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Oregon Central Coast Forest Collaborative (OCCFC)

Wildlife ZOA Sub-group

Comment from USFS: Please note that stands to be treated and how to treat them has not been finalized for the proposed NF Smith River Project. We have identified current conditions and desired future conditions (DFC). We are seeking input to help us connect those points – what treatment, where, and when will get us to the DFC**.**

Bullet Points from Wildlife ZOA Sub-group

1) The sub-group has asked that we define the following terms:
   - Interior Forest
   - Buffer
   - Edge
   - Connectivity

This is being worked on separately from this effort by the wildlife biologists on the forest and districts. Please note that there is a current national effort to provide a "framework" that characterizes "old growth" as opposed to "defining" the term old growth. It has been discussed internally and is now anticiapated that we will provide a "framework" of what these terms represent.

2 How are stands selected?

The purpose and need plays a big role in how stands are selected. The purpose and need is developed using the direction found in the Siuslaw National Forest Plan for that specific piece of ground. The existing condition is identify and then purpose and need is developed. What types of opportunities exist to move from the existing condition to the desired future condition? The Siuslaw National Forest's focus is managing for late successional reserve (LSR) with the objective to accelerate old growth characteristics which would then enhance habitat for species listed under the Endangered Species Act. We are also informed by local Watershed Analysis, LSR Assessments and the Northwest Forest Plan.

A silviculturist identifies which stands would benefit from treatments in order to move those stands towards the desired future condition, then Interdisciplinary Team members (IDT), such as wildlife biologists, looks at the laws and regulations and guidelines for the treatments proposed – do we need buffers to meet our Northern Spotted Owl Recovery Plan, how large do our Riparian buffers need to be to meet Northwest Forest Plan Aquatic Conservation Strategy Objectives, etc, etc? This approach helps ensure that the needs, recommendations, and/or concerns of potentially affected resources (including individual wildlife species) are given adequate consideration and appropriate priority.

1) **Silviculture Considerations**- Stand management is capped at 80-years within our Late Successional Reserve land allocation (Adaptive Management Reserve land allocation is 110); therefore, stands are recommended for treatment primarily based on age. The vast majority of the Siuslaw is Late Successional Reserve so restoration thinning has been the focus since the Northwest Forest Plan was signed.
2) **Logging Systems Considerations**– Stands recommended by Silviculture are assessed keeping in mind questions like: "Can we treat it? and, should we treat it?" in terms of the physical ability to harvest the stands, economic feasibility and resource protection. IDT planning identifies resource concerns that are within stands we may initially select to treat (selected by silviculture based on age).
   a) Consideration of Northern Spotted Owl Activity Centers
      i) Removed from consideration during layout (deferred from treatment).
         (1) Wildlife may review the stand and determine that treatment would be beneficial depending on current habitat conditions.
   b) Consideration of Known Marbled Murrelet Trees

Commented [AW1]: How will the current efforts impact actions?

Commented [AW2]: Terminology may not reflect importance to wildlife or edge effects

Commented [AW3R2]: The collaborative can develop an agreement to support these concepts, we can ask for clarification from the USFS

Commented [AW4]: More research needed on edge effects between thinned and old growth forests, it is important to be clear on what "edge" means

Commented [AW5]: Are high quality remote sensing data available for use during the stand selection process? At what stage are the data verified? How does that influence the decision about treatment?

i) Buffered for protection
ii) Harvest has date and timing restrictions (see Table 3 and Table 4 in Appendix A for date and timing concerns for MAMU and NSO.)

