actual effect of heavy thinning is to capture mortality and delay recruitment of desired levels of large snag habitat for 60 years or more.

[7] Powers, M., and S. Wessell. 2016. Management impacts and developmental patterns in mature Douglas-fir forests of the Pacific Northwest: An Annotated Bibliography.

[8] Reed, P. 2016. Reviewing the US Forest Service and Bureau of Land Management's "mature stand thinning" bibliography.

and large snags are a future source of coarse woody debris, another important habitat component for many species. It is important to have present and future sources of large trees and snags at adequate levels though time. Larger snags are generally better than smaller snags because they exist longer. Large trees and/or snags are essential habitat components for many species … [10]

Because snags that are artificially created (through girdling) take years to provide any potential habitat (and the quality of this artificial habitat is uncertain), the North Clack project could easily result in an immediate net reduction of snags across the landscape and contribute to the larger issue of a regional snag deficit resulting from previous Forest Service (FS) management. Since large snags are required for the habitat requirements of Westside indicator species like flying squirrels and spotted owls[11], but are in short supply due to past and present management, the **FS should exclude stands with high snag and large living tree densities from any logging and apply buffers on key snags and relatively large trees within proposed units.**

In short, the significant role played by large snags in the healthy functioning of the forest ecosystem is well documented. Recently, both the role of logging on the numbers of large snags and the ineffectiveness of current artificial snag creation has been documented. The impact of logging on large snag density[12] clearly shows that the paucity of large snags across a managed forest landscape relates to the logging of that landscape. Further, the usefulness of artificially-created snags has been thrown into doubt.[13] Knowing that this project has a strong likelihood of adversely impacting legacy forest features, which in turn will have a significant impact of the healthy functioning of the remaining forest ecosystem, directly contradicts the assertion that the project will enhance biological diversity. **This must be acknowledged and accounted for in the PA.**

THINNING IN LATE SUCCESSIONAL RESERVES

The North Clack project includes 191 acres of "variable-density thinning with skips and gaps" in Late-Successional Reserves (LSRs). According to the Northwest Forest Plan (NWFP), LSRs are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth reacted species, including the

[10] USDA/USDI 2000. ICBEMP SDEIS p 3-66 – 3-68.
[11] Cline, S.P., Berg, A.B., Wight, H.M., 1980. Snag characteristics and dynamics in Douglas-fir Forests, Western Oregon. Journal of Wildlife Management 44, 773–786.
[12] Issue 42 (March 2002) Dead wood all around us: think regionally to manage locally, by Janet Ohmann and Karen Waddell
[13] USDA Forest Service Gen. Tech. Rep. PSW-GTR-181. 2002

northern spotted owl. *NWFP Standards & Guidelines, C-11.* Thinning and other silvicultural treatments inside reserves are subject to review by the Regional Ecosystem Office to ensure that the treatments are beneficial to the creation of late-successional forest conditions. *NWFP Standards & Guidelines, C-13.*

The purpose of any silvicultural treatment within a LSR must be to benefit the creation and maintenance of these late-successional forest conditions. *NWFP at C-12.* As there is a general prohibition on commercial logging in LSRs, it is the burden of the agency to show that the proposed actions are clearly needed and will not prevent the LSR from providing the habitat for which it was created. **In the PA, please provide specific stand information for units proposed for logging within LSRs, and rationale for the actions proposed within these stands, beyond simply growing bigger trees faster.** In particular, please discuss the role of standing and down dead trees in enhancing biodiversity and the ecological impact of decreasing future snag retention by logging in LSRs. If your rationale is incomplete or inconsistent with the projected outcomes of commercial thinning (in relation to expediting the creation of late-successional structure), Bark recommends dropping these units from consideration.

IMPACTS TO NORTHERN SPOTTED OWL HABITAT

The North Clack project area contains one historic northern spotted owl nest site. According to the FS, the 'thin-owl emphasis' units are commercial thinning treatments with the objective to move the stands towards suitable habitat on a faster trajectory. They would include a light variable density thinning from below that will include skips and gaps and a post treatment canopy cover of 60-70%, with all large legacy trees being retained. Bark will be field-checking these units and then provide input on the accomplishment of achieving suitable habitat through this lighter-than-normal technique of thinning.

Suitable spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees. **If the FS wishes to recover spotted owl habitat, it must allow no degrading or removal of this habitat from the North Fork Clackamas watershed as part of the North Clack project.**

Further, within units in the historic home range of the spotted owl, we recommend:

- Retaining an average canopy cover of at least 40% to maintain dispersal owl habitat

- Limiting gaps to 1/4 acre in size with less than 10% of the total stand area in gaps
- Prohibiting cutting of trees larger than 20 inches in diameter (at a height of 4.5 feet) unless necessary for skyline corridors, skid trails, landings or temporary roads, in which case these trees are to be left on site as downed wood.
- Removing Riparian Reserve logging from consideration.

According to the North Fork Clackamas Watershed Analysis, Riparian Reserves in this area are especially important to support creation and retention of suitable habitat characteristics, as they are some of the first stands to become suitable habitat in the future. *WA at 2-55.* "Over the long term, late seral habitat in the North Fork watershed would be found primarily in the Riparian Reserves, which comprise 32% of federal land in the watershed." *WA at 1-16.* The North Fork's role in the NWFP's connectivity strategy is within the RRs, as well as small late seral blocks. However, the North Clack project includes 947 acres of "variable-density thinning with skips and gaps" in Riparian Reserves. Along with our other concerns about thinning in Riparian Reserves (elaborated below) this specifically concerns us. **Please provide rationale for why the FS believes thinning in Riparian Reserves within the historic home range is consistent with promoting future suitable habitat for northern spotted owls.**

Impacts to northern flying squirrels

In past comments, Bark expressed concern about impacts to northern flying squirrels (a principle spotted-owl prey), and we bring this concern up again here. The owl recovery plan recommends active management in critical habitat to improve conditions for the long term (USDI 2011 at III-19). According to agency research, variable-density thinning of Douglas fir stands can reduce the suitability of the site for the northern flying squirrels for 30 to 100 years, until long-term ecological processes (often also suppressed by thinning) provide sufficient structural complexity in the mid-story and over-story favorable to squirrels. Northern flying squirrel populations in mature and second growth forests decline after the stands are thinned and remain at low levels. Research has found that squirrel populations in un-thinned patches are larger than in thinned, and even those decline when *adjacent* areas are thinned.[14] Predation seems to be the most limiting factor – thinning opens the stands and results in a period of several decades when squirrels are too vulnerable to predation, so the

[14] Wilson, T.M. 2010. Limiting factors for northern flying squirrels (Glaucomys sabrinus) in the Pacific Northwest: a spatio-temporal analysis. Ph.D. dissertation. Cincinnati, OH: Union Institute & University.

population remains very low. Prescriptions that retain visual occlusion in the mid-story layers are best suited for maintaining squirrel populations.

Since recommendations for managing forests include retaining some areas of high stem density, retaining the mid-story, and retaining a contiguous closed canopy, Bark has expressed concern about the impact of thinning, especially in fire-origin stands, on retaining these key features. A strategy of maintaining adequate area and connectivity of dense, closed-canopy forests within managed landscapes by leaving areas of young forest un-thinned has been recommended by researchers to maintain northern flying squirrel populations[15].

In a 2013 paper by Todd M. Wilson and Eric D. Forsman, the Management Considerations includes the idea that: "It may be possible to develop new thinning prescriptions that keep moderately high populations of arboreal rodents in young forests while still achieving long-term management objectives for the stand." We have suggested one such approach in our comments which includes developing prescriptions in plantation stands that focus solely on skips (patches of trees left un-thinned) and gaps (removal of patches of trees). This strategy, a version of which appears to be proposed within the 60 acres of "gaps" (cut and leave trees in small gaps to improving owl habitat in Matrix) is in marked contrast with most prescriptions that typically thin throughout a stand (with or without delineated skips or gaps)." For this, Wilson and Forsman's research recommends keeping gaps small (100-400 m^2).[16] Bark supports noncommercial treatments to improve owl habitat by creating few small gaps (dropping small trees and leaving on the ground) to help increase structural diversity. **Bark also asks the FS to consider expanding this technique to more acres within the owl's home range, in *replacement* of proposed thinning, wherever deemed more appropriate to achieve improved habitat for the owl.**

Logging increases negative interactions with barred owls

The northern spotted owl's Revised Recovery Plan identifies competition from the barred owl as an important threat to the spotted owl.[17] The FS has also previously acknowledged that "(v)egetation management activities can also

[15] Manning, T.; Hagar, J.C.; McComb, B.C. 2012. Thinning of young Douglas-fir forests decreases density of northern flying squirrels in the Oregon Cascades. Forest Ecology and Management. 264: 115 –124.
[16] Wilson, Todd M.; Forsman, Eric D. 2013. Thinning effects on spotted owl prey and other forest-dwelling small mammals. In: Anderson, Paul D.; Ronnenberg, Kathryn L., eds. Density management for the 21st century: west side story. Gen.Tech. Rep. PNW-GTR-880. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 79–90
[17] USDI, U.S. Fish and Wildlife Service. February 2011. Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls. Region One U.S. Fish and Wildlife Service, Portland, OR.

benefit barred owls indirectly by providing habitat and prey species that are not necessarily preferred by the northern spotted owl." *Hunter EA at 133.* However, past projects have made very little mention of combined impacts of logging with the known effects of competition and trophic cascades associated with the barred owl. In the Pacific Northwest, the recent invasion of barred owls with loss and fragmentation of intact forest are combining to reduce population sizes of native species with limited adaptive responses to novel and fast-acting threats. As noted in the comprehensive work, *Population Demography of Northern Spotted Owls*[18], the fact that barred owls are increasing and becoming an escalating threat to the persistence of spotted owls does not diminish the importance of habitat conservation for spotted owls and their prey. In fact, the existence of a new and potential competitor like the barred owl makes the protection of habitat even more important, since any loss of habitat will likely increase competitive pressure and result in further reductions in spotted owl populations.

The *Population Demography* found that, "[o]ur results and those of others referenced above consistently identify loss of habitat and barred owls as important stressors on populations of northern spotted owls. In view of the continued decline of spotted owls in most study areas, it would be wise to preserve as much high-quality habitat in late-successional forests for spotted owls as possible, distributed over as large an area as possible."

Dugger et al. modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study area where barred owls were detected on some home ranges[19]. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was 2 to 3 times greater when barred owls were detected. They found that colonization rates for spotted owls decreased as the distance between patches of old forest increased (i.e., increased habitat loss and fragmentation) and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs. They concluded that conserving large blocks of contiguous old-forest habitat was important for reducing interference competition between the owl species.

In a recently published report, Holm et al. describe the potential trophic cascades triggered by the range expansion of the barred owl in our region. The authors suggest that the addition of the barred owl to PNW ecosystems may result in

[18] Forsman, et.al, 2011, published for Cooper Ornithological Society.
[19] Dugger, K.M., R.G. Anthony and L.S. Andrews. 2011. Transient dynamics of invasive competition: barred owls, spotted owls, habitat composition and the demons of competition present. Ecological Applications 21(7): 2459-2468.

restructuring of communities or even potential local extinctions. If the rate of increase barred owl population continues, forests could experience a loss of prey species as well as loss of important ecological processes.[20] Increased predation pressure on traditional prey of the northern spotted owl by the barred owl could indeed result in a local decline of species present in the North Clack project such as northern flying squirrels and red tree voles.

Holm et al. discuss several potential indirect effects on ecosystem processes, which include a decline in tree and shrub growth and establishment through increased predation pressure on seed dispersing species because of barred owl predation. Increases in barred owls could also result in a decline in tree squirrel abundance, which could indirectly lead to reduced recruitment and growth of these forests that rely on spore dispersal. A potential decrease in soil processing may also occur with the expansion of barred owls, since reduced numbers of burrowing small mammals would lead to subsequent declines in the rates of decomposition of organic matter and litter and mixing of forest soil.[21]

THINNING IN RIPARIAN RESERVES

Riparian Reserves are a part of the NWFP's broad Aquatic Conservation Strategy (ACS). Riparian Reserves generally parallel water bodies and streams and are portions of watersheds where riparian dependent resources receive primary emphasis and where specific standards and guidelines apply. This system was established to "restore and maintain the ecological health of watersheds and aquatic ecosystems."[22]

The FS often asserts that logging is needed in Riparian Reserves because they are "overstocked" with relatively uniform trees with low levels of diversity, and that they do not have mature and late-successional stand conditions. Bark's experience groundtruthing timber sale units has made it clear that this is often a drastic oversimplification of the local conditions, especially regarding Riparian Reserves in fire origin stands. Many Riparian Reserves in older plantation (>60 years old) and fire origin stands are in healthy, functioning condition, currently meeting the ACS objectives. A logging prescription that removes existing canopy,

[20] Holm, S.R., B.R. Noon, J.D. Wiens and W. J. Ripple. 2016. Potential Trophic Cascades Triggered by the Barred Owl Range Expansion. Wildlife Society Bulletin; DOI: 10.1002/wsb.714
[21] Pearce, J., and L. Venier. 2005. Small mammals as bioindicators of sustainable boreal forest management. Forest Ecology and Management 208:153–175.
[22] Klamath Siskiyou Wildlands Ctr. v. U.S. Forest Serv., 373 F. Supp. 2d 1069, 1092 (E.D. Cal. 2004).

decreases structural complexity, and adversely impacts soil stability does not meet the purpose and need of this project or comply with the ACS.

Indeed, many, if not most, ACSOs would be better met through the "no action" alternative. For example, Riparian Reserves in the Clackamas are currently far below the Forest Plan standards for woody debris in streams (which correlates to ACSO #3 and #8). Given that many of these forests are entering the stem-exclusion phase, where trees naturally begin to die, and structural diversity increases, No-Action would lead to more available LWD. However, the FS typically characterizes the "no-action alternative" as though it is stuck in time, in contrast to the action, in which time moves; not fully acknowledging that no-action will effectively allow natural processes to prevail.

Several sources point to passive management as the best approach to achieve ACSOs in Riparian Reserves. Pollock and Beechie[23] reviewed the sizes of deadwood and live trees used by different vertebrate species to understand which species are likely to benefit from different thinning treatments. They examined how riparian thinning affects the long-term development of both large diameter live trees and dead wood. Ultimately, they used a forest growth model to examine how different forest thinning intensities might affect the long-term production and abundance of live trees and dead wood. In Pollock and Beechie's study, passive management created dense forests that produced large volumes of large diameter deadwood over extended time periods as overstory tree densities slowly declined.

Pollock and Beechie's results showed that the few species that utilize large diameter live trees exclusively may benefit from heavy thinning, whereas species that utilize large diameter dead wood can benefit most from light or no thinning: "because far more vertebrate species utilize large deadwood rather than large live trees, allowing riparian forests to naturally develop may result in the most rapid and sustained development of structural features important to most terrestrial and aquatic vertebrates."

Similarly, Spies et al.[24] concluded that thinning produces unusually low-stem-density forests and causes long–term depletion of snag and wood recruitment

[23] Pollock, Michael M. and Timothy J. Beechie, 2014. Does Riparian Forest Restoration Thinning Enhance Biodiversity? The Ecological Importance of Large Wood. Journal of the American Water Resources Association (JAWRA) 50(3): 543-559. DOI: 10.1111/jawr.12206

[24] Spies, T., M. Pollock, G. Reeves, and T. Beechie. 2013. Effects of riparian thinning on wood recruitment: A scientific synthesis. Science Review Team, Wood Recruitment Subgroup, Forestry Sciences Laboratory, Corvallis, OR, and Northwest Fisheries Science Center, Seattle, WA. 28 January 2013. 46pp. http://www.mediate.com/DSConsulting/docs/FINAL%20wood%20recruitment%20document.p

that is likely detrimental in most Riparian Reserves. According to this work, commercial 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 un-thinned stands.

Even if the FS could adequately demonstrate how commercial logging in fire-origin riparian reserves is *necessary*, the action still must comply with all nine of the ACSOs, on both short- and long-term timeframes. Complying with the ACSOs means that the FS must manage riparian-dependent resources to maintain the existing condition or implement actions to restore the conditions. While some aquatic degradation, standing alone, does not constitute ACS noncompliance, the FS must avoid degradation that leads to the non-attainment of ACS objectives at both the short-term, localized scale and the long-term, watershed scale.[25] To make a finding that the logging "meets" or "does not prevent attainment" of the ACSOs, the NWFP requires the FS to describe the existing conditions of the watersheds within the project area, the natural variability of important physical and biological components, and explain *how* the proposed logging would maintain or restore the conditions of the watershed.[26]

An honest interpretation of **ACS Objective #8 recognizes that** logging in the Riparian Reserves will actually retard compliance, not improve it.

> **ACSO #8: Species Composition and Structural Diversity:** Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Large wood plays an important role in stream ecosystems modifiying both hydrologic sediment and nutrient transport by slowing, storing and redirecting stream water sediments and particulate organic matter. Additionally, large wood enhances stream habitat for fish, other vertebrates, and invertebrates by providing physical cover, enhancing habitat features such as pools, backwaters and secondary channels, and creating flow velocity refugia. Having adequate

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[25] Pac. Coast Fed'n of Fishermen's Ass'ns v. NMFS, 265 F.3d 1028, 1037 (9th Cir. 2001).

[26] Klamath Siskiyou Wildlands v Forest Service, 373 F. Supp. 2d.

levels of large woody debris (LWD) is critical for healthy streams in forested ecosystems.

MATURE/FIRE ORIGIN STANDS

The North Clack scoping letter identifies some stands proposed for logging as being "100 to 120 years old depending on fire burn patterns". Bark believes the best way for the FS to ensure that there is an overall increase of old growth forest habitat in the future is to let mature forests grow unmanaged. Furthermore, there is new urgency to protect mature forests to store carbon in order mitigate climate change, and to provide additional habitat as soon as possible to increase the chances that the spotted owls can co-exist with the invading barred owl (both issues which extremely important to Bark and are elaborated upon in other sections of these comments).

Any commercial logging, including thinning mature stands and/or removing mature trees, can reduce the quality of habitat and delay attainment of defining old-growth characteristics such as snags and dead wood that provide essential ecological services, including fish & wildlife habitat, carbon storage, slope stability, and capture-storage-release of water and nutrients.

Bark has observed that old-growth characteristics, such as large trees, snags, multiple layers, and slope stability, often begin to be present in mature stands (over 80 years old). Scientific literature demonstrates how "(s)ites that do not have the full complement of old-forest characteristics can partially function as old forests for those attributes that are present."[27] When old forests are in such short supply, as they are in the North Clack project area, these mature stands act as important "life boats" that will carry closed-canopy dependent wildlife through the habitat bottleneck created by decades of overcutting.

In David Perry's (Professor [emeritus], Oregon State University School of Forestry) correspondence to David Dreher (Legislative Assistant to U.S. Rep. Peter DeFazio), 15 June 2002, he writes:

The biological importance of mature forests (roughly 80-150 years old) was recognized by FEMAT, and the NRC panel agreed with their assessment. Basically, these are the next generation of old growth, and many are probably

[27] Everett, R., P. Hessburg, J. Lehmkuhl, M. Jensen, and P. Bourgeron. 1994. Old Forests in Dynamic Landscapes: Dry-Site Forests of Eastern Oregon and Washington. Journal of Forestry 92: 22-25.

already developing aspects of OG [old growth] habitat. With remaining OG at such low levels, the NRC panel felt that including forests on the cusp could make a significant difference in survival of some species over the next 100 years, and I would imagine that was the reasoning of FEMAT biologists as well.

If retained, mature forest stands in North Clack will continue growing and removing carbon from the atmosphere for decades. These mature forests have not yet reached their full potential for carbon storage and will continue to sequester additional carbon in both wood and soil for a long time. Old-growth forests in the moist "westside" portions of the Pacific Northwest store more carbon per-acre than any other temperate forests in the world.[28]

North Clack Unit 176 ("fire origin"), which includes mature forest characteristics including large diameter trees and existing gaps in the canopy

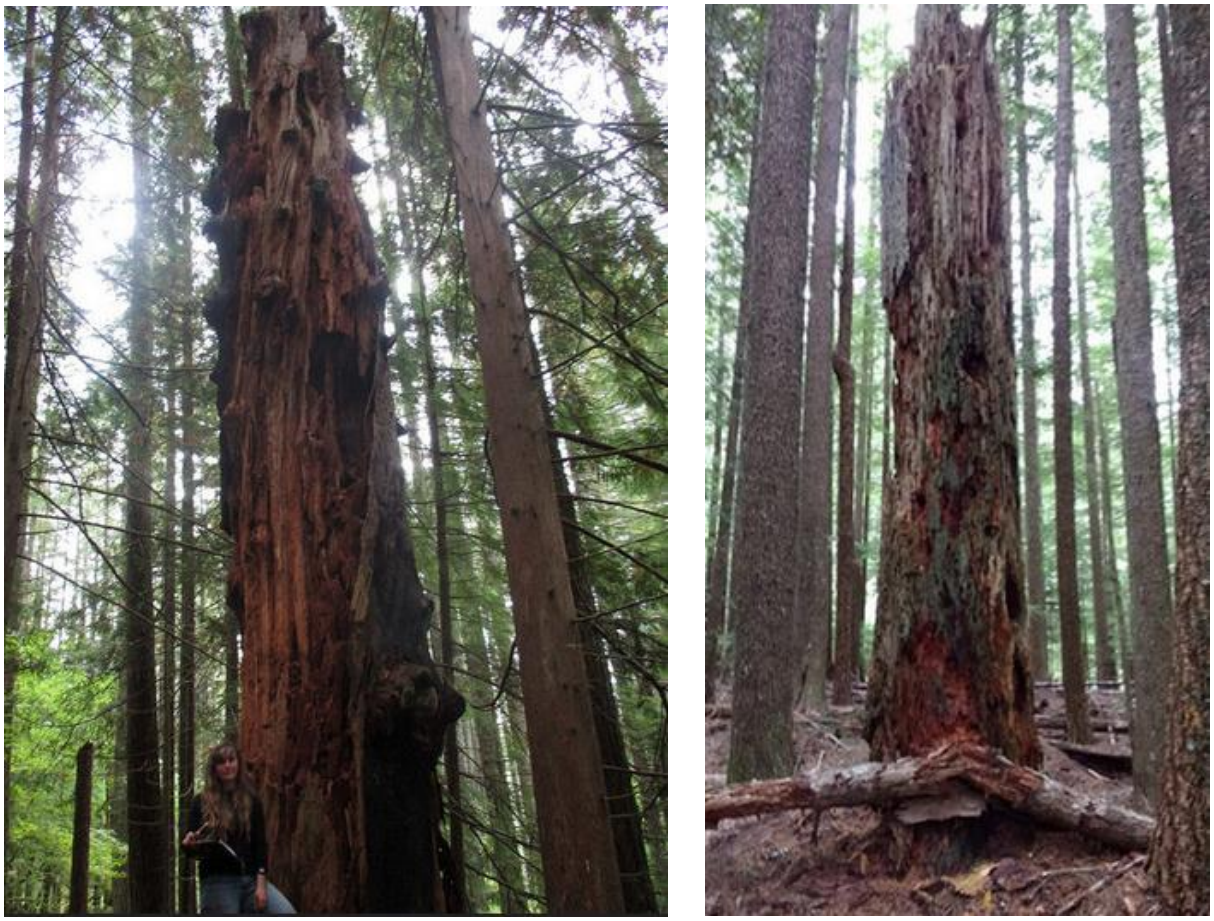
[28] Smithwick EAH, Harmon ME, Acker SA, Remillard SM. 2002. Potential upper bounds of carbon stores in the Pacific Northwest. Ecological Applications 12(5): 1303-1317. "The C densities we measured in old-growth forests of the PNW are higher than C density values reported for any other type of vegetation, anywhere in the world. … Results showed that coastal Oregon stands stored, on average, 1127 Mg C/ha, which was the highest for the study area, while stands in eastern Oregon stored the least, 195 Mg C/ha. … the highest C density was at stand CH04 at Cascade Head, ORCOAST, with 1245 Mg C/ha."

North Clack Unit 178 ("fire origin"), which includes mature forest characteristics including multi-story canopy, snags and down wood

Bark has visited several "fire origin" units of the North Clack project and found that tree ages and sizes vary, and that legacy trees and snags are scattered throughout the units. This condition was noted in the North Clack scoping letter:

Some of the fire-origin stands have scattered legacy trees that survived the fires; these large live fire-scarred trees would be retained. Some stands also contain large-diameter snags that have been dead for a century, most of which are crumbling down. Snags would be retained unless they pose a safety hazard.

Of the units we have surveyed in North Clack so far, most contain legacy trees and snags that should be carefully retained as part of this proposal if has a goal of promoting habitat dependent on these stand qualities.



Legacy snag in North Clack (“fire-origin) Unit 176 (left), Legacy snag in North Clack (“fire-origin) Unit 190 (right).

Legacy trees in North Clack (“fire-origin) Unit 196.

Legacy trees in North Clack (“fire-origin) Unit 212.

Legacy snags in North Clack ("fire-origin) Unit 202 (left), Legacy tree in North Clack ("fire-origin) Unit 202 (right).

It isn't just fire-origin units that include mature forest habitat characteristics. Several "plantation" units Bark has visited also include legacy trees and snags, among other structural components of a healthy forest. Where these exist (large down wood, large snags, large live trees, minor trees), **Bark recommends retaining no less than 40% of the canopy cover, retaining as much mid-story component of the stand as is feasible, retaining the largest trees in the stand, as well as retaining all legacy features.**

*Legacy snag in North Clack Unit 96 ("plantation", left, **GPS:45.20281, -122.12583**); Legacy tree in western portion of "plantation" Unit 6 (Right, **GPS: 45.22792, -122. 21347**)*

NO WHISKY TIMBER SALE

As part of an appeals resolution with Bark in 2006, Unit 20 of the No Whisky Timber Sale was dropped after Bark observed a wetland running east-west through the center of the unit which proved difficult to buffer. Now this area is within North Clack Unit 44. At the time of the No Whisky project being planned, we noted an OHV trail running the southern boundary of No Whisky Unit 20, connecting to Rd 4611-136, so we recommended that the route should be closed, revegetated and restored, and that a monitoring plan for Law Enforcement Officers to enforce OHV closure. This trail is still within the unit, as well as the noted wetland. Bark recommends dropping the area included in No Whisky Unit 20 from North Clack Unit 44, as well as closing and rehabilitating the illegal trail exiting the unit.

As part of the same appeals resolution for No Whisky, the FS stated that they did not foresee re-entry into Riparian Reserves within those units for 40-50 years. We recommend that the FS follow this intention and not re-enter any Riparian Reserves that they already thinned through the No Whisky project.

VISUAL QUALITY OBJECTIVES

The North Fork Clackamas River is an eligible scenic river and therefore carries a VQO of retention in the foreground and partial retention in the middle ground as seen from the river (FW-497). Management should protect outstandingly remarkable values and free flowing nature until designation is made or released from consideration – includes ¼ mi buffer on either side of high water mark. Scenic section should appear as predominantly natural landscape where human activities are not evident to casual visitors (FW-512).

SURVEY AND MANAGE SPECIES

Bark expects that surveys for Survey and Manage species will be completed for all units 80 years and older. We remind the agency that sufficient buffers are required for all survey and manage species, and that these buffers must be identified in sale and NEPA documentation. The scoping letter did not indicate how the FS will manage the located species. We request that the agency make this disclosure in forthcoming NEPA documents.

NORTH FORK CLACKAMAS RIVER WATERSHED ANALYSIS

We encourage the FS to look to the "Opportunities and Constraints" map in the NFCRWA, Map 3-2. The agency should take note and act according to the document's recommendations in regard to the areas identified as "constraint to opening size", which are mostly near steep slopes leading down to the main fork of the Clackamas. We also request that the FS retain "Remnant Late Seral" identified on this same map and prevent ground impacts in all areas with "landform stability concerns".

A recommendation from the document includes: "Landform with areas of potential instability need field verification by geomorphologist during project planning" *WA at 3-10.* Some areas in the watershed are "inherently unstable and merit special attention during project planning:"

- At the headlands of tributaries with steep gradients. Historically, many such areas have experienced debris flows, and those presently filled or filling with colluvium may fail with the slightest provocation. These conditions are most likely to be met within the RRSS, IRSS, and WRSS landform types." *WA at 2-6.*

According to the WA, 1,264 acres of soil types exhibit low relative productivity in the watershed. These are potentially screen 4 (Determination of Land Not Suitable for Timber Production, Daoust et al, 1984) soil types. They may not be able to adequately stock a stand w/n 5 yrs after complete removal of overstory (USFS, R-6 stocking standards), and should be identified within the PA if there are proposed commercial activities on these acres.

UNMAPPED RIPARIAN AREAS WITHIN PROPOSED UNITS

In past projects, Bark has observed instances where sale contract maps did not reflect all wet areas within proposed units, which resulted in ground-based logging occurring over areas with riparian components. We will be submitting information regarding unmapped riparian areas with these scoping comments, and continue to share information that we gather as we groundtruth this project.

In Unit 176, we noted an unmapped intermittent stream channel flowing downslope toward the 4613-015. The ground surrounding this channel contained indicator plants such as devil's club, and water could be seen moving downhill through the unit via the channel. Northwest Research Station stated in a 2015 PNW Research Station issue of Science Findings: "Managing for healthy riparian areas in head-waters provides many downstream benefits . . (d)ownstream productivity, water temperature, and instream habitat are tied to the health of the headwater stream-riparian system." Of the 15 vertebrates

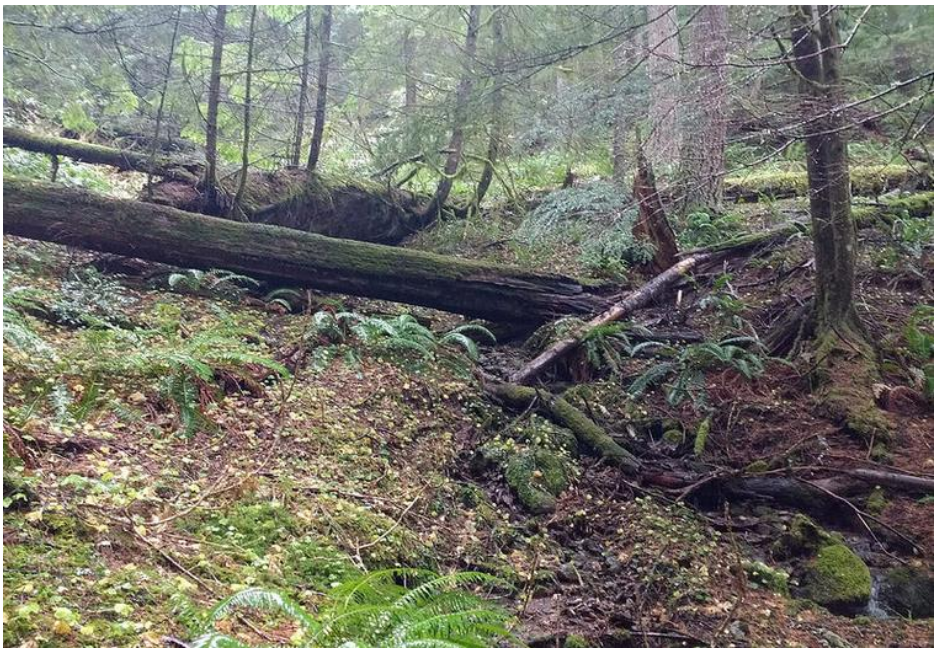
recorded the recent study of headwater streams, most have strong associations to features specific to small headwater streams.[29]

Unmapped riparian area in Unit 176 ***(GPS: 45.21205, -122.151117)***

In Unit 196, we noted two unmapped riparian areas feeding into the stream mapped within the unit by the FS. One, centered around **45.222231, -122.115554** is north of the mapped stream, and is also in proximity to many large legacy snags which surround the top extent of this stream. A species of Conocephalem, a liverwort not commonly seen in the area, was one of the wet forest-dependent species present. A second riparian area fed the mapped stream from the west, at **45.221387, -122.116717**. Overall, this unit contained a complex riparian network, and requires a riparian buffer to protect the hydrology and aquatic ecosystem present here.

[29] USDA Pacific Northwest Research Station. 2015. Heed the Head: Buffer Benefits Along Headwater Streams. Science Findings #178. http://www.fs.fed.us/pnw/sciencef/scifi178.pdf

*Unmapped riparian area in Unit 196 at **45.222231, -122.115554**, above and below*



*Unmapped riparian area at **45.221387, -122.116717** within Unit 196*

Unit 6 contains a large flat wet area at approximately **45.22666, -122.21576**, where the soil is completely saturated, with lots of skunk cabbage and other indicators. Elk appear to be using this area, as we noted a large amount of scat. Bark recommends no ground disturbance within this area. Upslope in the unit is a very steep, rocky and wet slope leading up to the road. There is also skunk cabbage and other indications that water is moving just underground on this slope at **45.22616, -122.21482**, and that disturbing this slope through commercial logging would cause unnecessary harm to soils and hydrologic processes within the unit.

*Large flat wet area in Unit 6 at approximately **45.22666, -122.21576***

We share this information to help create a more informed representation of baseline condition, because "(i)f an EA does not reasonably compile adequate information and sets forth statements that are materially false or inaccurate the Court may find that the document does not satisfy the requirements of NEPA, in that it cannot provide the basis for an informed evaluation or a reasoned decision."[30] Further, a "material misapprehension of the baseline conditions existing in advance of an agency action can lay the groundwork for an arbitrary and capricious decision."[31]

OTHER WILDLIFE CONCERNS

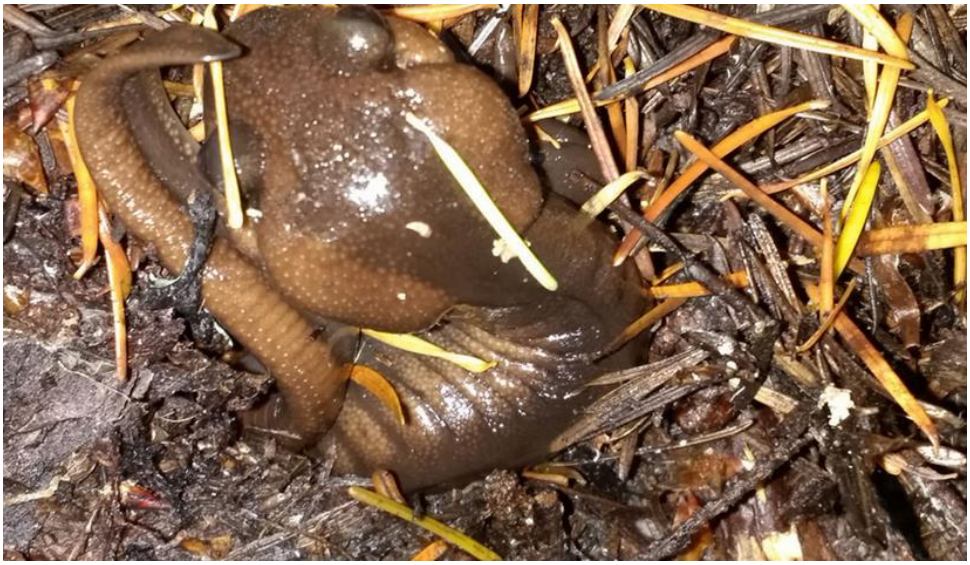
Red tree voles are Category C Survey and Manage species under the Northwest Forest Plan, and according to the IUCN Red List are "near-threatened". Threats to this species include loss of forest habitat and forest fragmentation[32]. This species has limited dispersal capabilities, and early seral stage forests may be a barrier to dispersal.

[30] Western North Carolina Alliance v. N. Carolina Dept. of Transp., 312 F. Supp. 2d 765, 776- 77 (E.D.N.C. 2003), citing Sierra Club v. United States Army Corps of Eng'rs, 701 F.2d 1011, 1030 (2d Cir.1983).
[31] Friends of Back Bay v. U.S. Army Corps of Engineers, 681 F.3d 581, 588 (4th Cir. 2012).
[32] Linzey, A.V. & NatureServe (Scheuering, E. & Hammerson, G.). 2008. Arborimus longicaudus. The IUCN Red List of Threatened Species 2008: e.T42615A10729936.

Several North Clack units may meet the stand-level criteria as described in the Red Tree Vole Protocol described by Huff et al.[33] Bark volunteers visited stands in project area that had evidence of surveys being conducted this spring.

Federal agencies have been pressed by conservation groups recently to consider new information (from either within the agency or from the public) regarding red tree voles in their planning process after official surveys have been completed. Bark requests that any new information regarding the presence of red tree voles be included in a supplemental NEPA effort, and that the appropriate no-cut buffers are immediately applied: a 10-acre surrounding buffer where no ground disturbing activities can occur.

In North Clack Unit 190, volunteers noted presence of a Northwest Salamander (Ambystoma gracile). While this is not an uncommon species within its range, it is rarely seen on the Clackamas district, and the FS should take care to protect its habitat. According to the IUCN Red List, needed conservation measures to promote this species' habitat include maintaining forested conditions in areas within at least 200-250 meters of breeding sites. Also, agencies should attempt to minimize forest fragmentation through logging (in the case of North Clack, "regeneration harvest").



In several units, including Units 96 and 196, we noted extensive Aplodontia colonies (Unit 96: **45.20358, -122.12456**; Unit 196: **45.2214353, -122.1172110**), which are sensitive to ground disturbance. Several other units

[33] Huff, R., K. Van Norman, C. Hughes, R. Davis and K. Mellen-Mclean. 2012. Survey Protocol for the Red Tree Vole, Version 3.0. Portland, OR. U.S. Department of the Interior, Bureau of Land Management, Oregon/Washington, and U.S. Department of Agriculture, Forest Service Regions 5 and 6. 52 p.

contained colonies of this species as well. A study of logging impacts to Aplodontia which was carried out in British Columbia found that impacts were greatest in areas used as skid trails, and these trails needed to be carefully designated to minimize impacts. Post-harvest persistence appeared to be highest in riparian no-machine buffer zones where there was no machinery impact.

Within proposed timber harvesting areas that contain Aplodontia, the researchers recommended that to protect the species:

- Mountain Beaver tunnel/runway system perimeters are to be delineated
- No machine use within these perimeters (except on top of a deep snowpack, which would likely not occur as part of this project)
- No mechanical site preparation within these perimeters, since any machine use will collapse nests and tunnels.[34]

Applodontia presence in Unit 196: ***45.2214353, -122.1172110***

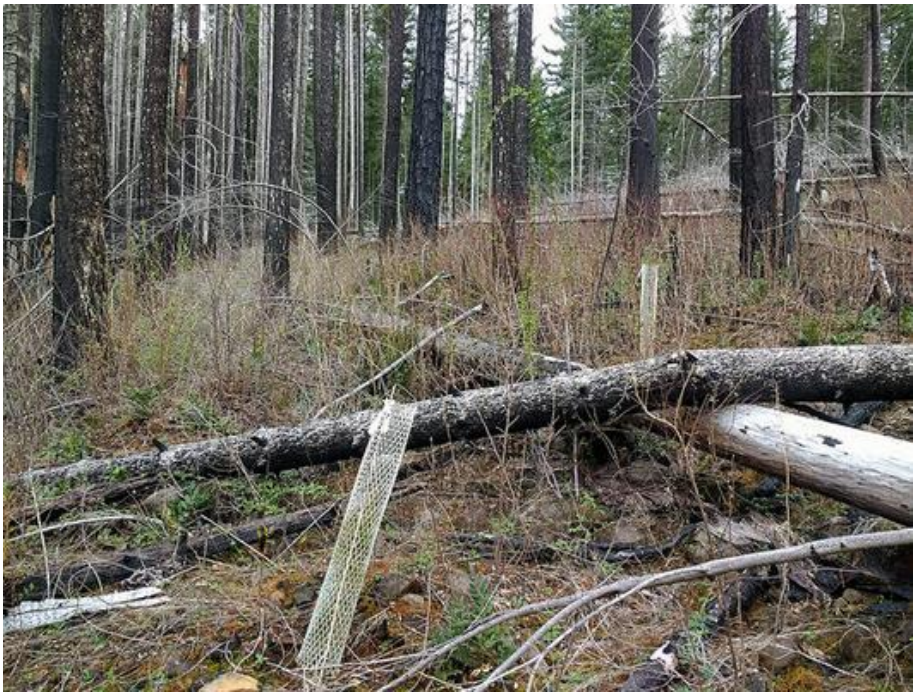
[34] Assessment of Alternative Timber Harvesting Methods on Mountain Beaver (Aplodontia rufa) in the Merritt Forest District: Progress Report 2001. Les W. Gyug, R.P. Bio. Okanagan Wildlife Consulting 3130 Ensign Way Westbank, B.C. V4T 1T9

Applodontia presence in Unit 96: ***45.20358, -122.12456***

STANDS WITHIN THE 36 PIT BURN PERIMETER

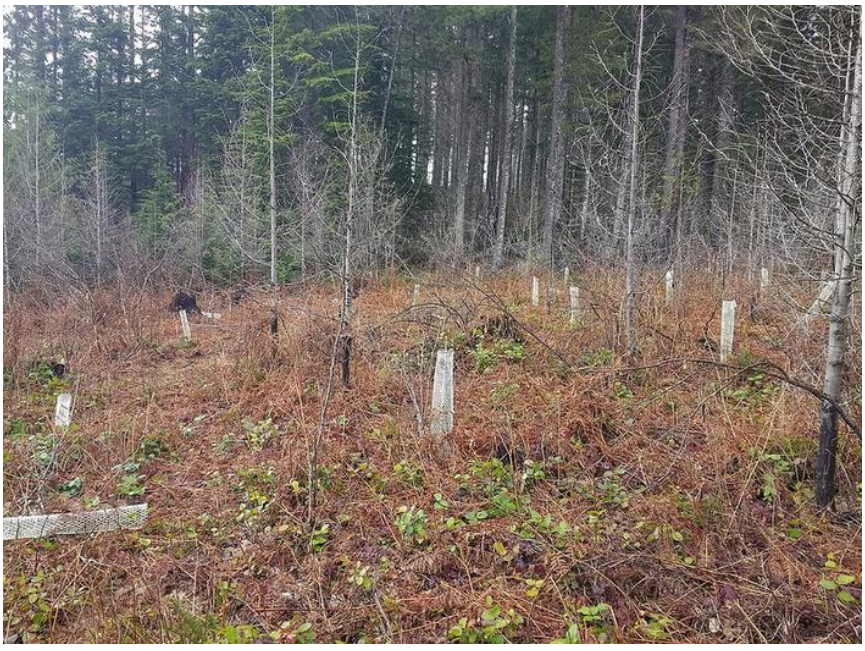
The North Clack Timber Sale includes 985 acres of "young-stand thinning and brushing" (called "seedling release" and "sapling release" on the map). According to the FS, the seedling release units involve cutting brush. Bark is concerned about and requests more information in the PA about what type of active management may occur in the "seedling release" units, as the units we have so far visited include post-fire habitat created by the 36 Pit Fire, and some are in Late-Successional Reserves.

For example, Unit 306 is located within the perimeter of the 36 Pit Fire, and includes recently planted Doug firs, W. Redcedars and W. white pines. Approximately half of these plantings are dead, and mostly surrounded by young shrubs with an overstory of burnt snags, with large amounts of woodpecker foraging sign. There is also some natural seeding that occurred within this unit. **Please provide rationale for doing brushing within these units, much of which have a limited shrub layer to begin with.**



North Clack “Seedling Release” Unit 306

"Seedling Release" Unit 314 is another example where the planted saplings are mostly dead, surrounded by other dead young trees. Is the rationale of this unit to remove all other competing vegetation to promote the survival of the few young trees that are still alive?



North Clack "Seedling Release" Unit 314

While the FS not explicitly indicated that it would pursue post-fire logging, we must still remind you that is well accepted in scientific literature that post-fire logging removes legacy features that help maintain the genetic and species diversity in the areas burned, as well as structural and functional health. In studies of the structures left by high-intensity burns, ecologists have found biodiversity equal to, or surpassing, the biodiversity found in old-growth forest.

Dr. Richard Hutto, one of the nation's top ornithologists, found that: "Besides the growing body of evidence that large, infrequent events are ecologically significant and not out of the range of natural variation, an evolutionary perspective also yields some insight into the 'naturalness' of severely burned forests… The dramatic positive response of so many plant and animal species to severe fire and the absence of such responses to low-severity fire in conifer forests throughout the U.S. West argue strongly against the idea that severe fire is unnatural. The biological uniqueness associated with severe fires could emerge only from a long evolutionary history between a severe-fire environment and the organisms that have become relatively restricted in distribution to such fires. The retention of those unique qualities associated with severely burned forest should, therefore, be of highest importance in management circles".[35]

The current science asserts (and the FS acknowledges) that there are no ecological benefits to "salvage" logging.[36] Since the fire, the high to moderate burn severity areas in the North Clack converted to an early seral forest habitat; habitat that is well recognized for providing a multitude of beneficial functions and processes, such as complex food webs, nutrient cycling, and high structural complexity.[37]

"The ecological cost of salvage logging speaks for itself, and the message is powerful. I am hard pressed to find any other example in wildlife biology where the effect of a particular land-use activity is as close to 100% negative as the typical postfire salvage-logging operation tends to be," concluded Dr. Hutto, Director of the Avian Science Center at the University of Montana.

[35] Hutto, R.L. 2006. Toward meaningful snag-management guidelines for postfire salvage logging in North American conifer forests. Conservation Biology 20(4): 984-993.

[36] Noss, R.F., J.F. Franklin, W. Baker, T. Schoennagel, and P.B. Moyle. 2006a. Ecology and Management of Fire-prone Forests of the Western United States. Society for Conservation Biology Scientific Panel on Fire in Western US Forests, Washington, DC.

Noss, R.F., J.F. Franklin, W.L. Baker, T. Schoennagel, and P.B. Moyle. 2006b. Managing fire-prone forests in the western United States. Frontiers in Ecology and the Environment, 4(9):481-487.

[37] Swanson, M. E., et. al. 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Frontiers in Ecology and Environment: 10.1890/090157

Stands with post-fire logging occurred already along OHV trail #802

The FS should not remove additional trees from stands within or adjacent to those which were already logged post-36 Pit Fire. In these units, hazard trees have already been removed from the proximity of roads and trails, and there is plenty of defensible space for firefighters to operate within, in the event of another fire igniting downslope. The intact stands along OHV trail #802 have experienced a high amount of use by woodpeckers, which is evident on the bark of the snags, and through observations of several species of birds including black-backed woodpeckers.

Bark requests more information in the PA about the "Sapling Release" units proposed with the North Clack project. One such stand, previously thinned Unit 342, included widely spaced residual trees with saplings of five different conifer species growing underneath. How does the FS intend to "release" the saplings?

Sapling Release Unit 342

REGENERATION HARVEST

The North Clack Project includes 255 acres of "regeneration harvest" to "Create Early-Seral Habitat while Providing Forest Products". The Pacific Northwest Research Station Science Findings[38] found that for a number of microclimatic and ecological attributes, as well as public perceptions of scenic beauty, 15-percent green-tree retention resulted in responses to harvest that are not significantly different from those in a clearcut.

After not planning "regeneration harvests" in the District in over a decade, we are concerned that the FS is bringing back so many acres as part of this project. According to the FS, the other recent planned regeneration harvest unit (Hunter #102) was identified because it had many plant indicator species important for deer and elk foraging that may be reduced if the stand's canopy continued to close. The FS also stated that forage has declined in large part due to the continued policy of full fire suppression on the District, as fire is the historic source of forage openings. There has not been an effort by the FS to provide

[38] Green-tree retention in harvest units: Boon or bust for biodiversity, Issue 96, 2007

evidence that increased acres of regeneration logging will result in increased forage across the landscape in North Clack.

Some units Bark surveyed contain mature and legacy trees/snags, as well as other indicators of a healthy stand. In some stands, such as Unit 96, numerous gaps in the canopy already exist, and there is no lack of understory vegetation across the entire unit. "Regeneration harvest" tends to leave few or no snags,[39] and even when logging retains snags, the usual prescription is to have a minimum per acre which can be considerably fewer than needed for cavity-nesting animals, and snags often fall over from wind. As noted above, when snags decay, they provide a long-term nutrient and water supply and their removal obstructs nutrient cycling on the site. As such, this logging will reduce the species richness and key ecological processes associated with early-successional ecosystems.

Natural early-successional forest ecosystems have unique characteristics, including high species diversity, complex food webs and ecosystem processes[40]. Compared to historic conditions (i.e. before industrial-scale logging was common on public lands), this type of habitat is currently lacking on the public forest landscape, mainly because of the decades of fire suppression, and programmatically "salvage" logging of areas where fires do occur and replanted conifers, quickly taking away any early-seral habitat value.

Bark has previously pointed out that logging designed to emulate a natural disturbance (to create early-seral habitat) has a much different effect on soils, water, wildlife habitat, and biodiversity than the disturbance it attempts to step in for. In one case for example, results of current research on streamflow deficits suggests that reported trends of streamflow reduction in recent decades could be caused as much or more by cumulative effects of clearcut logging than by climate change.[41] Furthermore, over 50% of the North Fork is within transient snow zone, resulting in increased risk of landslides because of canopy removal on steep slopes.

As an alternative to clearcutting, we recommend reintroducing fire back into the landscape (as the agency is with the meadow burning prescriptions in this project), which would improve deer & elk forage while also benefiting a host of other species. We encourage the agency to look to existing openings to take

[39] Lindenmayer, DB and McCarthy MA. 2002. Congruence between natural and human forest disturbance: a case study from Australian montane ash forests. Forest Ecol Manag 155: 319–35.
[40] Swanson, M. E., et. al. 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Frontiers in Ecology and Environment: 10.1890/090157
[41] Perry, T.D && Jones, J.A. (2016) Summer streamflow deficits from Regenerating Douglas Fir forests in the Pacific Northwest, USA. Ecohydrology, doi:10.1002/eco.1790.

advantage of what forage opportunities these conditions provide, including identifying additional locations for prescribed burning.

Plantation Unit 96, where "regeneration harvest" is proposed

FORAGE BURN

As mentioned in previous section, Bark supports returning fire to the landscape at the Boyer Creek meadow, and elsewhere, to promote native forage plants and to control non-native plant species which have been present in the meadow for years. This situation and recommended action is written in the North Fork Clackamas Watershed Analysis at 5-7. Bark suggests that the FS takes another look at the watershed to assess if there are additional prescribed burning opportunities to fulfill its Purpose and Need.

Fire has historically been the dominant stand-replacing event that created early-seral habitats within the watershed and, as Bark has previously pointed out, this process has clear benefits when compared to regeneration harvest and other techniques which put a stand at a deficit for dead wood and other components of complex habitat. Focusing on existing openings where conifers have not and may not establish seems to be a great place to start reintroducing fire, along with under-burning in stands which have a low likelihood for a fire reaching the crown.

Depending on the species the FS is targeting in this meadow (to both increase and decrease), the agency should take steps to not inadvertently bring in additional noxious weeds, and to maximize the impact on the species they are

targeting. The Use of Prescribed Fire to Control the Spread of Four Dominant Invasive Plant Species in the Great Lakes Region has some good suggestions for controlling thistle, species of which may be present in the Boyer meadow. The authors found that repeated late spring burns reduced abundance of thistle. Dormant season burns reduced flowerhead, seed production, and relative abundance. Early spring burns may increase cover by increasing sprouting and reproduction. The table below further summarizes resources the authors used to complete their project.

Canada Thistle

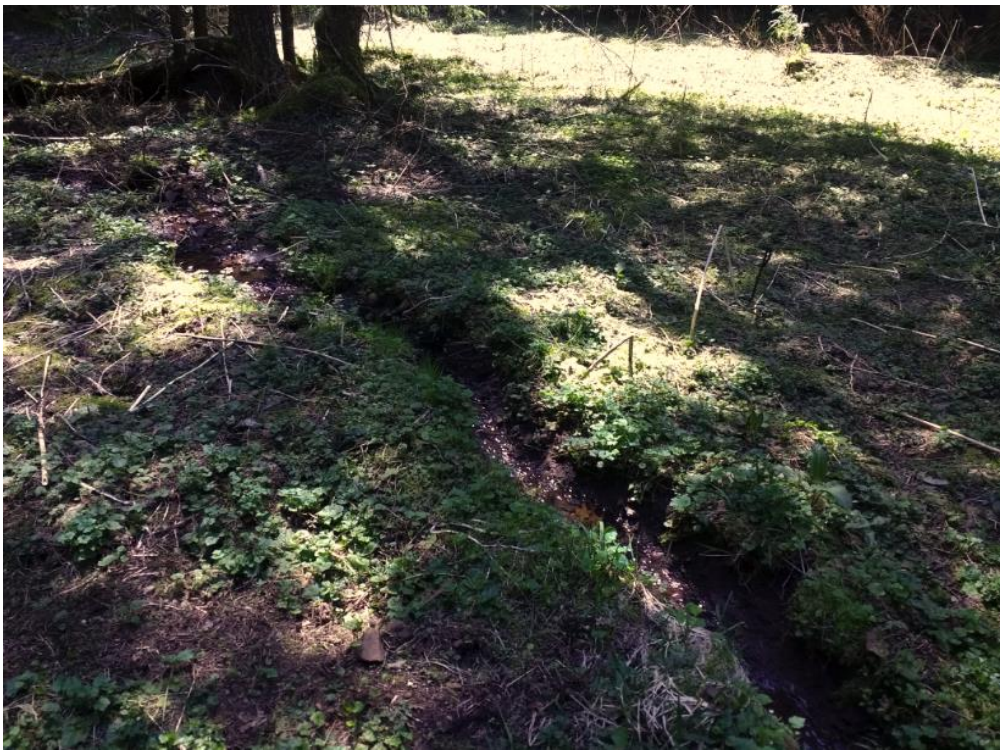
Article	Response to Fire Treatment
First-year response of a Phragmites marsh community to seasonal burning Thompson & Shay, 1988	Summer- INC Fall- INC Spring- NC
Fall-Prescribed Burn and Spring-Applied Herbicide Effects on Canada Thistle Control and Soil seedbank in a northern mixed-grass prairie Travnicek *et al.*, 2005	INC
Canada thistle response to prescribed burning (North Dakota) Smith, 1985	DEC
Fire Ecology and Management in Plant Communities of Malheur National Wildlife Refuge Southeastern Oregon Young, 1987	INC
Frequent Fire Slows Invasion of Ungrazed Tallgrass Prairie by Canada Thistle (Colorado) Morghan *et al.*, 2000	Frequent burns: 1998- DEC 1999- NC Single Burn: 1997-INC
Five Years of Annual Prairie Burns Becker, 1989	DEC
Prairie Fires and Wildlife Kirsch and Kruse, 1973	DEC
Fire and drought experiments in northern wetlands: a climate change analogue Hogenbirk and Wein, 1991	Calmadgrostis meadow: Light burn-INC, Deep burn-INC Salix savannah: Light burn- DEC, Deep burn-DEC

†. DEC = a decrease, INC = an increase, NC = No change. When provided in the article, variables surrounding the treatment are listed along with the responses.

However, if oxeye daisy is present in the meadow, the FS should take extra care to not promote further invasion by this species. Prescribed burning is usually not recommended for controlling oxeye daisy, as fire may increase vulnerability of a site to invasion by exposing bare mineral soil. *See Montana State University Extension, 2017.*

In the Boyer meadow, Bark noted the presence of water running through the unit (both above and below ground), centered around **45.19516, -122.08282** and hitting the old temporary road alignment directly below. Bark has concerns about this temporary road being rebuilt because of the generally wet conditions along it's route and its proximity to Boyer Creek, and recommends that Units 71

and 80 be accessed from above so the road does not need to be rebuilt. We also recommend not using heavy equipment to implement the burn in the meadow.



*Stream running through Boyer Creek meadow at **45.19516, -122.08282***

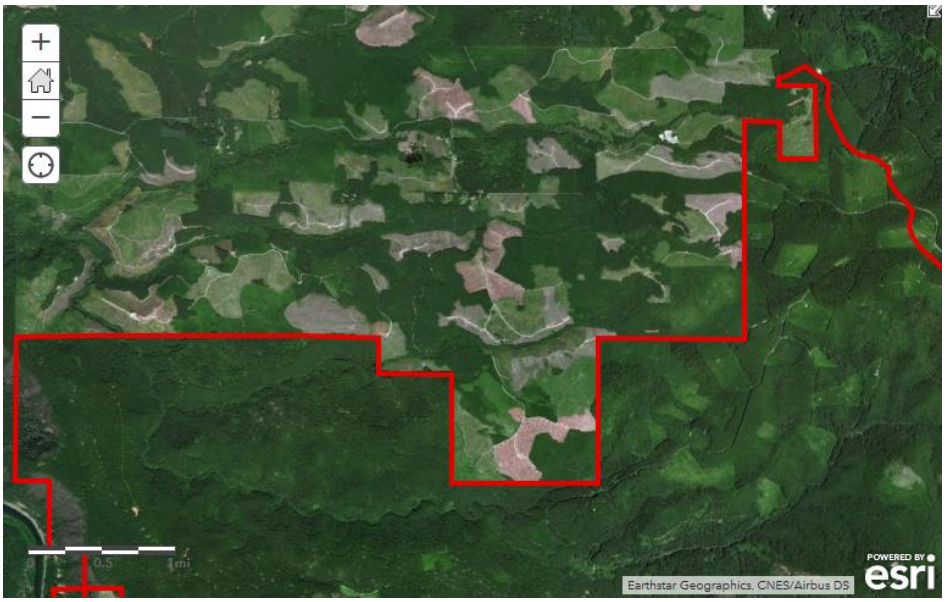
FIRE HAZARD REDUCTION

As part of North Clack, the FS has proposed 150 acres of piling and burning of slash along Road 4610 and northern Forest property lines. MHNF's Strategic Fuel Treatment Placement Plan makes a recommendation for a fuel break along the 4610, but not elsewhere within the watershed. In the PA, Bark would like to see more rationale for the fuel break along the northern Forest boundary (much of which has been recently clearcut on private land), and how it interacts with the Strategic Fuel Treatment Placement Plan.

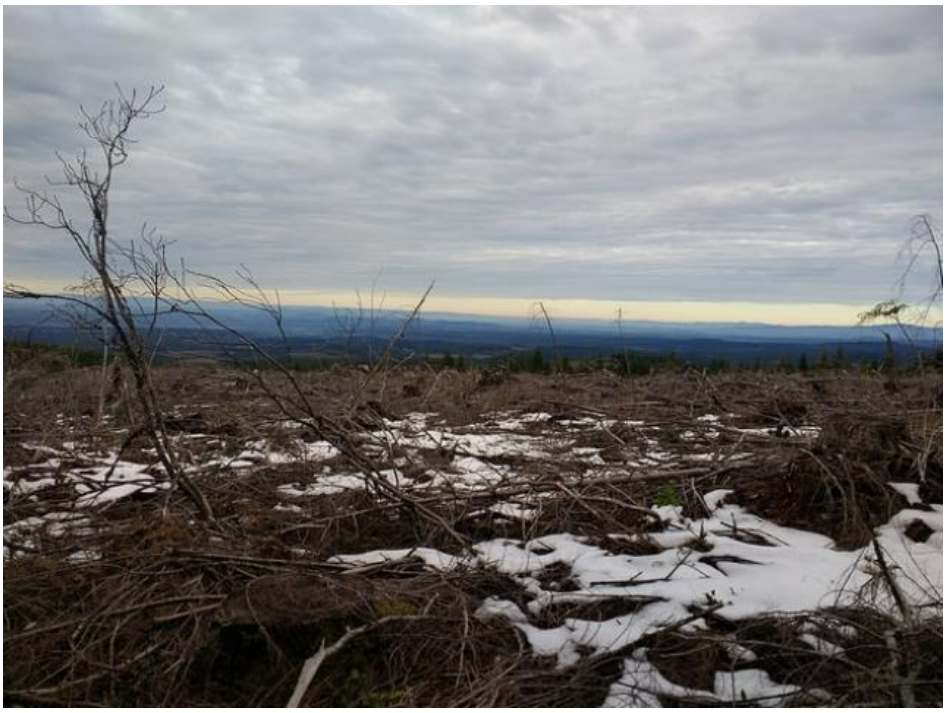
Recent findings suggest intensive plantation forestry characterized by young forests and spatially homogenized fuels, rather than pre-fire biomass, are significant drivers of wildfire severity. This has implications for perceptions of wildfire risk, shared fire management responsibilities, and developing fire resilience for multiple objectives in multi-owner landscapes.[42]

[42] Harold S. J. Zald et al, Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape, Ecological Applications (2018). DOI: 10.1002/eap.1710
https://phys.org/news/2018-04-high-wildfire-severity-young-plantation.html#jCp

The satellite imagery available for the North Clack area shows the amount of clearcut land adjacent to the Forest, however since this imagery was taken there have been additional clearcuts completed and more will surely occur within the timeframe of this project. If a fuel break along the Forest boundary is implemented, FS should coordinate with landowners, so the effort is not duplicated unnecessarily, or made futile by private forest management actions.



Current imagery for the North Clack project's northern boundary with private land



Existing clearcut adjacent to Unit 212 where a fuel break is proposed

SYSTEM ROADS

The FS is proposing to "Maintain and Repair" **70 miles** of FS System Roads, **5.7 miles** of active and passive road decommissioning, **26.2 miles** of road closures, and **1.2 miles** of road-to-trail conversion (the end of the 4611 road).

Bark generally supports and appreciates the emphasis on reducing the road network in the North Clack project area, including the road-to-non-motorized trail conversion. However, Bark has observed a mixed record of MHNF's ability to successfully close and restore roads to a hydrologically stable condition. Because of the current high road density and the certain degradation that existing open, "closed," and new roads will cause, the USFS needs to address this issue in subsequent NEPA analysis. *Sierra Club v. Morton*, 510 F.2d 813, 824 (5th Cir. 1975) (requiring the agency to "disclose the history of success and failure of similar projects"). In addition, the FS cannot rely on closing roads as mitigation for impairment that the North Clack project would cause if implemented.

The Forest Plan specifies that the open road density for large game wintering areas (which encompasses the planning area) must not exceed 1.5-2 miles/miles^2 (B-10 vs. general Winter Range). Bark remains very concerned about both road densities that exceed LRMP levels as well as any planned road construction within areas that already exceed the LRMP levels. Should this

prove true in subsequent NEPA analysis, this project should not go forward as planned because it violates LRMP standards for open road density. 16 U.S.C § 1604(i); 36 C.F.R. § 219.10(e). In the Region 6 2005 Aquatic Restoration Strategy, areas with road densities above 2.0 miles per square mile were considered indicators for prioritizing watershed restoration.

Terrestrial wildlife is also greatly influenced by road density. Roads impact wildlife in a variety of ways including direct mortality from vehicle collisions, increased poaching, over-hunting, and over-trapping facilitated by access; reduced numbers of snags and down logs; increased negative edge effects; facilitated or hindered movement depending on species; and chronic negative interactions with humans.[43]

The Pacific River Council's (PRC) recommended target road density of less 1.5 miles per square mile in 6th field watersheds is an additional example of a robust, science-based target for watershed restoration in MHNF. PRC published these management recommendations after they were reviewed and contributed to by the Western Environmental Law Center, Friends of Mount Hood, Oregon Wild, Crag Law Center, the Columbia River Inter-Tribal Fisheries Commission, Clackamas River Providers, Oregon Trout Unlimited, Bark and several others.

Given that the FS is considering changes to a number of miles of roads within the North Clack project area, and given the large geographic scale of this project, the FS has recognized that it must consider its Travel Analysis Report (TAR) for the Forest, and identify the Minimum Road System (MRS).[44]

In 2015, the FS released its TAR, a synthesis of past analyses and recommendations for project-level decisions regarding changes in road maintenance levels. Included in this report was a list of roads "not likely needed", with the objective maintenance level being "D-decommission".

Recent project analyses have failed to discuss the need for a minimum road system, much less assess what the minimum road system for the project areas might look like or whether the proposed road related actions work towards that minimum road system. To identify the minimum road system, the FS must consider whether each road segment the agency decides to maintain on the system is needed to meet certain factors outlined in the agency's own

[43] Wisdom MJ, Holthausen RS, Wales BC, et al. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Volume 1 – Overview. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station. General Technical Report PNW-GTR-485.

[44] 36 C.F.R. § 212.5(b)(1) ("For each national forest . . . the responsible official must identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands.").

regulation.[45] Here, the FS should consider whether each segment of the road system within the project area is needed to:

- Meet resource and other management objectives adopted in the relevant land and resource management plan;
- Meet applicable statutory and regulatory requirements;
- Reflect long-term funding expectations; and
- Ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

In assessing specific road segments, the FS should also consider the risks and benefits of each road as analyzed in the travel analysis report, and whether the proposed road management measures are consistent with the recommendations from the travel analysis report. To the extent that the final decision in this project differs from what is recommended in the travel analysis report, the FS must explain that inconsistency. *See, e.g.*, *Smiley v. Citibank*, 517 U.S. 735 (1996).

Bark commends the FS for starting this work through the release of the roads table on the North Clack project page. This is a great way for the public to see which roads are "Needed" or "Not Needed" according to the TAR, as well as where the information gaps reside.

Road surface as a vector for sediment

Elevated road use for log-haul greatly increases erosion and sediment delivery on unpaved roads. Research on logging roads has consistently documented that roads used by more than four logging trucks per day generated more than seven times the sediment generated from roads with less use and more than 100 times the sediment from abandoned roads.[46] The FS's own summary of scientific information on roads[47] concluded that "rates of sediment delivery from unpaved roads are . . . closely correlated to traffic volume." Even with a road surface of

[45] 36 C.F.R. § 212.5(b)(1). *See also* Attachment A ("analyze the proposed action and alternatives in terms of whether, per 36 CFR 212.5(b)(1), the resulting [road] system is needed"); ("The resulting decision [in a site-specific project] identifies the [minimum road system] and unneeded roads for each subwatershed or larger scale").
[46] Reid, L.M., Dunne, T., and C.J. Cederholm, 1981. Application of sediment budget studies to the evaluation of logging road impact. J. Hydrol (NZ), 29: 49-62.
[47] Gucinski, H., M.J. Furniss, R.R. Ziemer, and M.H. Brookes. 2001. Forest roads: a synthesis of scientific information. General Technical Report PNW-GTR-509. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 103 p. Available online at: http://www.fs.fed.us/eng/road_mgt/science.pdf

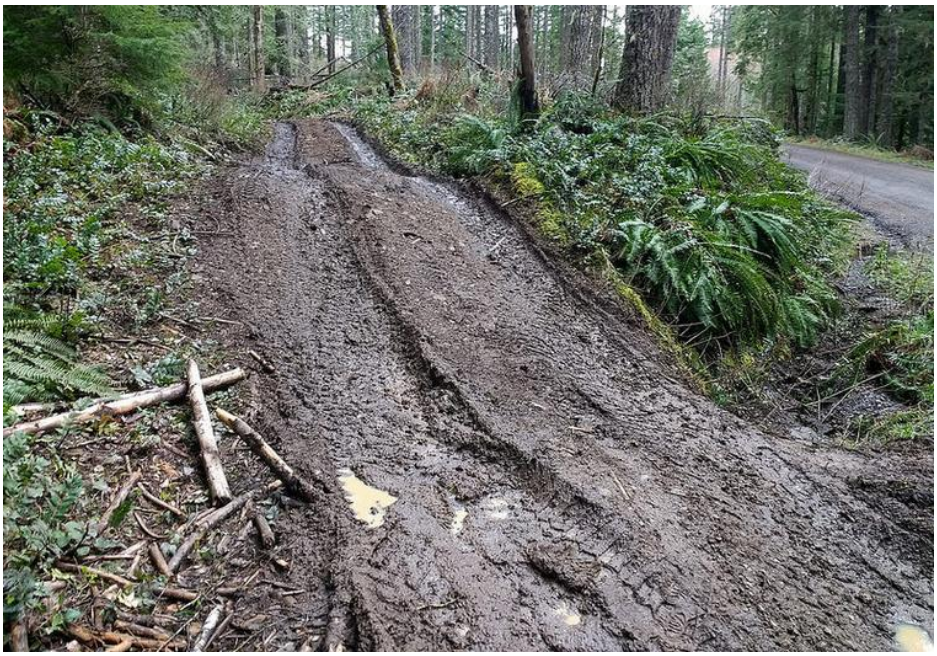
crushed rock aggregate,[48] documented that elevated truck traffic increased sediment production by 2 to 25 times that on unused roads in western Oregon.

Primary mechanisms for increased erosion and sediment production from road use are the production of highly mobile fine sediment on road surfaces, road prism damage, disruption of gravel or aggregate surfaces, and rutting. On constructed and reconstructed roads, the highly elevated sediment production from roads used for haul is delivered to streams at stream crossings and other points of connectivity between streams and roads, such as gullies and relief drainage features that dump elevated road runoff laden with sediment to areas in relatively close proximity (e.g., less than 300 feet) to streams. This impact of log hauling at stream crossings, alone, will greatly elevate sediment delivery to the stream system. **The North Clack PA should include data regarding the projected increase of sediment from log haul on <u>all</u> roads used.** If it is likely that sediment would increase from wet-weather hauling (an action which has occurred in recent projects on the CRRD) the FS should also include these projections in the PA.

SITE SPECIFIC SYSTEM ROADS COMMENTS

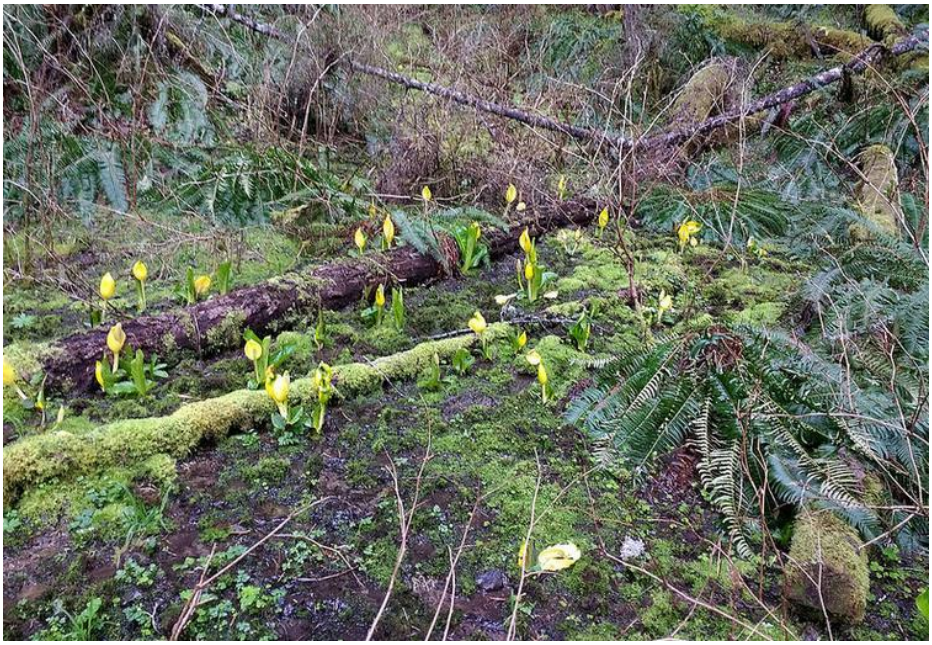
The Scoping map shows the 4610-022 road as "Already Closed". However, no actual closure exists for this road, which is easily accessed from the 4610. Thankfully, the full road has not been used for quite some time, as it crosses a sensitive riparian area before entering proposed North Clack Unit 90. Given the intersection with this riparian area, and the proximity to other unauthorized routes (elaborated on later in these comments) this portion of the road should absolutely not be used for log haul, and instead be effectively blocked so illegal use of the road does not continue.

[48] Foltz, R.B. and Burroughs, E.R., Jr. 1990. Sediment production from forest roads with wheel ruts. In: Proceedings from Watershed Planning and Analysis in Action. Symposium Proceedings of IR Conference, Watershed Mgt, IR Div, American Society of Civil Engineers, Durango, CO, July 9-11, 1990. pp. 266-275.

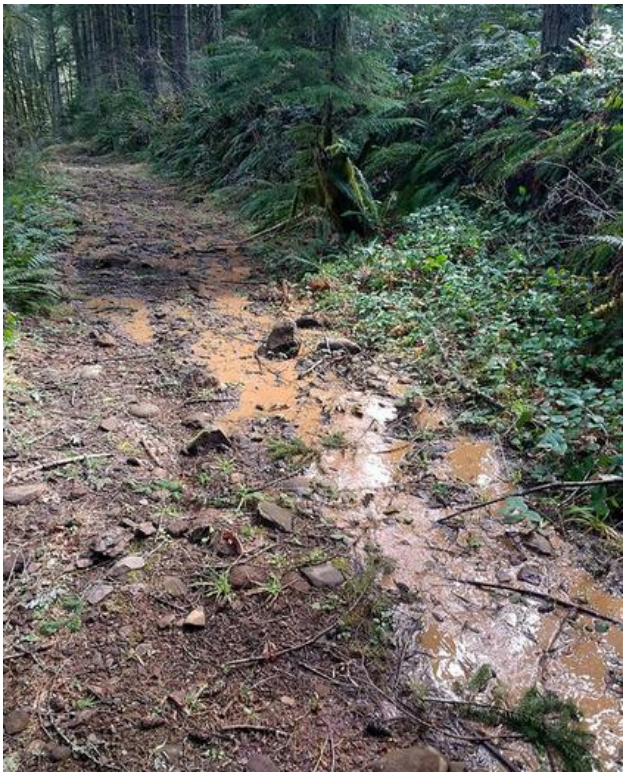


Entrance to road 4610-022, accessing Unit 90

Riparian intersection with 4610-022, accessing Unit 90 (above and below)

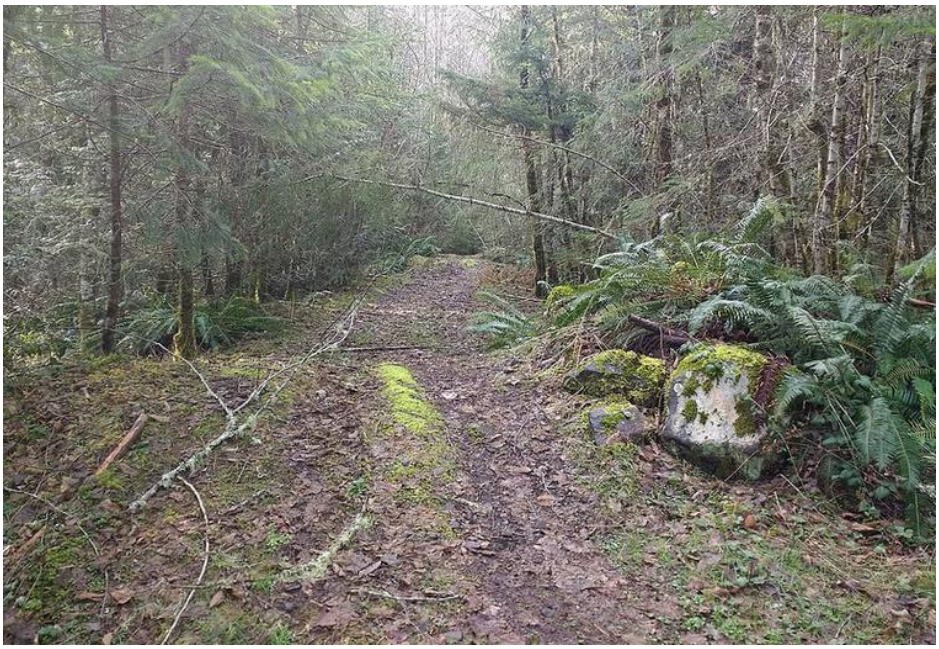


The 4610-011 past the converted OHV trail #800 is fully decommissioned and drops off steeply into Unit 6 (elaborated on in another section of these comments), above the North Fork Clackamas River. The slope down to Units 4 and 6 are very steep, wet and rocky to allow any ground-based logging off this temporary road. Even cable logging off the road, which would need to be rebuilt, would cause impacts to unstable and wet soils surrounding the road, and provide direct access by OHV users riding the #800 trail to sensitive habitat and terrain in Unit 6. Before the road becomes decommissioned at the boundary between Units 4 and 6, there is a significant amount of uncontrolled erosion occurring, bringing sediment laden water down the road. Bark recommends bringing the end of this road up to where it meets the #800 trail by decommissioning everything to the north of this junction and allowing no road rebuilding or log haul on the already decommissioned portion of the road.



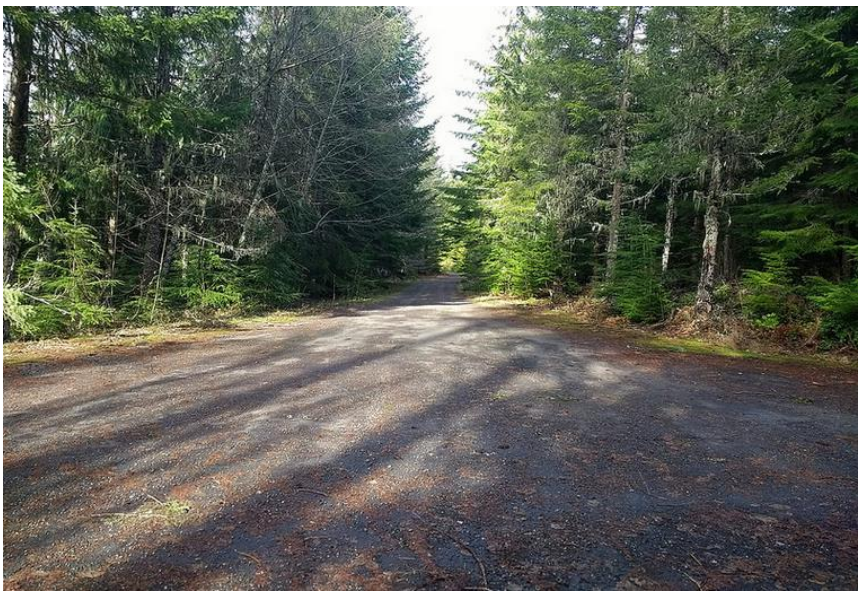
*Erosion occurring on 4610-011 at **45.22526, -122.21807***

An unnamed but mapped system road at **45.20940, -122.15150** that is labeled on the scoping roads map as “Already Closed” has been breached and currently accesses Unit 140. We recommend fully decommissioning this road to ensure that this road closure is not repeatedly breached again.



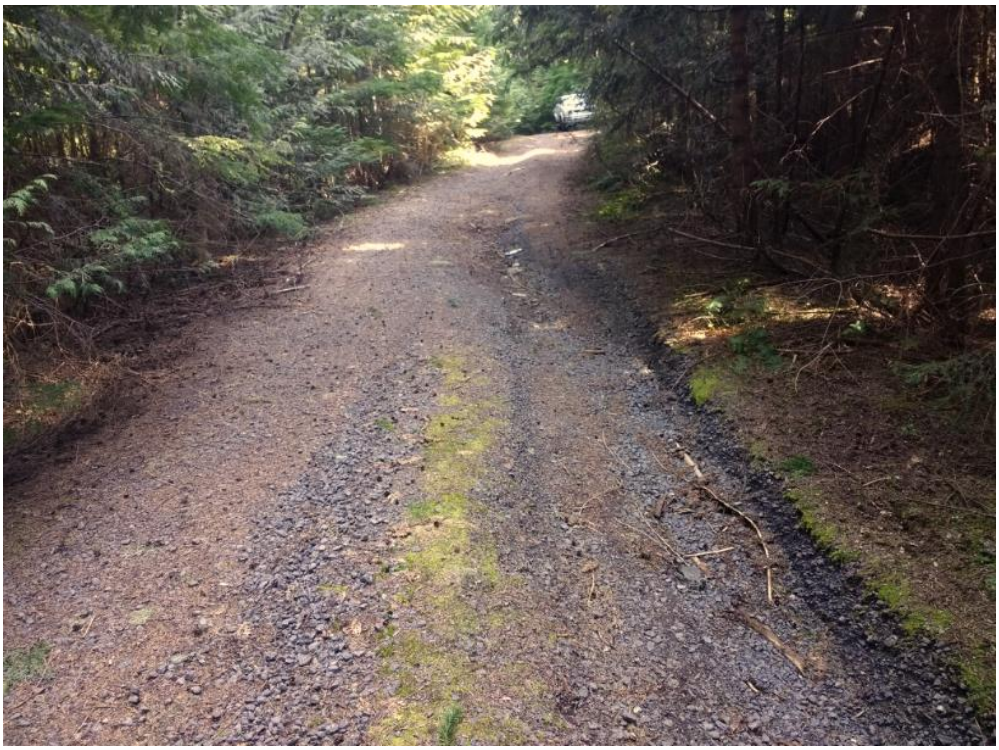
*Breached "closed" unnamed but mapped system road at **45.20940, -122.15150***

Bark noted that the "closed" road 4613-160 was not bermed or otherwise bermed at all, even though its represented as "Already Closed" on the scoping map. We recommend correcting this error in the database and adding this road closure to the Proposed Action of the North Clack project.



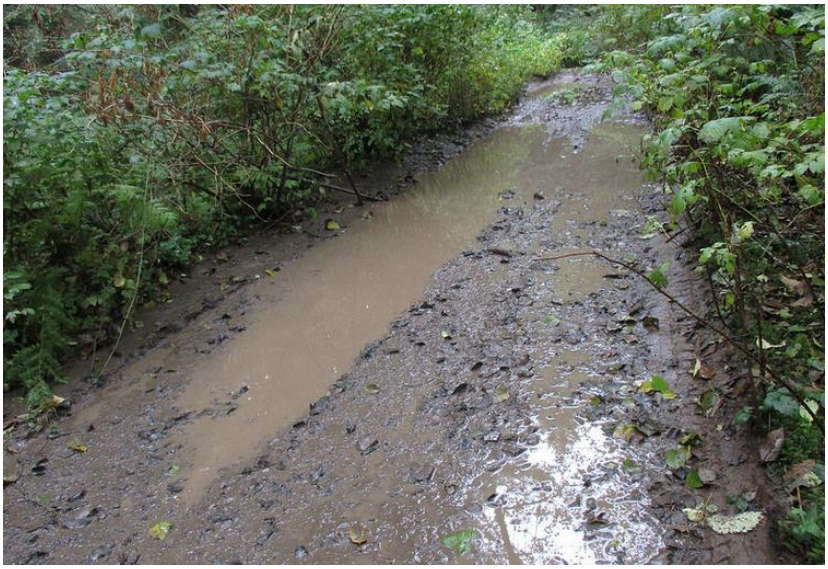
"Closed" road 4613-160

Bark has also observed gully erosion occurring along the 4613-130 at **45.22937, -122.12789** adjacent to Unit 202. We recommend addressing this road issue through the use of waterbars after the road is closed at its intersection with the 4613 road.



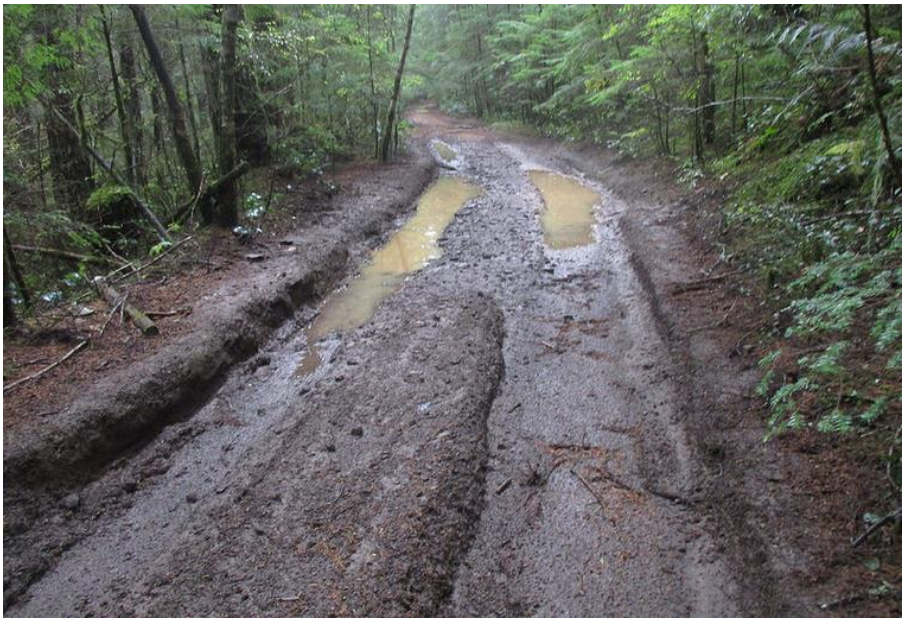
*Gully erosion along the 4613-130 road at **45.22937, -122.12789***

Bark strongly supports decommissioning the southern end of Road 4613-130 from the 4613 to where it crosses Whisky Creek and beyond. This part of the road goes through poorly-drained soils where water pools and runs down the muddy road, and the culvert itself is aging and beginning to become undercut. Since the road is a loop off the 4613, the southern entrance is redundant and cuts off aquatic habitat at Whisky Creek.



Southern entrance to FSR 4613-130 from 4613 (above) leading to Whisky Creek crossing (below)

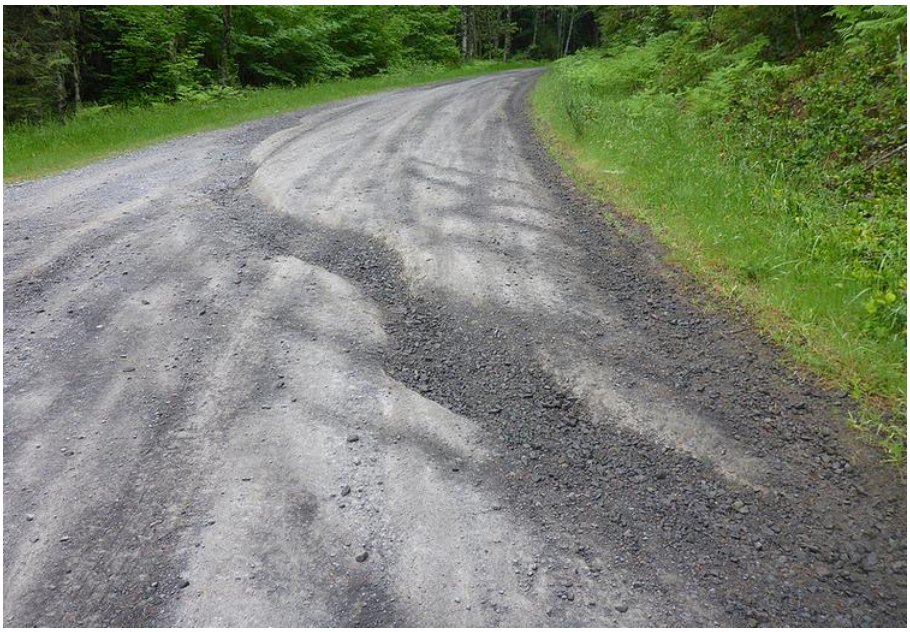
Just north of the 4613-130 Whisky Creek crossing, FSR 4613-016 runs to the southwest and terminates at a deteriorating stream crossing which is actively dumping sediment into the upper reaches of a tributary of Whisky Creek. Across from the crossing is an unauthorized trail which leaves the Forest to an unknown location. The area is surrounded by toilet paper, bullet casings, and other trash. The 4613-016 does not access much else than this illegal trail, stream impacts, and garbage. Because the situation requires active response, Bark recommends decommissioning this road from the junction with 4613-130 to it's terminus at this failing stream crossing.



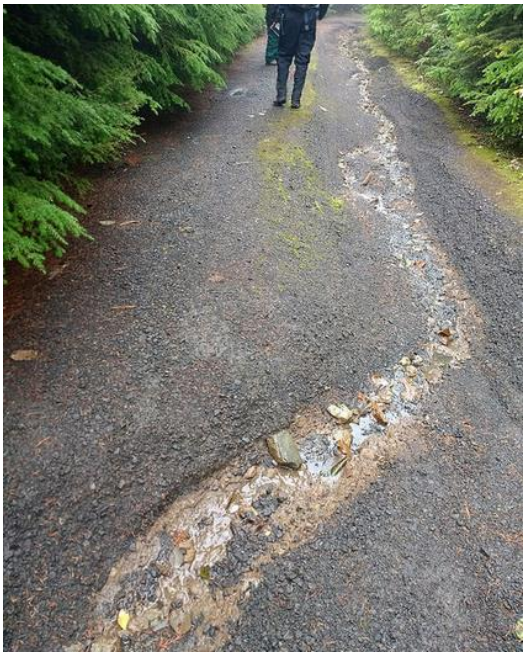
FSR 4613-016 muddy road conditions (above) leading to deteriorating stream crossing at Whisky Creek tributary (below)

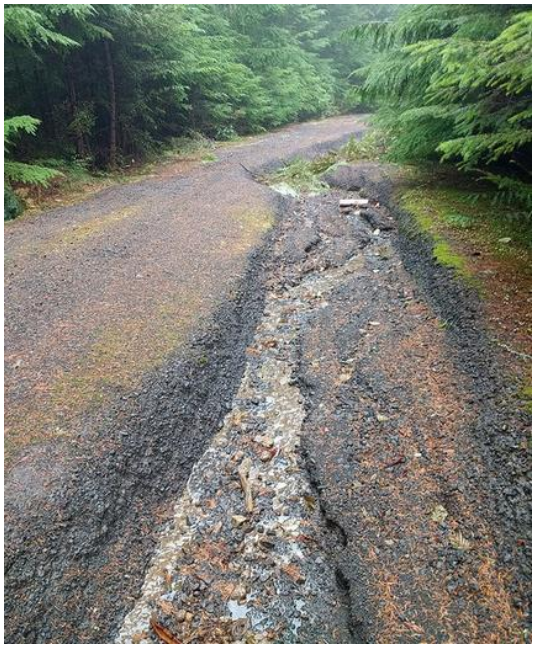
Within the North Clack project area there are several system routes which are experiencing significant hydrologic issues, including uncontrolled gully erosion extending for long stretches along the roadbeds. Bark recommends that the FS take steps to think long-term about these occurrences while designing erosion control measures on them to prevent damage to terrestrial and aquatic habitats. There may be some instances where out-sloping waterbar placement may not be

enough to prevent this kind of damage, and in these instances the FS should consider active decommissioning as an option.



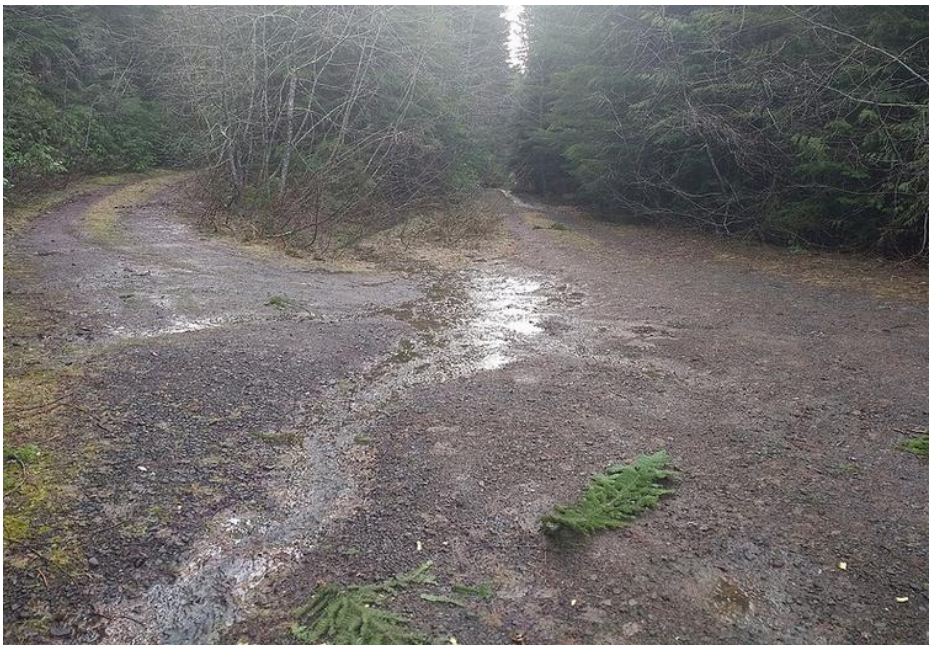
Uncontrolled gully erosion on 4613 near Whisky Creek and adjacent to Unit 176 (above), and on 4613-140 (below)



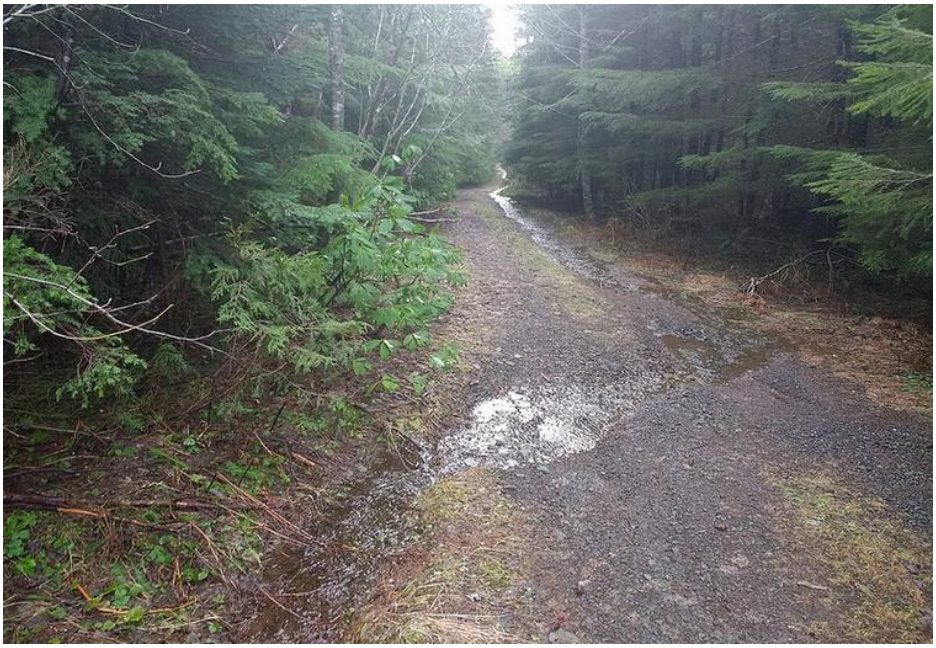


The 4614-160 at its intersection with the 4614-150 is experiencing gully erosion where water originating from the east side of the road junction is running across both roads and for a long distance down the 4614-160 as it runs parallel to Fall

Creek. These roads are proposed to be closed with the North Clack Proposed Action, however if no action is taken to address this erosion issue it will continue, or simply form again if the road is re-graded. Bark recommends decommissioning these roads, starting just before the 4614-150 Fall creek crossing.



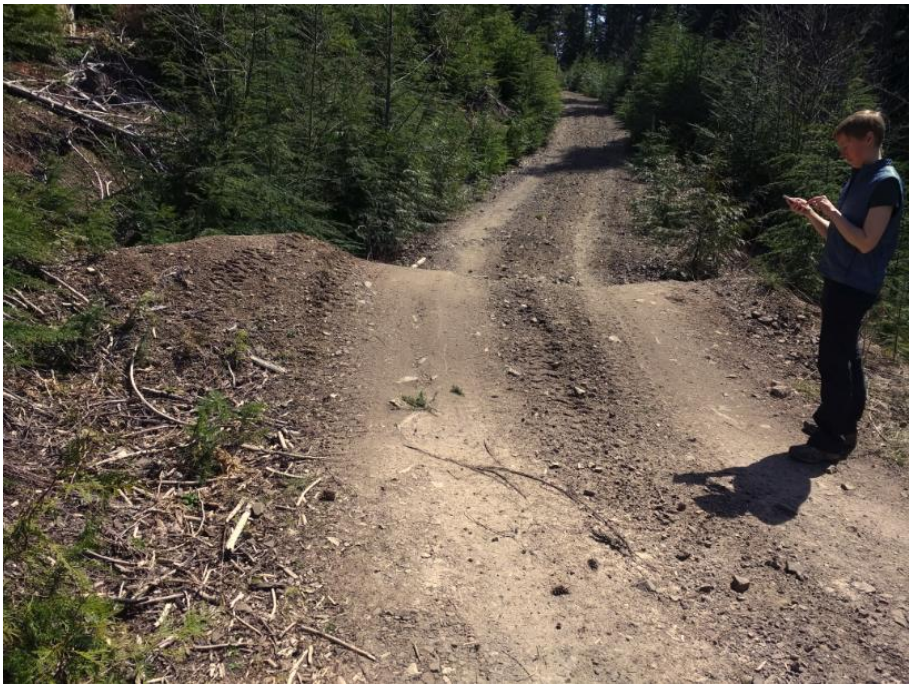
Gully erosion at junction of 4614-150 and 4614-160 (above and below)



In the last two projects Bark has visited post-logging, “closures” where there was an existing metal gate or barricade present consisted of simply laying the old barricade across the road. We saw this with the FS present on the 6311-130 road accessing the Bass Timber Sale, and again on the 4640-130 accessing the Mag Timber Sale. There is currently a broken gate present on the 4614-120, which is proposed to be “closed” with North Clack. If this closure is to be implemented via gate or other barricade other than a berm, we recommend removing the broken gate and using a different object to accomplish this task.

Existing broken gate on the 4614-120

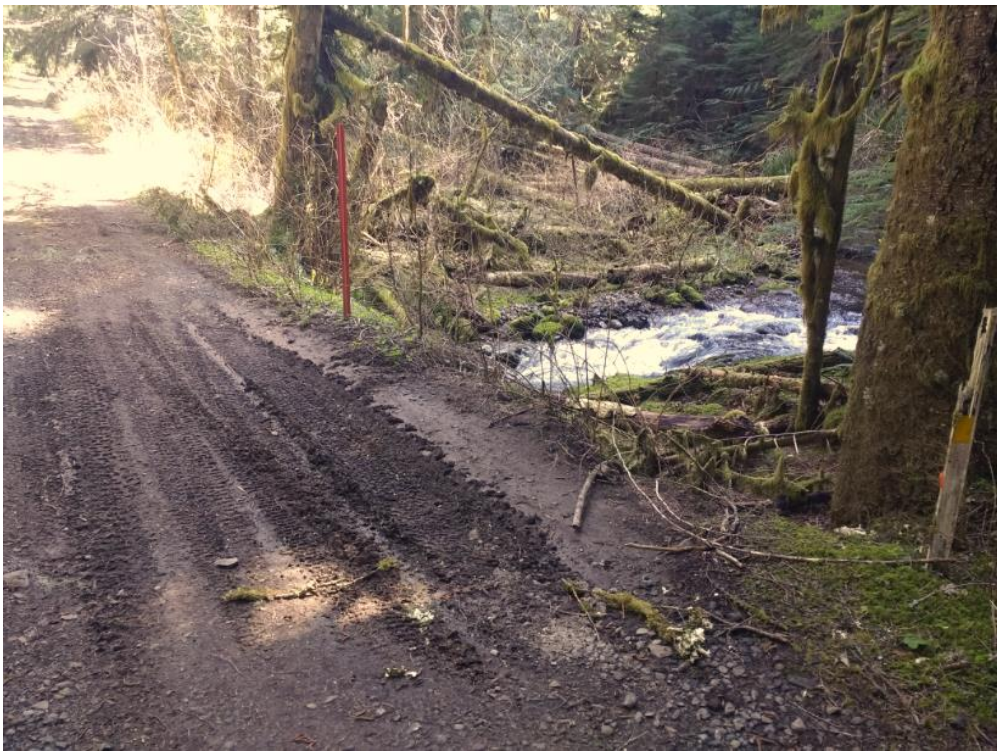
On the 4610-155 shortly after it enters North Clack Unit 342, an existing berm has been repeatedly driven over in order to access the unit. Along with effectively closing this road post-project implementation, Bark recommends that the FS investigate this route to find out what resources the vehicles are accessing and what ecological damage has been caused. This way additional proposed actions to address any damage done here.



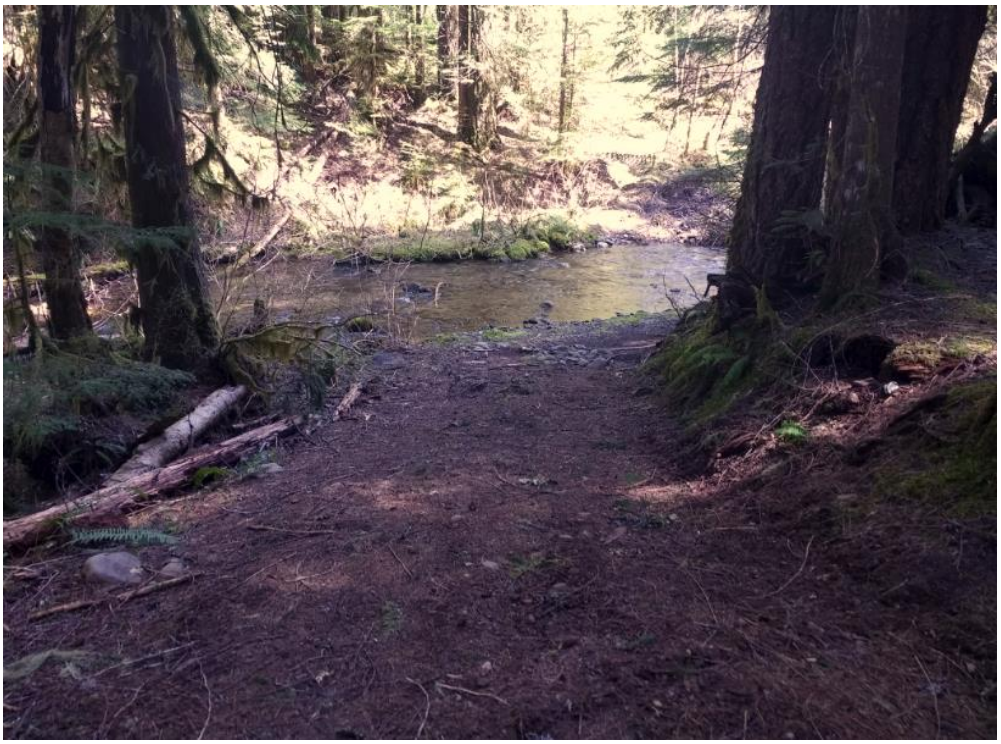
Berm on 4610-155 shortly after it enters North Clack Unit 342

Road 4610-150 where it crosses the North Fork Clackamas River no longer has a standing bridge and the road is overgrown on the north bank of the river. Because of the lack of existing crossing and its overgrown nature of the north bank, Bark supports the action of classifying this road as decommissioned.

Bark has concerns about the existing bridge over the North Fork Clackamas River where the 4610-153 enters private property, which is in poor shape and could be a safety hazard. Bark has recently observed that folks may be avoiding the bridge by driving directly through the North Fork, damaging the banks. Furthermore, we're curious about the FS's long-term plan for the 4610-153, which has several deteriorating stream crossings which are dumping sediment, and long sections of gully erosion. If there is not a requirement to permanently keep the access to the inholding, we'd suggest actively decommissioning this road.

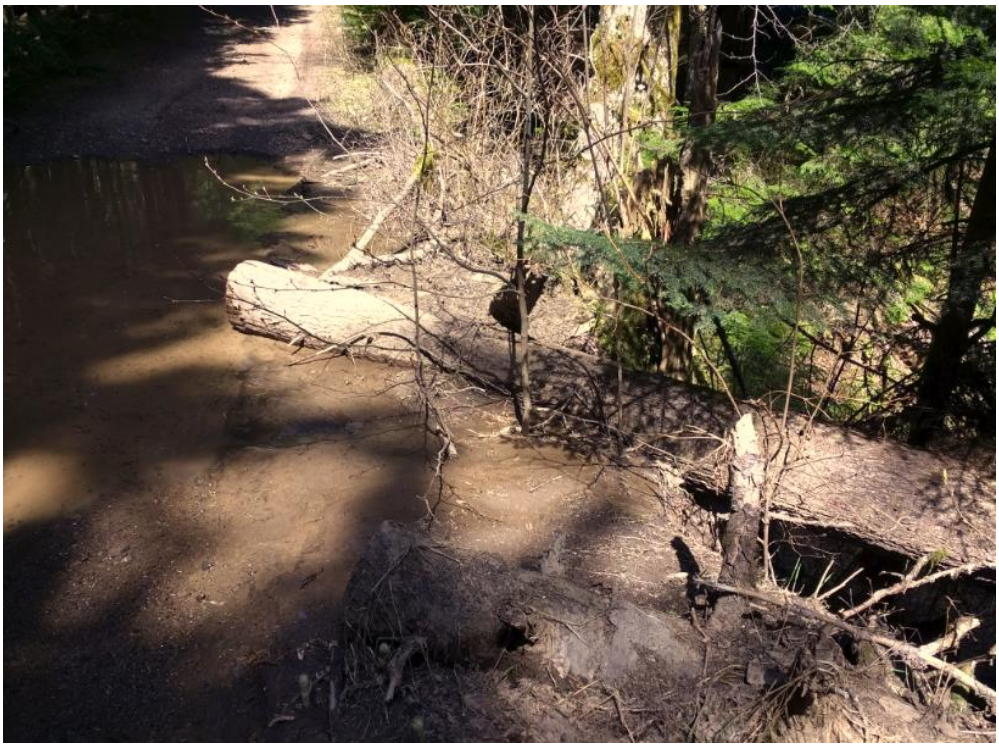


Existing bridge over the North Fork Clackamas River where the 4610-153 enters private property



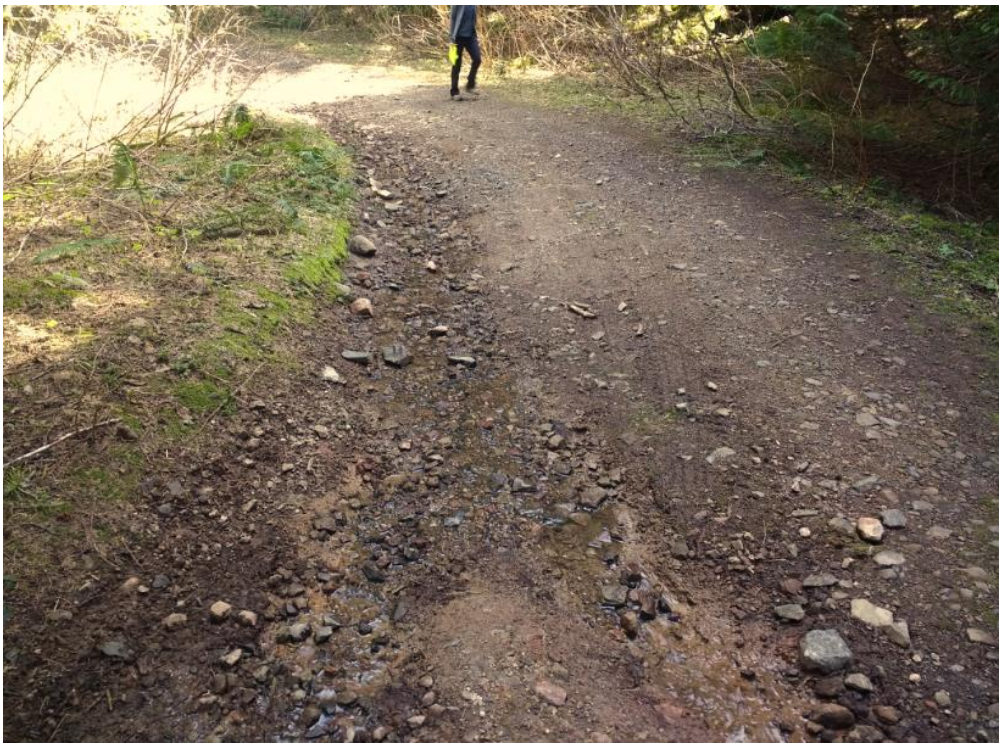
Route circumventing existing 4610-153 bridge over the North Fork Clackamas River, directly entering river and exiting on the opposite side.

At the stream crossing on the 4610-153 at **45.21547, -122.10041**, Bark noted a slump in the road with mud actively running into the tributary of the North Fork Clackamas. If this road is no longer needed to access the private inholding at the end of the road, Bark recommends decommissioning this road at its intersection with the 4610, and ripping out the culverts, to address this and other stream crossing issues.

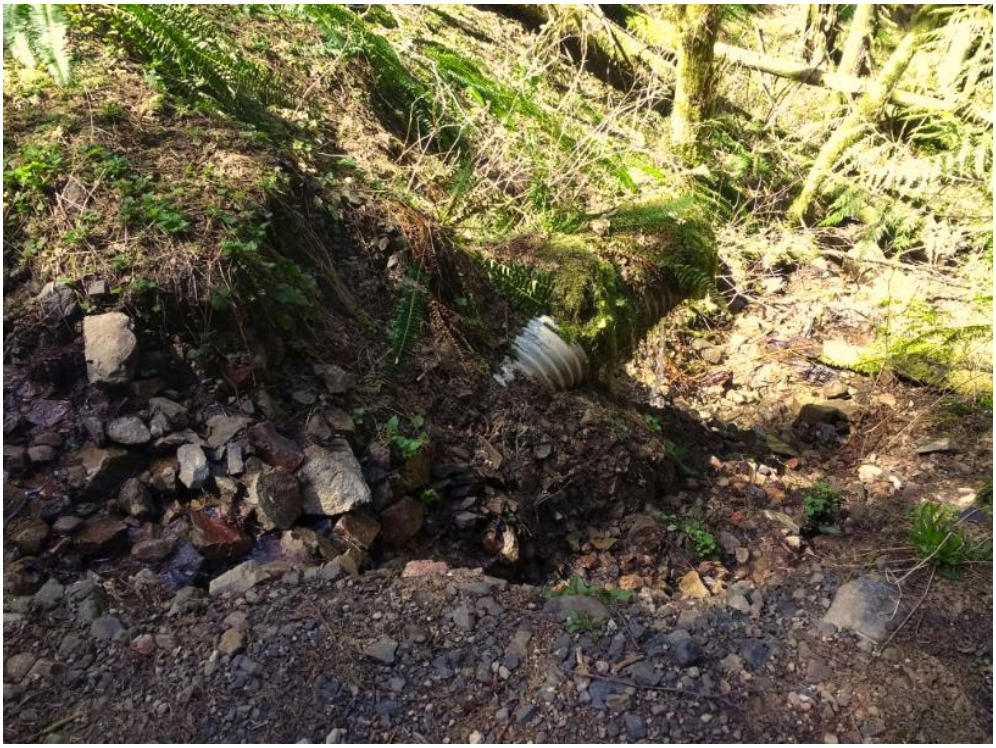


*Stream crossing on the 4610-153 at **45.21547, -122.10041***

One such additional stream crossing issue exists at the 4610-153 crossing with a tributary to the North Fork at **45.21957, -122.08980.** A seep which starts at **45.21958, -122.09056** feeds a water-filled gully which runs down the road and terminates at the crossing, where it has completely gouged out the road around the culvert and feeds directly into the stream. Bark recommends addressing this issue immediately, and in the long-term removing this culvert may be the best way to move forward with protecting aquatic habitat in this area. Road gullies exist in other places along this road, including one which is actively dumping road fill into Unit 130 at **45.21985, -122.08988** and sending it down towards the creek.



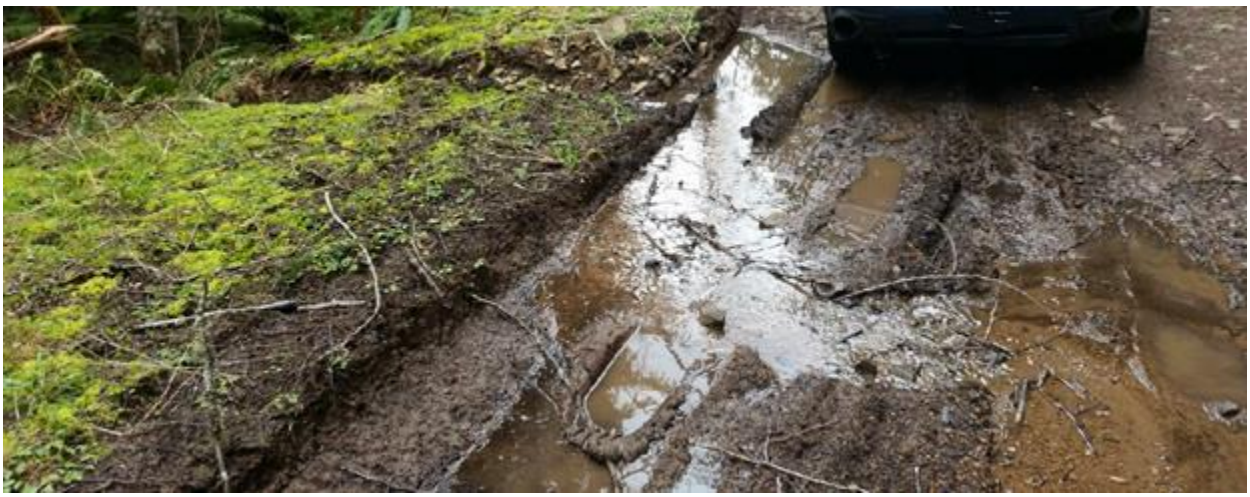
*Water-filled gully which runs down the 4610-153 road and terminates at stream crossing, fed by seep at **45.21958, -122.09056***



*Failed culvert at 4610-153 with a tributary to the North Fork at **45.21957, -122.08980***

The 4613-200 appears to not be needed beyond the junction with the 4613-205, due to its redundancy in access to surrounding forest (by 4613-013 and 4613-140). The 4613-013 parallels the -200 uphill where access for active forest management would be better, along with access from the 4613-140. Because of this and its proximity to the North Fork, Bark recommends that the 4613-200 be actively decommissioned.

The North Clack project includes one road to trail conversion – extending existing #*521* hiking trail to Huxley Lake. Bark supports this action, as it will hopefully reduce the amount of unauthorized motorized activity surrounding the trail and save the FS money that they would otherwise spend repairing and maintaining the end of the 4611 road, which is in poor shape and barely drivable by most passenger vehicles. The road itself includes several hydrologic issues including at **45.18027778, -122.07888889** where the road is crossed by a significant amount of water which is transporting mud off the road surface downslope. 4611-026, at the terminus of 4611 is surrounded by Wilderness and should be permanently taken off the system.



Road 4611 at 45.18027778, -122.07888889

TEMPORARY ROADS

Bark does not support the amount of temporary roadbuilding the agency states is required to achieve their Purpose and Need in the North Clack project area. The very first aquatic recommendation of the North Fork Clackamas Watershed Analysis on 5-1 is to "Avoid New Roads", with a further recommendation on 5-2 to "allow no new roads or motorized trails through riparian reserves". 19.1 miles is more mileage than Bark has seen proposed by the District in one project, and

as the agency is well aware, these roads are vectors for stream sediment, illegal activity, disruption of wildlife, noxious weeds, and more.

As in past projects, the FS is planning to re-use previously decommissioned roads, and since many of these roads have been passively decommissioned, the agency will likely claim it will be achieving a net reduction in road density after the project when these roads are "rehabilitated". Bark has long suggested that, while this approach appears good on paper, it is not what always happens on the ground. For example, in Bark's monitoring of the implementation of the Bass, Drum, and Mag timber sales, we have found many roads that were not properly winterized and/or closed after the work had been complete. This information was previously shared with the FS. The problem is so systemic that when NMFS assessed the Jazz Timber Sale, it estimated that "…approximately 21% of the roads may not be decommissioned after project completion". *Jazz LOC at 25*. This does not provide much assurance that the FS will, in fact, follow-through with the road work these projects require.

It is well-documented that road construction vastly elevates erosion for many years, particularly in the first two years when the construction causes a persistent increase in erosion relative to areas in a natural condition. [49],[50],[51]. Specifically, major reconstruction of unused roads can increase erosion for several years and potentially reverse reductions in sediment yields that occurred with non-use. *Id.*

Available scientific information shows that reconstruction of closed and abandoned roads, could persistently elevate erosion and sediment delivery in several ways. Reconstructed roads cause elevated erosion and sediment for many years after decommissioning.[52] The USFS Region 5 method for estimating cumulative watershed effects indicates that even 10 years after road decommissioning, a mile of decommissioned road is equivalent to 0.2 miles of new road in terms of adverse cumulative effects.[53] After 50 years, a mile of

[49] Potyondy, J.P., Cole, G.F., Megahan, W.F., 1991. A procedure for estimating sediment yields from forested watersheds. Proceedings: Fifth Federal Interagency Sedimentation Conf., pp. 12-46 to 12-54, Federal Energy Regulatory Comm., Washington, D.C.

[50] Rhodes, J.J., McCullough, D.A., and Espinosa Jr., F.A., 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Tech. Rept. 94-4, Portland, Or.

[51] Beschta, R.L., Rhodes, J.J., Kauffman, J.B., Gresswell, R.E, Minshall, G.W., Karr, J.R, Perry, D.A., Hauer, F.R., and Frissell, C.A., 2004. Postfire Management on Forested Public Lands of the Western USA. Cons. Bio., 18: 957-967.

[52] Id.

[53] Menning, K. M., D. C. Erman, K. N. Johnson, and J. Sessions, 1996. Aquatic and riparian systems, cumulative watershed effects, and limitations to watershed disturbance. Sierra Nevada Ecosystem Project: Final Report to Congress, Addendum, pp. 33-52. Wildland Resources Center Report No. 39, Centers for Water and Wildland Resources, University of California, Davis.

obliterated road has still has impacts equivalent to 0.1 mile of new road. Thus, as it is apparent that decommissioning will not instantaneously eliminate the persistent impacts of roads on erosion and sediment delivery, building these roads will likely have adverse impacts to the aquatic and terrestrial environment.

Road construction is by far the greatest contributor of sediment to aquatic habitats of any management activity.[54],[55] Even temporary road construction can cause resource damage including erosion and sedimentation, exotic species spread and disruption of wildlife.[56] Unpaved roads and stream crossings are the major source of erosion from forest lands contributing up to 90% of the total sediment production from forestry operations.

We provide the following road-related recommendation for this project based on a recent synthesis of science relating to implementation of the Aquatic Conservation Strategy: *Prohibit the construction of new permanent and "temporary" roads, except in limited instances were construction of a short segment of new road is coupled with and necessary for the decommissioning of longer and more damaging segments of existing road.*[57]

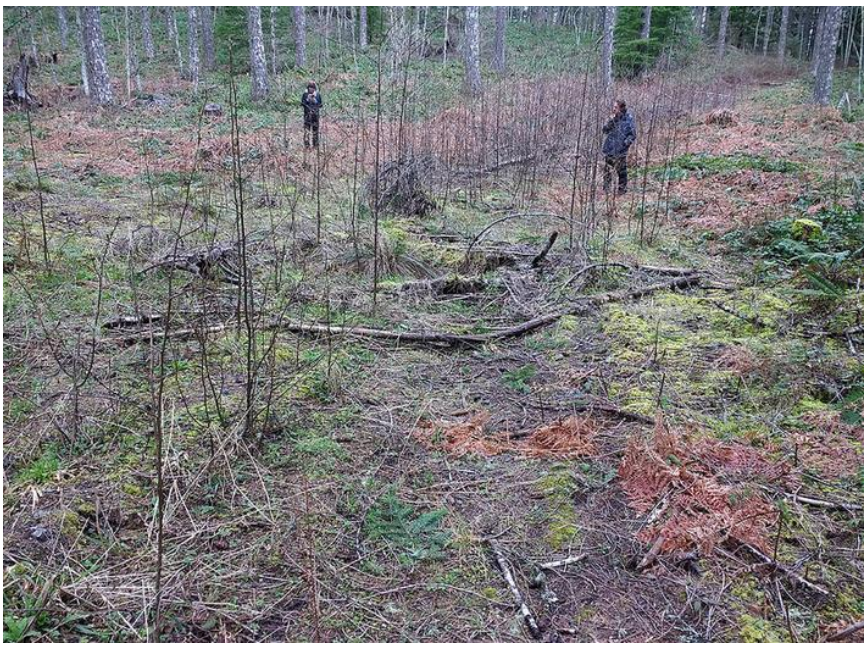
Bark recognized the "existing" temporary road into North Clack Unit 89 as originally accessing No Whisky Unit 21. The following observations and recommendations are copied from a 2013 FS BMP monitoring form:

"Problem: Temporary road was to have been obliterated. The road was not decompacted and had an inadequate amount of waterbars constructed, improperly constructed waterbars, and an inadequate amount of ground cover applied, although some piles of slash were placed at numerous places. The sale administrator failed to notify the contractor that the contract requirements were not met prior to the final approval of the sale.…

….Problem: Sale Administrator was not available when unit was completed.
Adaptive management action: Provide adequate Sale Administration staffing for workload, so that coverage is available when the assigned Sale Administrator is not working. (The district had two additional sale inspectors for 2013 summer workload).
-Tighter enforcement of sale contract provisions

[54] Meehan, W.R. (ed.). 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. Am. Fish. Soc. Special Publication 19.
[55] Robichaud, P.R., L.H. MacDonald and R.B. Foltz. 2010. Fuel management and erosion. Ch. 5 in: W.J. Elliot, I.S. Miller and L. Audin (eds.). Cumulative Watershed Effects of Fuel Management in the Western United States. USDA For. Serv. Rocky Mtn. Res. Sta. Gen. Tech. Rep. RMRS-GTR-231. Fort Collins, CO.
[56] Trombulak, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14:18-30.
[57] Frissell, Christopher A., R. J. Baker, D. DellaSala, R. M. Hughes, J.R. Karr, D. A. McCullough, R. K. Nawa, J. Rhodes, M.C. Scurlock, R. C. Wissmar. 2014. Conservation of Aquatic and Fishery Resources in the Pacific Northwest: Implications of New Science for the Aquatic Conservation Strategy of the Northwest Forest Plan . Coast Range Association, Corvallis, OR. 44 pp. (http://coastrange.org/documents/ACS-Finalreport-44pp-0808.pdf)

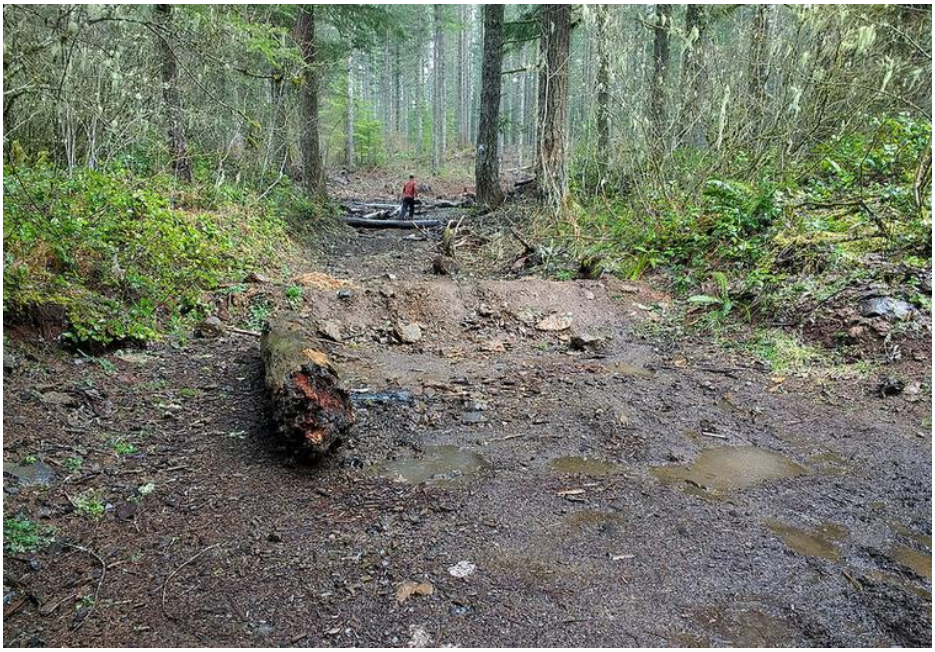
-Sale Administrator to communicate TSA contract problems to Line Officer and other departments at time of sale closure.
-Consider having obliteration of existing temporary roads a separate stewardship project instead of a routine appraisal allowance. This would help ensure project approval prior to logger receiving Stewardship credit.
Increase monitoring by both Sale Administrator and other specialists, including during the harvest activities."



Current condition of temporary "existing" road into North Clack Unit 89

Since this road is to be used again for the North Clack project, it is a good example of one to bring up the issues and recommendations above, so the FS can move forward more successfully this time around with contract oversight and implementation, relating to temporary road building specifically.

Bark noted that the berm closing off the temporary road accessing North Units 16 and 18 (and No Whisky Unit 5) is at this point ineffective, barely preventing motorized access from straying off the main 4610. We recommend a much larger berm with deep slash and boulders be placed after any re-use of this road for North Clack.



Berm on temporary road accessing North Units 16 and 18

We have so far provided evidence of the effects of temporary roadbuilding, and the chronic effects of an oversized road system on surrounding forest and aquatic ecosystems in our comments. **We re-encourage the FS to consider these recommendations, including significantly reducing temporary roadbuilding, as they select their alternative, as this will assist the agency moving forward with the best project possible for the North Fork Clackamas River watershed.**

OHVs and UNAUTHORIZED MOTORIZED ROUTES

In addition to impacts from the proposed action, significant additional impacts come from illegal OHV use in the North Clack project area. NEPA requires the agency to address the impacts "on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…cumulative impacts can result…by collectively significant actions taking place over a period of time." 40 C.F.R. § 1508.7. The cumulative effects of OHVs and timber harvest – including that proposed here, which may include construction of new skid trails and other roads needs considered in the subsequent analysis.

Bark is concerned that building or rebuilding numerous roads for logging in North Clack could result in an increase of OHV access and would undo the restoration work done to remedy the damage done by the original entries.

Some road closure and trail rehabilitation projects completed recently within the District's Goat Mountain project area have been effective in reducing unauthorized target shooting, OHV use, and garbage dumping in stands proposed for thinning. Effective restoration actions already implemented in the North Clack project area have included boulders and slash being placed along the road, large berms, re-contouring/de-compacting, re-vegetating, and the removal of trash. We believe these actions, where implemented, have been effective and encourage the FS to employ these types of strategies within the North Clack project.

Deep slash and boulder placement to deter illegal OHV use in damaged areas adjacent to the 4610 road

While North Clack is under contract, roads constructed for the project could provide unregulated motorized access over the course of multiple years, as roads may be needed for more than one season.

Bark requests a commitment from the agency to enforce effective barricades on roads built or rebuilt for this project when operations are not occurring. *This includes time when the area is still under contract but outside the normal operating season.*

We suggest that any final decision mitigate potential risks associated with future road development by: 1) continuing to firmly limit construction of new roads; 2) ensuring controlled access during the project implementation; and 3) ensuring timely & secure road closure upon the project's completion.

Specific Recommendations for reducing impacts from unauthorized recreational use in the North Clack project:

To restrict access to temporary roads and skid trails built or rebuilt for this project when operations are not occurring (including between the normal operating seasons if work in sale unit in question is not complete in one season), please consider the following recommendations:

- Between operating seasons *and* at the conclusion of the contract, include seasonal erosion control measures such as waterbar placement, and diversion ditch creation;

- Between operating seasons *and* at the conclusion of the contract, include piling slash on the first few hundred feet of temporary road or skid trail, and placing boulders at the entrance to units from main road;

- Incorporate skips to help obstruct unauthorized OHV use in thinned units. Leave a thick, "vegetated screen" along roads in areas where OHV use is expected based on past and current use. If there are areas within the units in question that would benefit ecologically from skips (such as seeps or other riparian areas), *do not* remove these in exchange for the vegetated screens, but look to achieve both the visual and ecological goals of the skips in these units;

- Provide adequate Sale Administration staffing for workload, so that coverage is available when the assigned Sale Administrator is not working;

- Require the Sale Administrator to discuss all requirements with contractor at pre-work meeting, review all pre-work discussions with contract representatives on site, and reemphasize as unit completion is eminent;

- Require inspection by Sale Administrator before contractor's equipment is moved offsite;

- Require implementation and effectiveness monitoring of PDCs by both Sale Administrator and other specialists, including during the harvest activities; and

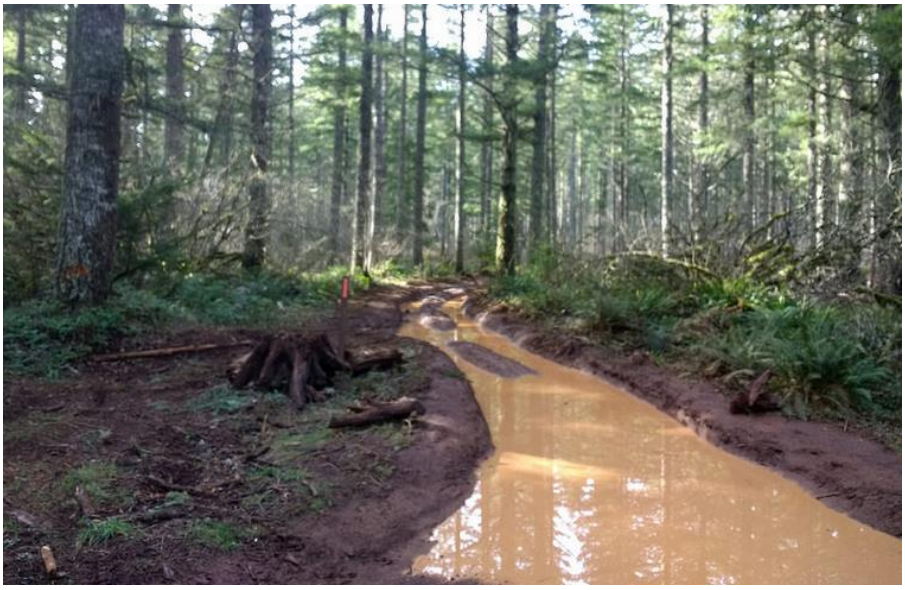
- After project implementation and before conclusion of the contract, fully implement and monitor effectiveness of the aforementioned activities in

order to impede further damage from unauthorized motorized access to units after thinning has taken place.

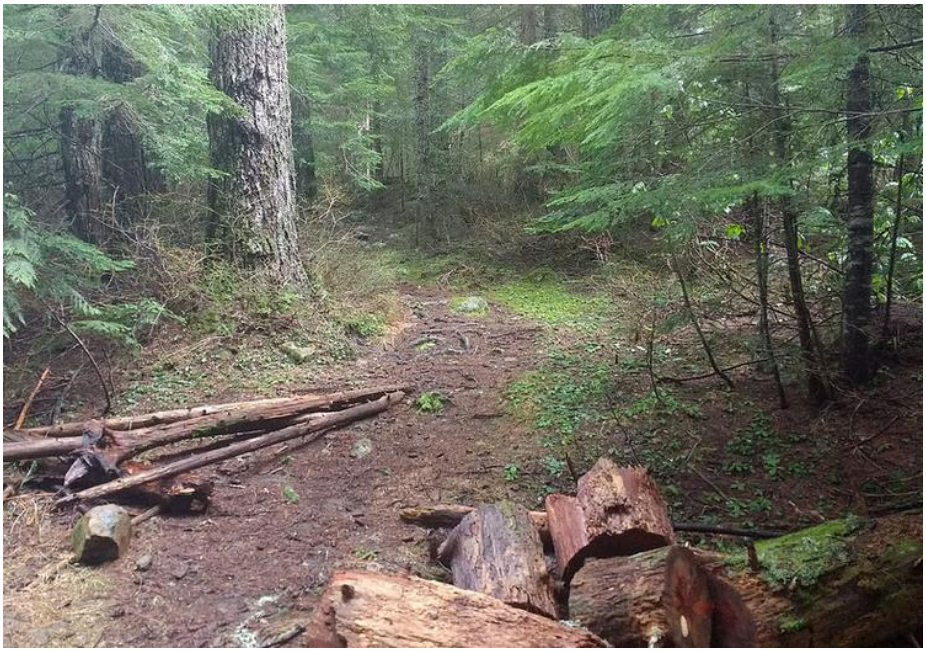
These recommendations will be especially useful during re-use of established OHV trails as temporary roads (as is the case with converted 4610-115, accessing several units), as well as when new roads are built in proximity to existing OHV trails (as is the case with converted 4611-121, 4611-125, and 4611-130 roads accessing Unit 42). We encourage the FS to prioritize use of existing trails as temporary roads when there is a risk of expanding the illegal trail network. We request that the agency provide rationale for their decision to build a new road into the forest when OHV trails are available to re-use.

Existing illegal routes

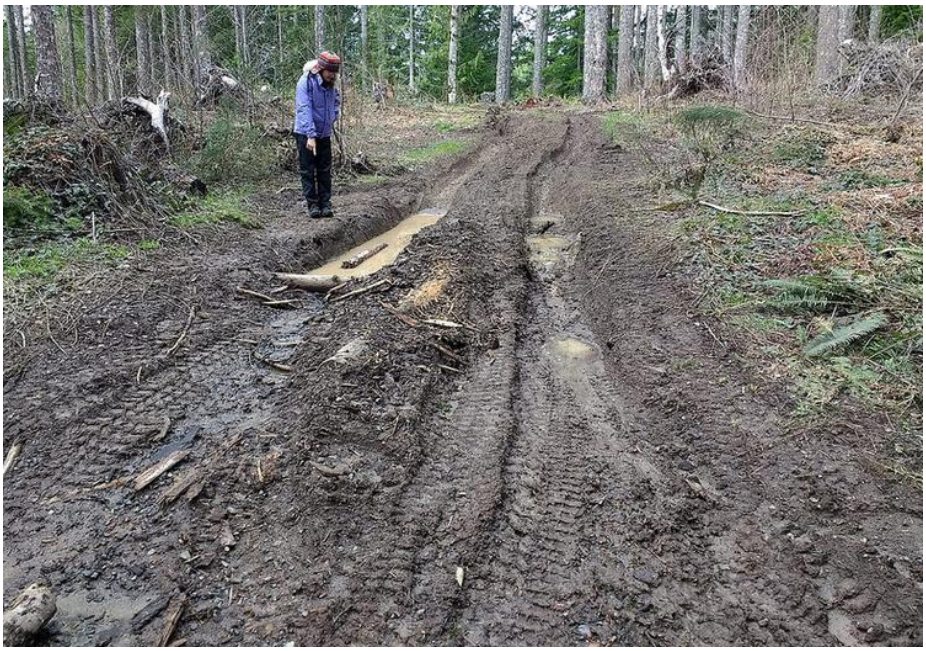
The North Clack Proposed Action includes 7.1 miles of rehabilitation of unauthorized OHV routes. Here, Bark will submit some locations of illegal trails found within the North Clack project area (some of which the FS has knowledge of). These are all routes that we are supportive of the FS obliterating through the North Clack project.



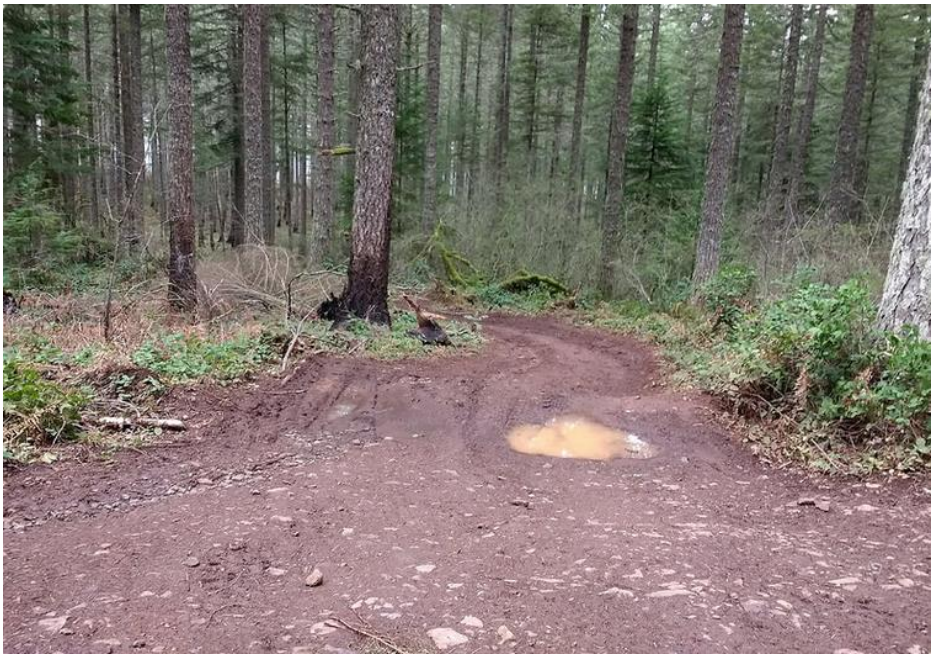
*Illegal OHV trail off Trail 802 at **45.20595, -122.20720***



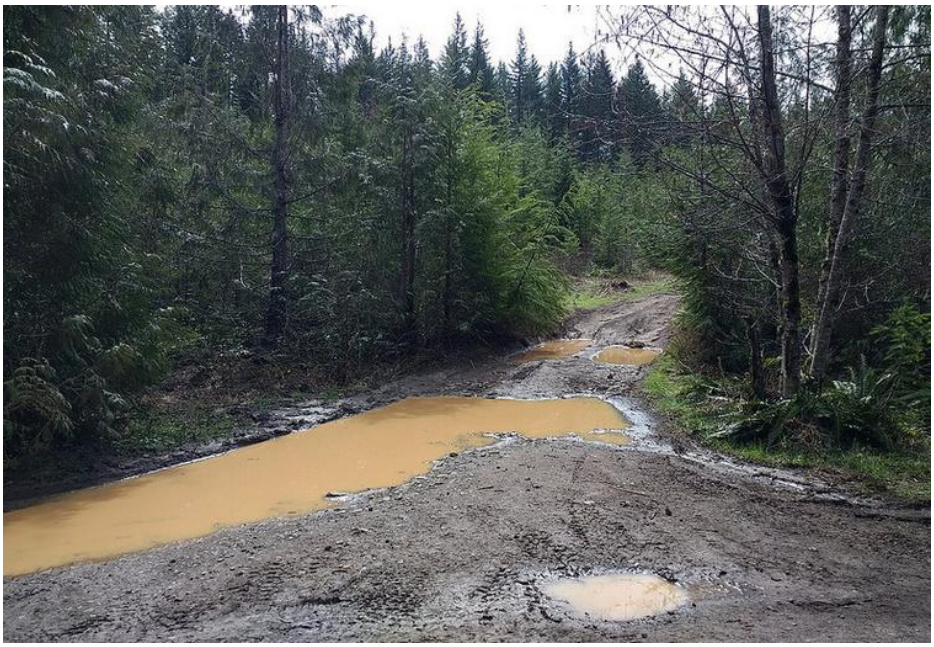
*Illegal route off 4614-150 at **45.23862, -122.10941***



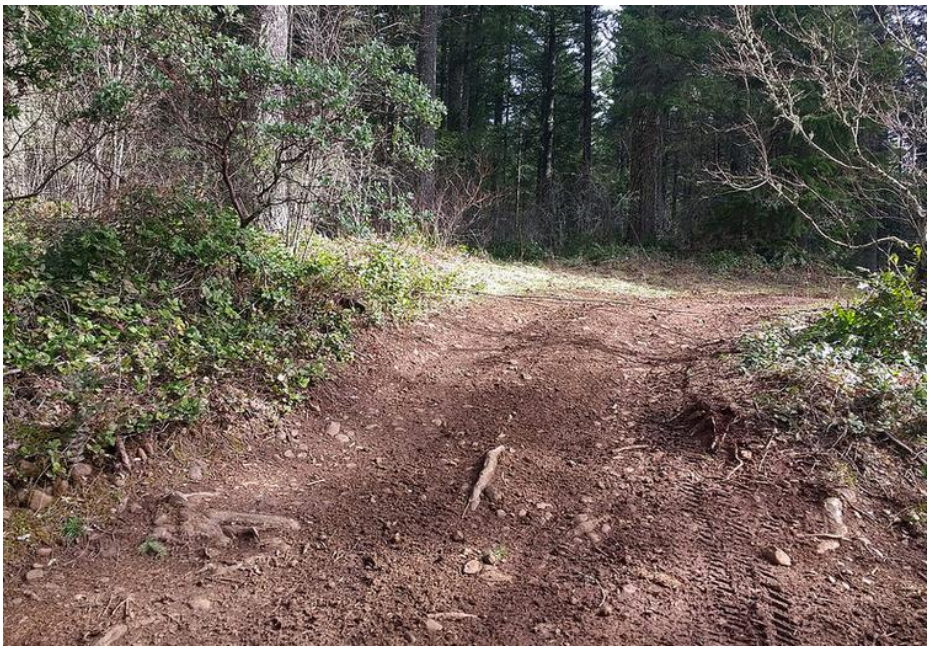
*Illegal route off 4610 at **45.20349, -122.13246***



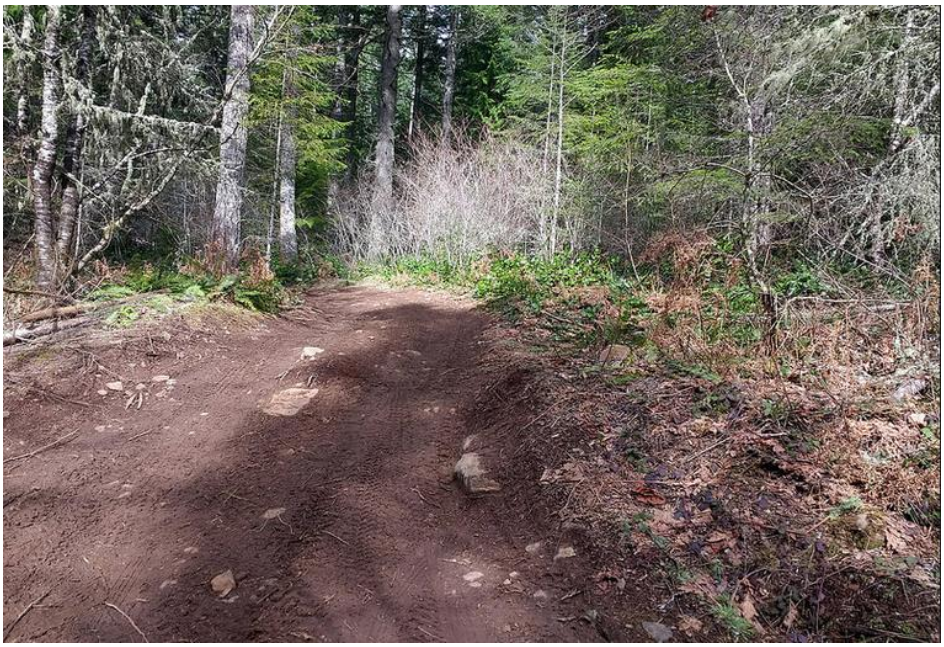
*Illegal road adjacent to Unit 304 at **45.21625, -122.22001***



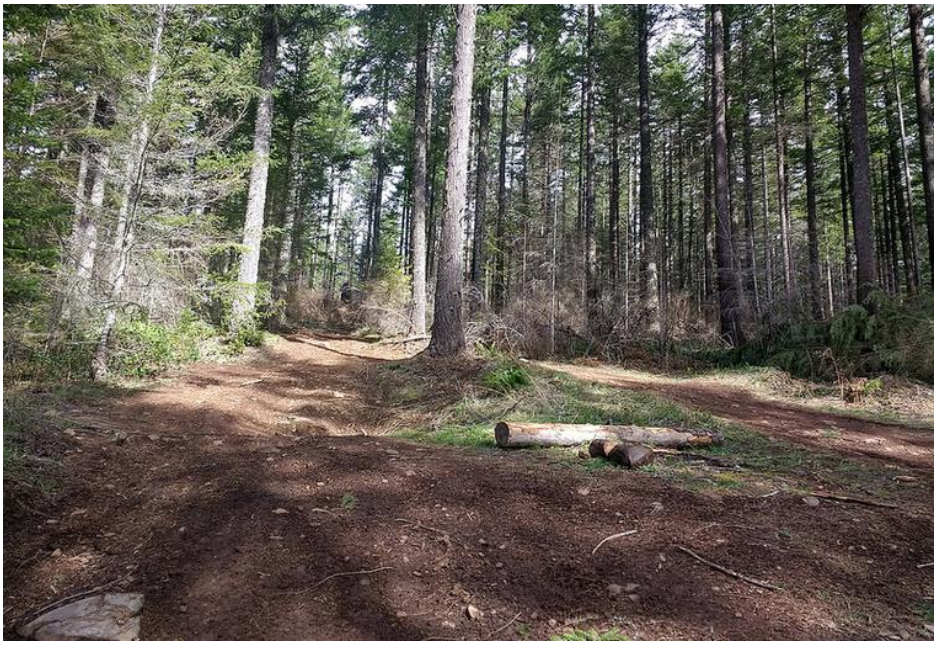
*Illegal trail off 4610 at **45.20369, -122.16691***



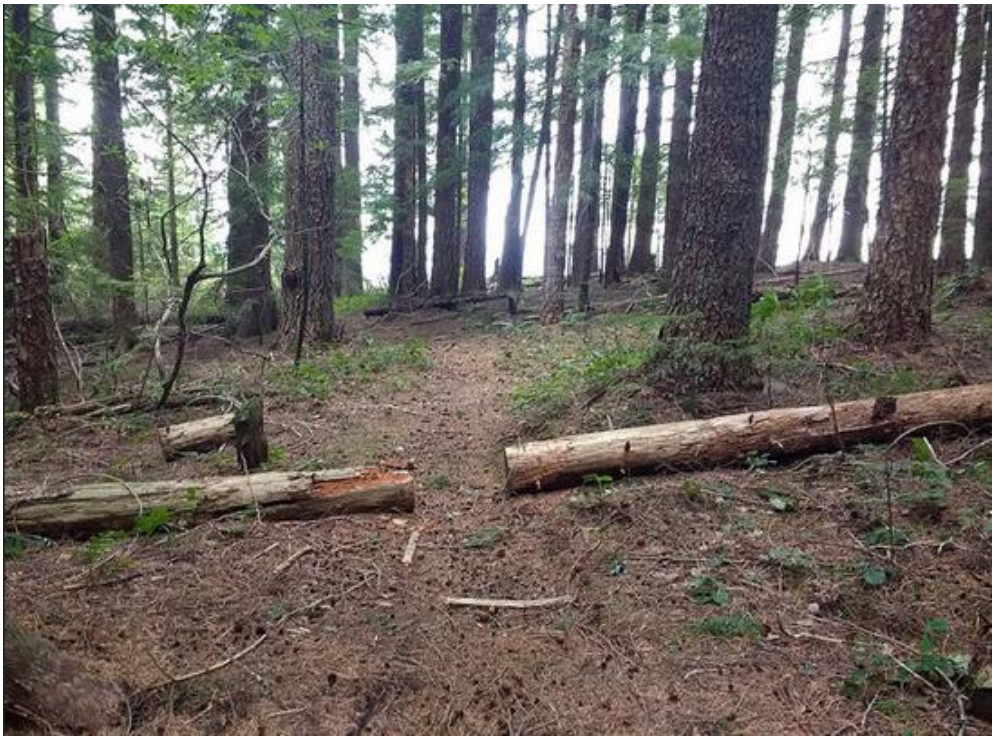
Illegal OHV trail off Trail 802, ***45.21414, -122.22047***



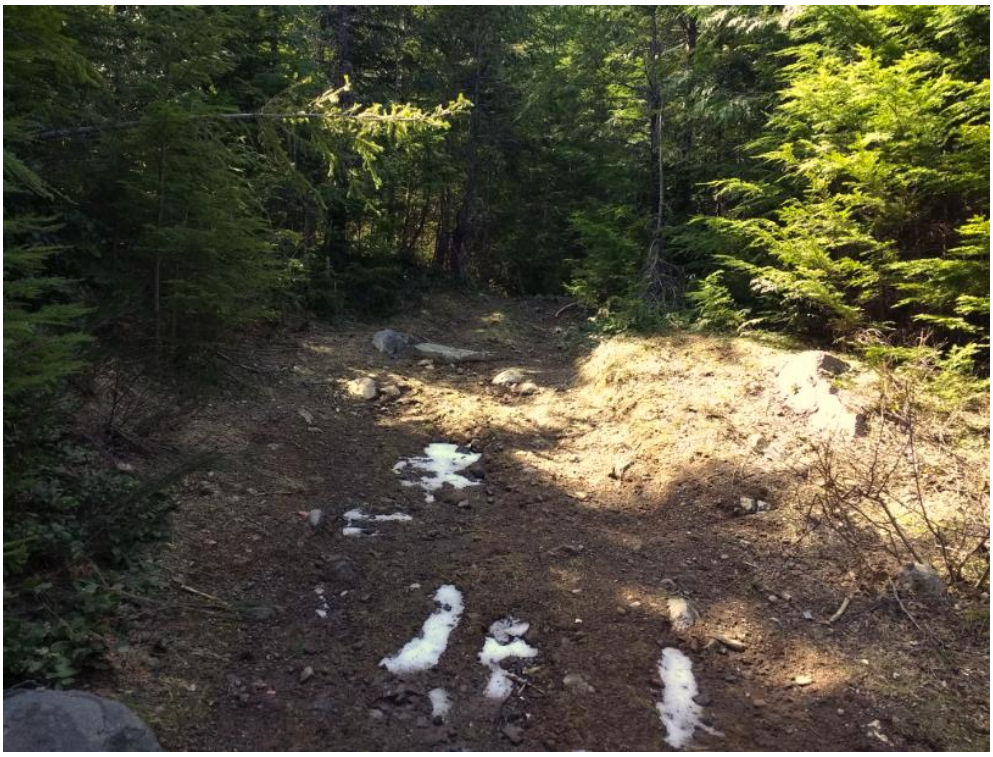
Illegal OHV trail off trail 802, ***45.20479, -122.21444***



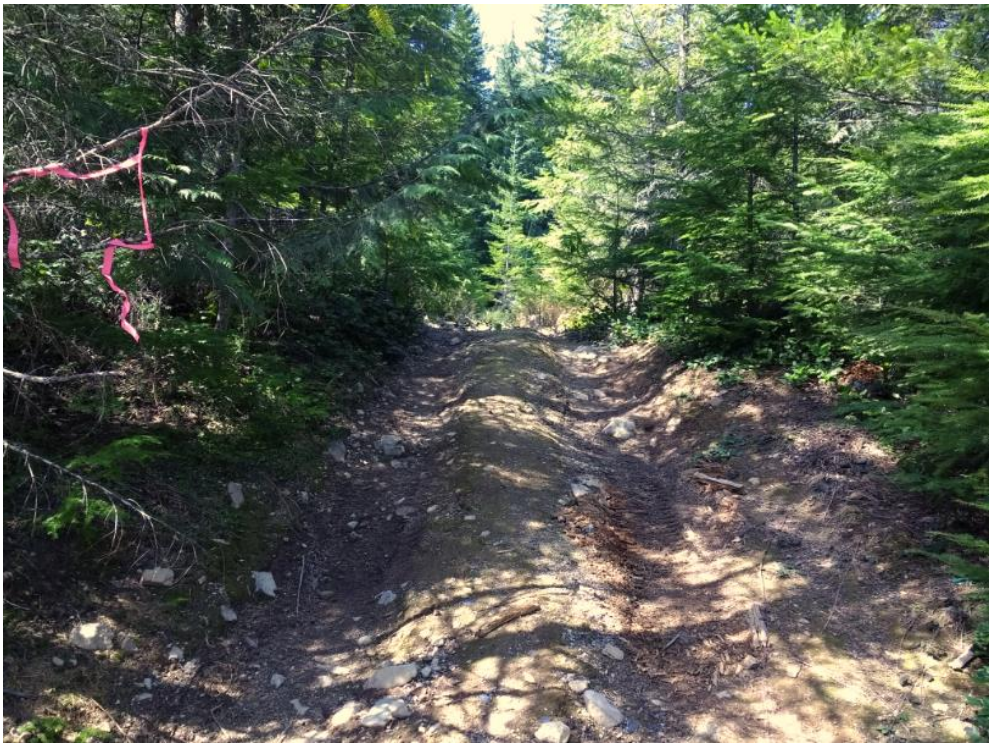
Illegal OHV trail off trail 802, ***45.20896, -122.21930***

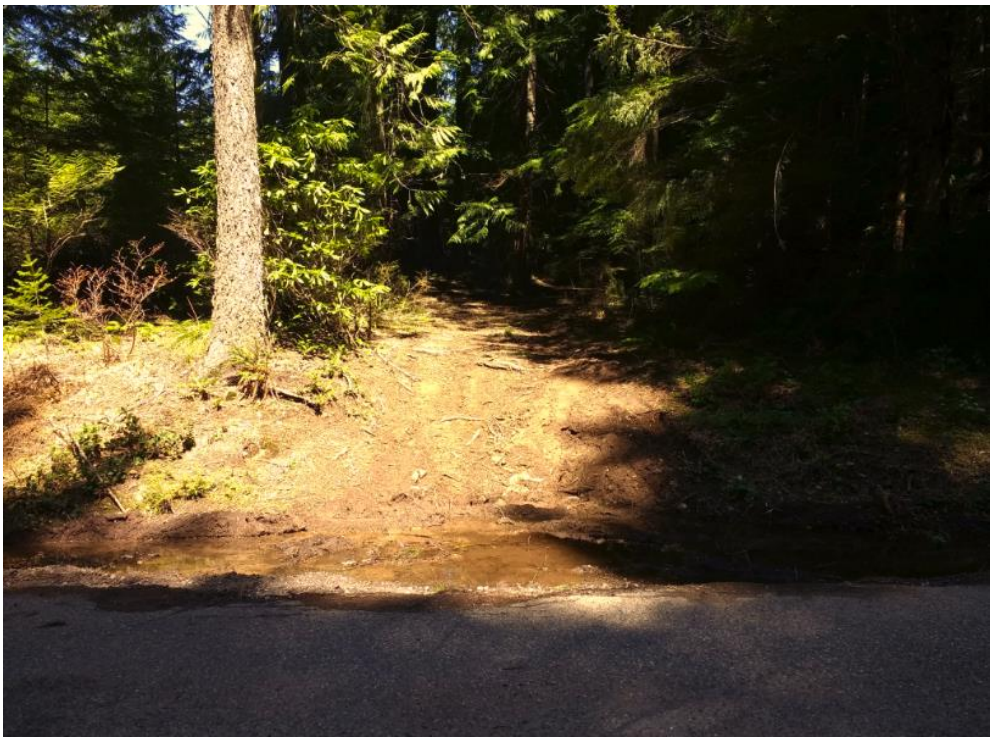


Illegal trail accessing hunting perch within Unit 212, from private land clearcut to the west

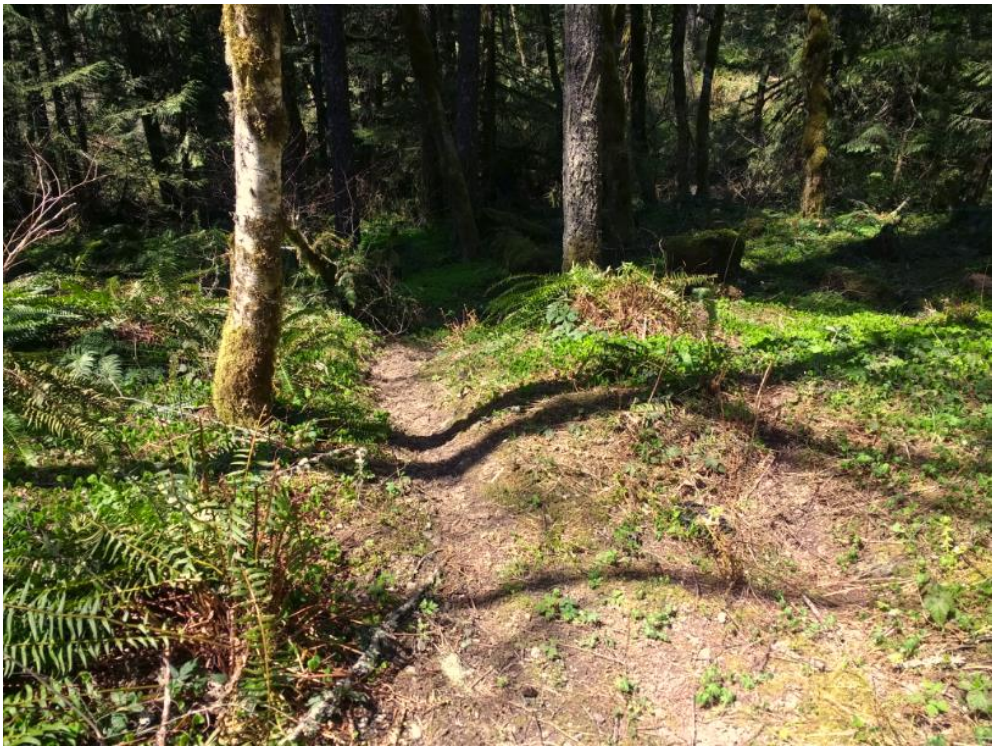


*Illegal routes adjacent to dispersed camp at the end of 4613-120 at **45.24345, -122.12686** (above), and **45.24309, -122.12445** (below)*

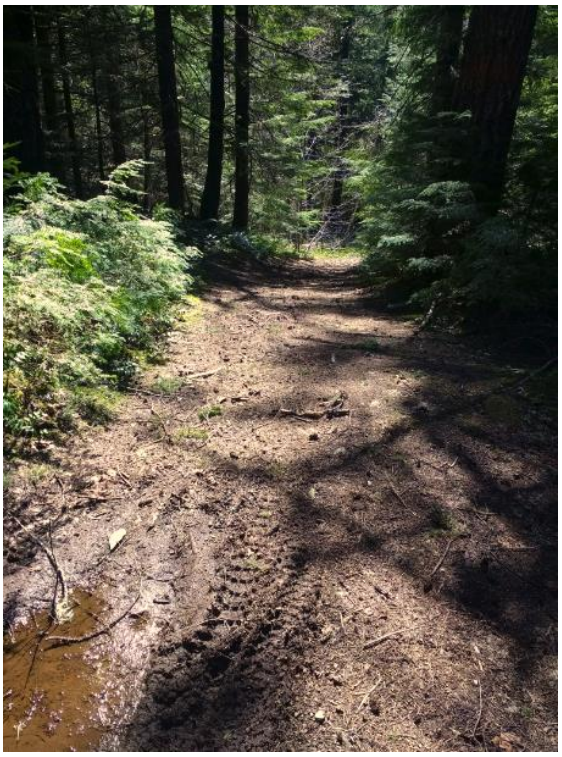




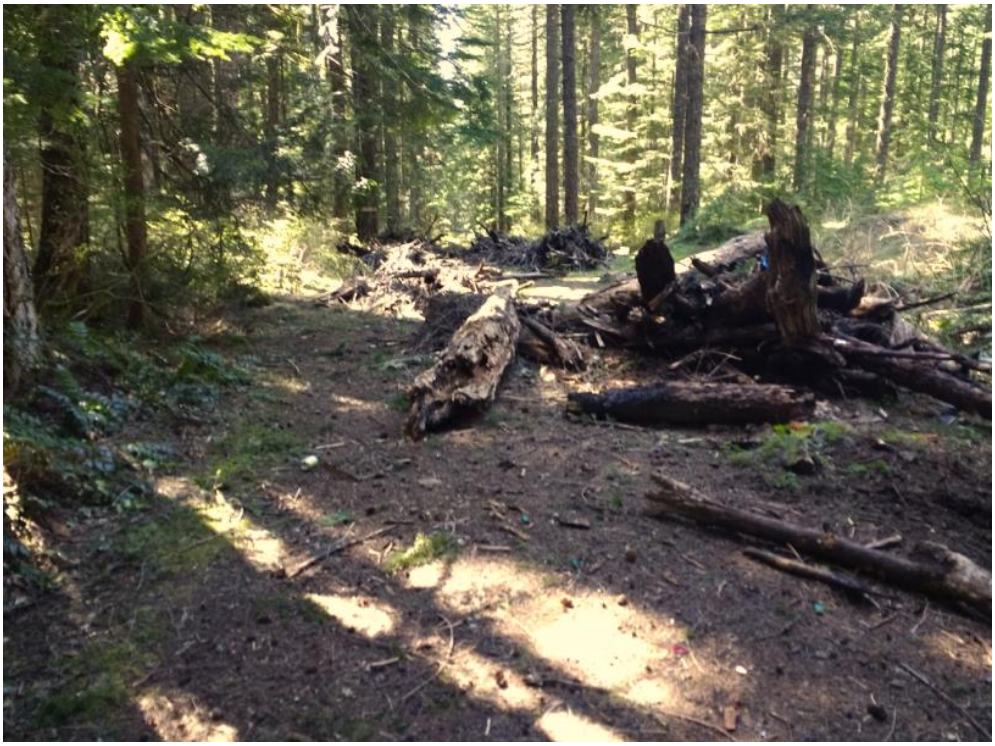
*Illegal route off 4613 at **45.23585, -122.11934***



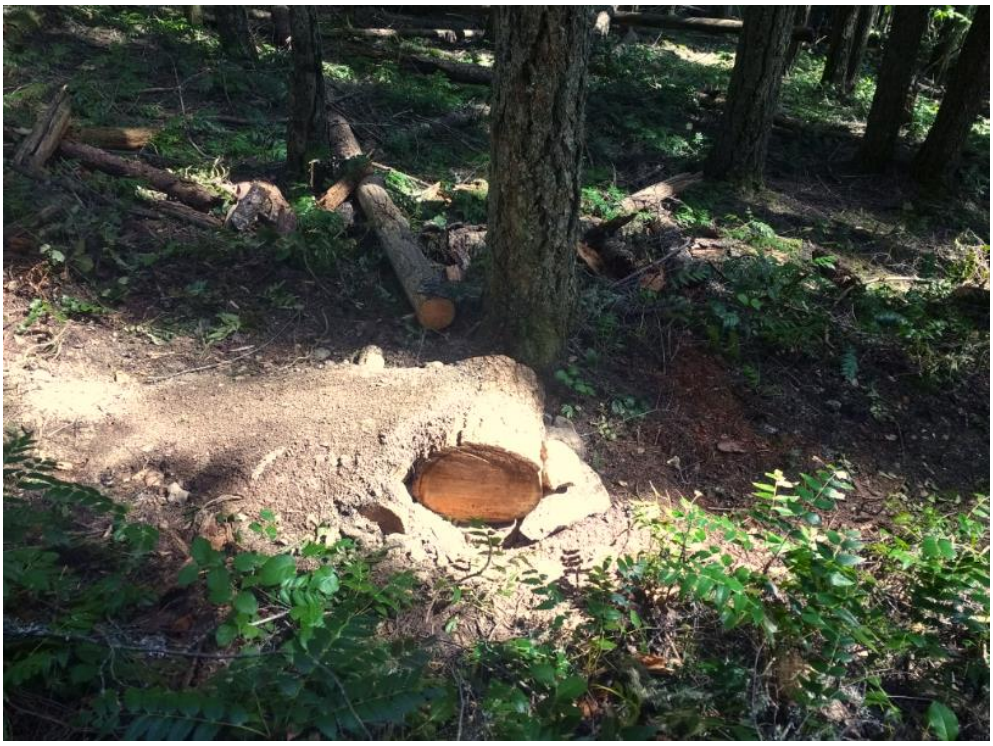
*Illegal single-track trail accessing the top of the North Fork Crossing camp from the 4613 at **45.20813, -122.14942***



*Illegal trail running through North Clack Unit 44 at **45.18128, -122.11681***



*Breached closure by OHVs on 4611-002 at **45.18321, -122.12349***



*Recent illegal single-track trail building within Unit 178 at **45.21232, 122.14738***

Not included in above photos but observed by Bark is a network of illegal roads spreading into Unit 200, directly across from Unit 196. The entrance to these routes begins from 4613-140 at approximately **45.22189, -122.11846.**

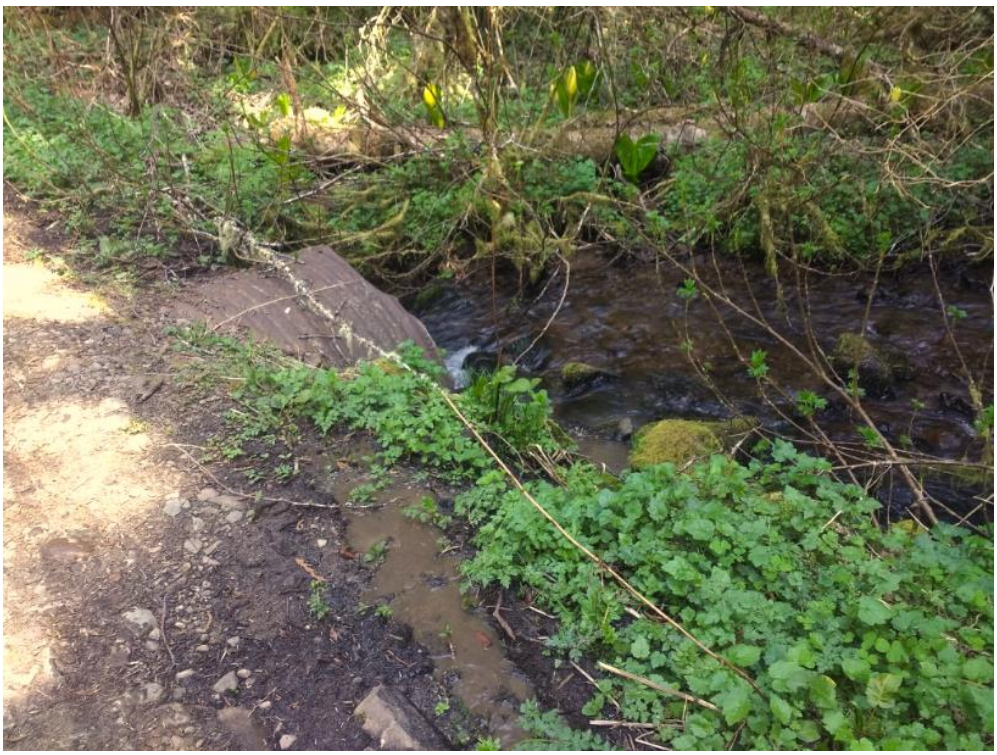
AQUATIC/RIPARIAN HABITAT RESTORATION

Bark supports the itemized effort by the agency to address aquatic habitat in the North Fork Clackamas watershed. Obstruction of passage for aquatic organisms, the deficit of large woody debris, an oversized road network, and unauthorized user access are all examples of threats which currently impede aquatic recovery in the watershed.

Bark supports replacing and/or removing culverts that are barriers to fish and aquatic organism passage and/or causing other ecological harm to the aquatic system. Bark also supports adding large woody debris in streams where it is

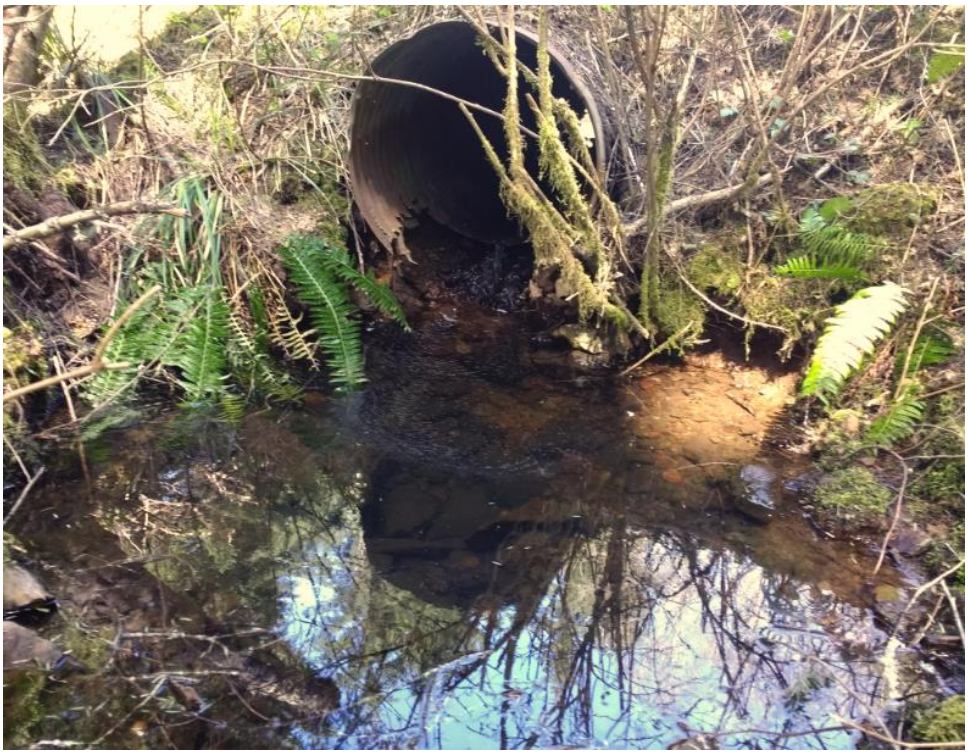
lacking due to past management to enhance water quality and aquatic diversity. The North Fork Clackamas Watershed Analysis at 5-1 recommends that "Fish restoration should concentrate on increasing instream LWD through short and long term recruitment throughout the watershed."

Bark has specifically observed the culvert deteriorating, and water bringing road fill and sediment directly into Whiskey creek at the crossing with 4614-120. We support the replacement of this culvert before any kind of haul occurs, but also have doubts that this haul will have anything but negative impacts on this part of Whisky Creek. Upon driving over the creek once, sediment was observed washing directly into the stream. The FS will need to design strict PDCs (including no wet-weather haul) to address this ecologically damaging crossing carefully so it doesn't fail during project implementation.



4614-120 Whisky Creek crossing, road sediment entering stream

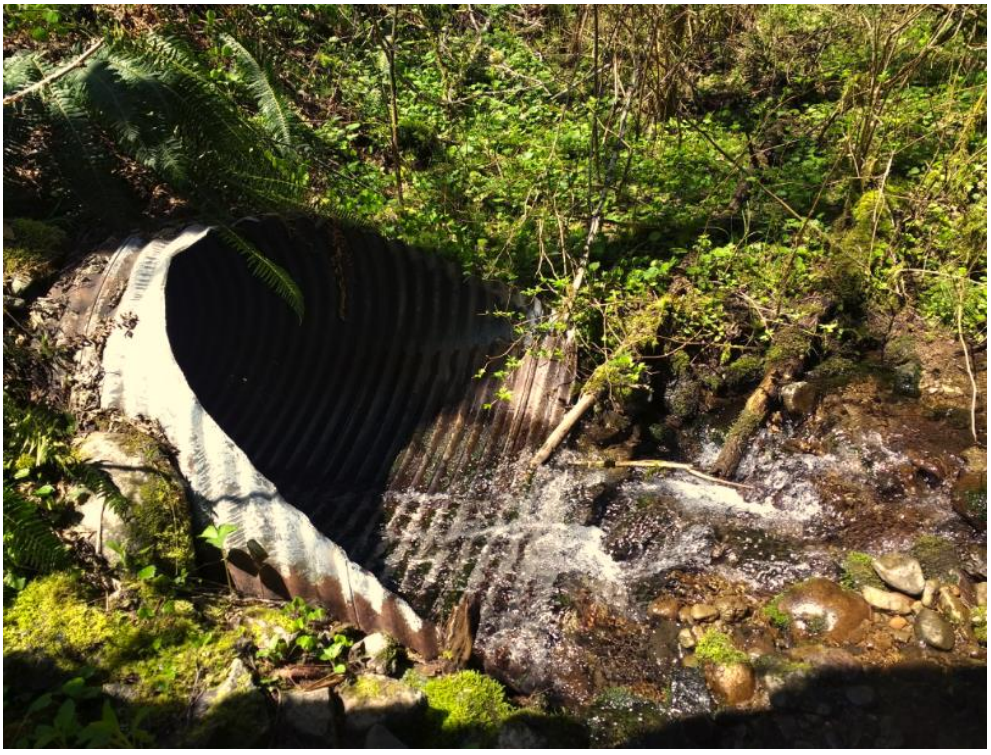
Along with the other culvert replacements, Bark supports replacing the culvert at Road 4611 at Winslow Creek. Currently there are two culverts which are not functioning properly, and one is severely deteriorated and appears to be polluting the water downstream with its own decay. Will the FS be ripping and replacing both culverts?



Road 4611 at Winslow Creek

The 4613 culvert at Bedford Creek is receiving more water than it is built for. The culvert is aged and needs to be replaced with something bigger. The 4613 culvert at Dry Creek is becoming undercut at the upstream end of the road, and at the downstream end is causing a plunge into a pool below, cutting off connectivity for aquatic habitat. The culvert needs to be replaced with the slope of the creek in mind so this issue is addressed.

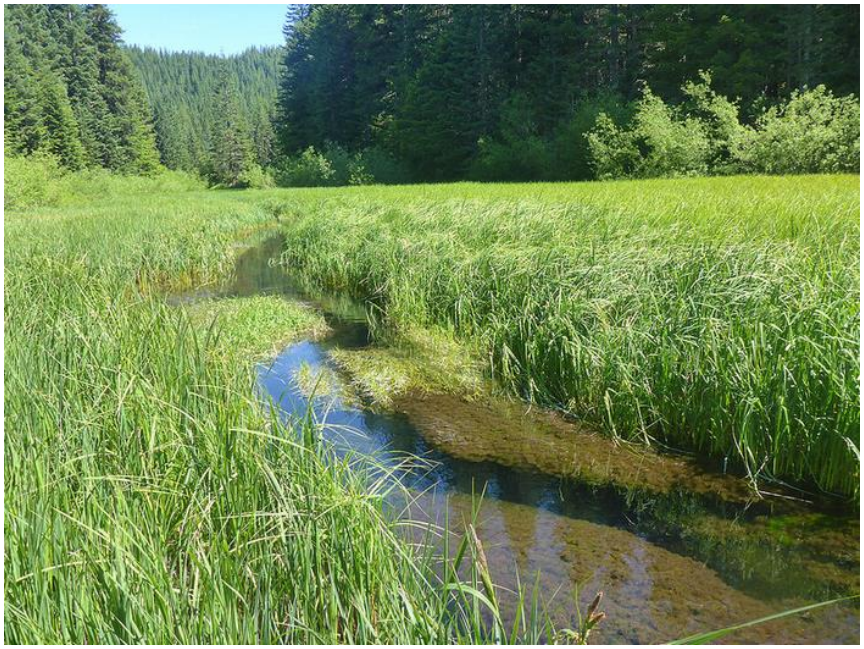
4613 culvert at Bedford Creek



4613 culvert at Dry Creek (above and below)

RESTORING BEAVERS TO THE NORTH FORK CLACKAMAS WATERSHED

For wildlife advocates and agency specialists, reintroducing beavers into areas within the Forest boundary has been part of a long-term vision for restoring the health of MHNF's ecosystems while creating resiliency against the projected effects of climate change on cascade environments. With the context of climate change's expected effects on our region, the FS should and is pursuing the reintroduction of beaver and restoration of its habitat within the North Clack project area.



Tumala Meadow in 2017

Historically, beaver-created wetlands were common in the Clackamas watershed. Beaver activity creates productive and complex slow-water habitats for fish, helps moderate both base flows and peak flows, traps sediment and nutrients, and helps maintain riparian hardwood plant communities.

According to one researcher, abandoned beaver meadows contained about 736,000 metric tons of stored carbon—about 8% of the total stored in the soils of their study area. But if all the beaver dams were occupied with their wetlands intact, beaver meadows would be storing about 23% of the area's soil carbon, an estimated 2.7 million metric tons of organic carbon. Extrapolated to all areas of North America where beavers have traditionally lived and then placed in the context of a preindustrial world, the study suggests that beavers—as well as their relatively sudden removal from the landscape by trappers in pre-Colonial times—may have had a substantial effect on global climate.[58]

Historic photos reveal that Tumala Meadows had wider extent of flooding than it does today which was likely influenced by a beaver population. By damming the stream which meanders through the meadow, beaver increased species and habitat diversity.

The removal of beavers from the watershed has likely resulted in altered ecosystem processes and functionality including higher erosion and sediment

[58] Wohl, E. (2013). Landscape-scale carbon storage associated with beaver dams. Geophys. Res. Lett., 40, 3631 – 3636, doi:10.1002/grl.50710.

delivery into streams, changes in riparian plant community composition, changes in stand conditions, lack of presence of hardwood-dependent species, degraded fish habitat, and more. While beaver ponding was once significant within the Forest boundary, it is no longer, and parts of many streams and wet areas that formerly supported cottonwood dominated communities do not now. In some places, conifers have invaded and replaced the hardwoods as a result of beaver removal.

Several species in the North Clack project area depend on these riparian hardwoods including yellow warblers, red-eyed vireos, and downy woodpeckers. Black cottonwoods are especially important to downy woodpeckers for cavity excavation. The lack of beavers within the Forest has been correlated to the lack of large cottonwood and alder.

Beaver dams and the habitat they create are considered the foraging habitat for the peregrine falcon, a R6 Sensitive Species. As a R6 Sensitive Species, current policy guides the FS to manage for suitable nesting and foraging habitat for the peregrine falcon. As beaver populations increase with development of beaver dams and ponds, waterfowl populations increase, which in turn provides increased prey species for the peregrine falcon.

Bark visited the meadow with the FS in July of 2017 to find that there was recent beaver activity, but no dams or lodges. Bark supports the installation of Beaver Dam Analogues, to simulate beaver dams and to encourage beavers to build dams in incised channels and across potential floodplain surfaces. We are also pleased to hear that the relocation of beaver to Tumala Meadows in coordination with Oregon Department of Fish and Wildlife, may also be part of this project if they do not reestablish on their own. Bark supports this goal and encourages MHNF to explore the following tools relating to the process of beaver restoration:

- Guidelines for Relocation of Beaver in Oregon - ODFW
- The Beaver Restoration Guidebook - U.S. Fish and Wildlife Service
- OFWO - Beaver Restoration
- Beaver Restoration Toolbox
- MidCoast Watersheds Council: Beaver Outreach & Education Materials

CLIMATE CHANGE ANALYSIS

A decade ago, the FS released its Strategic Framework for Responding to Climate Change, followed in January 2009 by a directive on the importance of addressing climate change in NEPA analysis. In this document, then FS Chief Abigail R. Kimbell characterized the Agency's response to the challenges presented by

climate change as "one of the most urgent tasks facing the Forest Service" and stressed that "as a science-based organization, we need to be aware of this information and to consider it any time we make a decision regarding resource management, technical assistance, business operations, or any other aspect of our mission."

According to the FS, North Clack could be made part of a proposed pilot project with Clackamas County to develop a "Purpose Driven Harvest Plan" pending USDA Wood Innovation Grant approval. The pilot project would support harvest and "climate smart conditions in providing lumber, small diameter utilization for the emerging mass timber market". Bark is curious by how "small diameter" is defined within this context?

Bark would like to see more information about the "Purpose Driven Harvest Plan" and a robust, quantitative carbon analysis as part of the project analysis if North Clack is stated to include "climate smart conditions". To this end, we encourage the FS to engage with and include Land use strategies to mitigate climate change in carbon dense temperate forests[59], a paper released in 2018 which explores PNW forests' role in the regional carbon cycle.

In this paper, reforestation, afforestation, lengthened harvest cycles on private lands, and restricting harvest on public lands increase net ecosystem carbon balance 56% by 2100, with the latter two actions contributing the most. Resultant co-benefits included water availability and biodiversity, primarily from increased forest area, age, and species diversity. Increasing forest carbon on public lands reduced emissions compared with storage in wood products because the residence time is more than twice that of wood products. Hence, temperate forests with high carbon densities and lower vulnerability to mortality have substantial potential for reducing forest sector emissions.

The authors conclude that Pacific temperate forests can store carbon for many hundreds of years, which is much longer than is expected for buildings that are generally assumed to outlive their usefulness or be replaced within several decades. Recent analysis suggests substitution benefits of using wood versus more fossil fuel-intensive materials have been overestimated by at least an order of magnitude. While product substitution reduces the overall forest sector emissions, it cannot offset the losses incurred by frequent harvest and losses associated with product transportation, manufacturing, use, disposal, and decay.

[59] Land use strategies to mitigate climate change in carbon dense temperate forests. Beverly E. Law, Tara W. Hudiburg, Logan T. Berner, Jeffrey J. Kent, Polly C. Buotte and Mark E. Harmon PNAS March 19, 2018. 201720064; published ahead of print March 19, 2018. https://doi.org/10.1073/pnas.1720064115

The evolving analysis on climate change within the EA process is an important benchmark in the future of public involvement. This has become a major point of concern, not just for the scientific community, but an issue that has squarely fallen within the public interest. Unfortunately, recent EA project analyses by the FS on climate change is almost non-existent.

In 2016, the Council on Environmental Quality (CEQ) released final guidance for federal agencies on how to consider the impacts of their actions on global climate change in their NEPA analysis. This final guidance provides a framework for agencies to consider both the effects of a proposed action on climate change, as indicated by its estimated greenhouse gas emissions, and the effects of climate change on a proposed action.

However, on March 28, 2017 the Trump Administration issued an executive order titled "Presidential Executive Order on Promoting Energy Independence and Economic Growth" which attempts to relieve agencies from the requirement to consider the effects of GHG emissions and climate change: https://www.whitehouse.gov/the-press-office/2017/03/28/presidential-executive-order-promoting-energy-independence-and-economi-1. Among other things, this executive order rescinds the CEQ guidance regarding consideration of climate change in federal decision-making, but the E.O. also recognizes that "[t]his order shall be implemented consistent with applicable law" and "all agencies should take appropriate actions to promote clean air and clean water for the American people, while also respecting the proper roles of the Congress and the States concerning these matters in our constitutional republic." While the guidance was finalized in August 2016, it followed a series of court rulings addressing the issue of greenhouse gases and NEPA, which found that whenever greenhouse gases are significant or rise from the project, either directly or indirectly, they much be analyzed in a NEPA document. Thus, despite the E.O., the FS must continue to carefully consider the effects of GHG emissions and climate change in all its decisions.

The FS has often claimed the short-term carbon emissions and the difference in long-term carbon storage that could be attributable to the Proposed Action are of such small magnitude that they are unlikely to be detectable at global, continental or regional scales. Additionally, it has asserted that changes in carbon stores are unlikely to affect the results of any models now being used to predict climate change. The same thing could be, and is, said about every individual timber sale in National Forests in the Pacific Northwest. The failure of federal agencies to place projects within the context of emissions from logging on

a regional or statewide level has led the public to thinking that the forestry sector is no longer a contributor to global greenhouse gas emissions.

The aforementioned CEQ guidance, which we encourage you to follow, requires the FS to **consider alternatives that would make the action and affected communities more resilient to the effects of a changing climate.** The FS should also choose mitigation measures to reduce action-related GHG emissions or increase carbon sequestration in the same fashion as they consider alternatives and mitigation measures for any other environmental effects.

Human-caused climate change will not only affect natural systems, it will also intensify the impacts of human activities such as off-road vehicles, roadbuilding and logging. **The FS must analyze the impacts of these activities in the broader context of climate change and acknowledge that the historic impacts of these activities will be exacerbated by climate change.** The FS must then commit to specific management actions to address the increased impacts of these threats now and to take additional actions as necessary.

Forests play a role in the carbon cycle in several ways. As natural ecosystems, they remove CO2 from the atmosphere through photosynthesis, storing the carbon primarily as wood and other biomass, and in the soil. These stores are referred to as a carbon pool, stock, or reservoir. Globally, forests account for about one-half of terrestrial carbon stores and, taken as a whole, they store carbon in roughly equal amounts above and below ground in the U.S.[60] When trees decay or burn, CO2 is released back to the atmosphere, some immediately, most more slowly through decay. At large scales, the processes of storage and release of carbon have historically been in approximate balance. Individual forest stands might be killed by fire, wind, insects, or disease, but across landscapes, balances of growth, decay, and combustion would produce a characteristic level of carbon storage. Over long periods of time, climate, resulting disturbance regimes, and thus the relative balance of carbon stores, would change. Historically, forests were one of the mechanisms that helped maintain fairly stable concentrations of atmospheric CO2, and they still remove some of the excess CO2 from burning fossil fuels.[61]

Estimates vary, but it appears that about one-half of the carbon absorbed by terrestrial ecosystems in the conterminous U.S. is absorbed by forests, equivalent to around 10% of U.S. carbon emissions from fossil fuels. The amount

[60] Brown, Rick. The Implications of Climate Change for Conservation, Restoration, and Management of National Forest Lands, p7

[61] Brown, Rick. The Implications of Climate Change for Conservation, Restoration, and Management of National Forest Lands

of carbon sequestered by forest ecosystems plays an important role in regulating atmospheric levels of carbon dioxide. Factors affecting the amount and rate at which forests sequester carbon include climate, disturbance, management, land use history, and species composition.[62] The potential to store additional carbon in Pacific Northwest forests is among the highest in the world because much of the area has forests that are long-lived (e.g., Douglas-fir) and maintain relatively high productivity and biomass for decades to centuries.

While old growth forests act as abundant stores of carbon from past centuries of growth, within a carbon sequestration regime it is the role of the young forests to add new carbon to these stores. When a stand is cut it creates a debt of carbon due to the releases of the stores previously held in the soil, as well as dead and live tree matter. For over a decade after the initial cut the stand continues to emit carbon as the soils gradually recover from the disturbance and post-logging slash continues to decay.

Removal of biomass from any forest limits its ability to sequester carbon for a period after the disturbance and can even turn the forest into a carbon source.[63] Not only that, but also the act of removing trees requires carbon emissions. Moreover, reducing tree densities increases weatherization of dead biomass, which would increase the rate of carbon emissions from decay. Current enthusiasm for wide-scale thinning must be tempered with a realization that removing too much fuel makes forests hotter, dryer, and windier which can increase fire hazard and increases decomposition rates, both of which conflict with carbon storage and other objectives.

The FS insists that the scale of climate impact is inherently global, missing the fact that local actions have an impact on global climate trends. However, it is absolutely possible to quantify the amount of carbon sequestered in the North Clack project area (see, for example, the BLM's Hole in the Road EA in which did just that). How many tons of carbon will the North Clack Timber Sale emit into the atmosphere during and after project implementation from logging operations and decay? How much carbon sequestration does the project area currently sequester? How much sequestration capacity will be lost, and for how long? How will the forests' resiliency to a changing climate be affected by the logging and road building?

[62] Hudiburg, Tara, Et.al. 2009, Carbon dynamics of Oregon and Northern California forests and potential land-based carbon storage. Ecological Applications, 19(1), pp. 163–180.
[63] Mitchell SR, Harmon ME, O'Connell KEB. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest Ecosystems. Ecological Applications, 19:3; 643-655.

The FS should be quantifying climate change emissions from its projects and taking the analysis a step further to examine the carbon tradeoffs, including carbon emitted from the project and the loss of future carbon sequestration because of the project.

CONCLUSION

Bark has several suggestions for improving the North Clack project, and requests that the agency review these suggestions and create alternatives that meaningfully incorporate these 27 suggestions – singly or together – to assess their ecological benefit and to create a project that better achieves the purpose & need for the North Clack project:

- Exclude stands with high snag and large living tree densities from any logging and apply buffers on key snags and relatively large trees within proposed units;
- In the PA, quantify impacts to snags and down wood over time from logging for Action and No Action scenarios;
- In the PA, please provide specific stand information for units proposed for logging within LSRs and RRs, and rationale for the actions proposed within these stands;
- Drop units which would lead to degradation or removal of suitable habitat from the watershed as part of the North Clack project;
- Consider expanding owl gaps technique to more acres within the owl's home range, in replacement of proposed thinning, wherever deemed more appropriate to achieve improved habitat for the owl;
- Where down wood, large snags, large live trees, and minor trees exist retain no less than 40% of the canopy cover, retain as much mid-story component of the stand as is feasible, retain the largest trees in the stand, and retain all legacy features;
- Drop the area included in No Whisky Unit 20 from North Clack Unit 44, do not re-enter any Riparian Reserves that were already thinned through the No Whisky EA or any other thinning project;
- Management should protect outstandingly remarkable values and free flowing nature until W&S designation is made or released from consideration;
- Identify required buffers for all Survey and Manage species in sale and NEPA documentation;
- Look to the "Opportunities and Constraints" map in the NFCRWA, Map 3-2, and act accordingly;

- Continue to engage with Bark's information regarding unmapped riparian areas;
- Provide rationale for activities within "Seedling Release", and in "Sapling Release" units;
- Do not pursue any commercially-driven post-fire logging as part of this project;
- Remove regeneration harvest from the Proposed Action;
- Focusing on existing openings where conifers have not and may not establish to reintroduce fire, including prescribed burning at Boyer Creek meadow;
- Delete temporary roadbuilding along Boyer Creek to Units 71 and 80. We also recommend not using heavy equipment to implement the burn in the meadow;
- Provide more rationale for the fuel break along the northern Forest boundary and how it interacts with the Strategic Fuel Treatment Placement Plan;
- Look for additional opportunities to reduce the road network in the watershed and include more miles of road decommissioning in the Proposed Action;
- Include data regarding the projected increase of sediment from log haul on all roads used;
- Engage with Bark's site-specific system roads comments;
- Significantly reduce the mileage of "temporary" road construction;
- Reduce OHV impacts by 1) limiting construction of new roads; 2) ensuring controlled access during the project implementation; and 3) ensuring timely & secure road closure upon the project's completion;
- Engage with Bark's site-specific unauthorized trail comments;
- Replace and/or remove culverts that are barriers to fish and aquatic organism passage and/or causing other ecological harm to the aquatic system;
- Add large woody debris in streams where it is lacking due to past management to enhance water quality and aquatic diversity;
- Pursue beaver habitat restoration in the North Clack project area and elsewhere; and
- Provide a robust, quantitative carbon analysis as part of the PA.

As the FS is considering the optimal method of accomplishing the purpose and need for the North Clack project, please consider that active management is not always the best avenue to achieve forest health. In the comments above, Bark

has provided ample suggestions to improve this project – based on our survey of both the project area and the scientific literature pertaining to aquatics, wildlife, roads, and forest health. We anticipate a thorough review of these comments and look forward to the necessary changes made to both the forthcoming decision and the project itself.

Thank you,

Michael Krochta
Forest Watch Coordinator, Bark