c) Consideration of Special Interest Areas
   i) Kentucky Falls Special Interest Area in North Fork Smith project area
d) Consideration of Hydrologic concerns
   i) Headwalls
   ii) Unstable slopes
   iii) Legacy roads and culverts left on the landscape
e) Consideration of Road issues
   i) Roads, and road work (including temp spurs) is assessed to determine whether a stand is going to be commercially viable for treatment, and whether the stands can be treated feasibly.
      (1) An example would be a decommissioned road with several large fills and culverts to replace to access a 5 acre very young stand or even previously heavily thinned stand that currently has low volume per acre. Unless during an IDT a specialist has a specific need to treat this area or do more work to the road network, I would not consider this stand for a commercial thinning treatment due to the lack of economic viability and the resource impact incurred for a low volume and/or small areas (acres).
   ii) Reconnaissance of possible issues associated with non-key system roads and key road to assist Transportation Planner
f) Consideration of Fisheries issues
   i) Coho habitat stream buffers (Please refer to Table 1 on page 7.)
   ii) Deferred stands are occasionally used as large wood sources for aquatic restoration projects where trees are tipped and removed. These stands may also contain riparian felling and riparian planting sties as part of aquatic restoration strategies. Work is coordinated with Silviculture and Wildlife.
g) Consideration of Economic viability (specific to proposed harvest method for a stand)
   i) Assess trees per acre and/or volume per acre (visually and combined with stand exam data)
   ii) Assess areas within stands that are treatable (viable places that can be logged feasibly and have adequate volume)
   iii) Assess access (roads)
   iv) Assess landings needed
   v) Fluctuating market rates

3) **Wildlife recommendations** are based on nearby habitat conditions for a suite of species dependent on a variety of habitats. Recommendations could include but not limited
   i) Thinning treatments that help restore habitat characteristics and structural complexity of mature late-successional forests capable of supporting multiple wildlife species
   ii) Thinning treatments that help accelerate the development of stands in managed units to promote large diameter trees, multi-layered canopies, understory growth and plant diversity along with naturally occurring snags and dead wood.
   iii) When appropriate, thinning to <40% canopy cover, promotes understory growth and allows the existing mid-story to develop structural features, both of which improve the habitat for Northern Spotted Owl prey and foraging opportunities.
   iv) Deferral of thinning treatments of managed units to retain conditions conducive to arboreal rodent foraging and nesting habitat (primarily for northern flying squirrel and red tree vole).
   v) Mature forest stands adjacent to managed units (planned for treatment) may appear on LiDAR as suitable habitat for MAMU and NSO (based on tree height), but do not necessarily contain habitat structures indicative of MAMU and NSO habitat (e.g., multilayer canopies and microhabitat features capable of supporting nesting platforms); USFS-approved wildlife specialists conduct field assessments to make this determination.

4) **Transportation infrastructure needs** are assessed based on stands that are recommended for treatment. Roads that are no longer needed for the use and management of NFS lands would be candidates for decommissioning. Recommendations would be made to close/store roads that are expected to be needed for future use and management of NFS lands.
5) **Hydrological Recommendations** involve assessing
    a) Soil conditions
        i) Slope (steepness)
        ii) Position (headwall, seeps)
        iii) Potential compaction and displacement of proposed harvest methods
    b) Water Quality
        i) Drainage network
    c) Decommissioning legacy roads or system roads that are no longer needed on the landscape.
        i) Typically, is planned to reduce or eliminate impacts to water quality
        ii) Can be implemented to reduce fragmentation if not impacting water quality
6) **Fisheries** specialists (and hydrology) assess the transportation system for potential to contribute sediment to streams during wet periods. Roads that are susceptible to these conditions may be restricted from timber haul or allowed during dry periods only.
7) **Fisheries**: Plantation stands are selected by Fisheries specialists primarily as tree source areas for large wood placement into adjacent streams. Only stands considered to be "fully stocked" are selected as wood placement source areas. Upland (non-riparian) plantation stands act as tree sources for helicopter wood placement projects. Stands are selected based on proximity to wood placement streams, tree size (16-24" dbh), and accessibility with an excavator.
    a) Tree tipping with an excavator only occurs along existing roads and skid trails that run along the edges or into the interior of the stand. Tree removal from these stands does not measurably decrease stand stocking. Occasionally where slopes are gentle enough for excavator access, trees are tipped within small sections of stands. All tree selections are coordinated with Silviculture and Wildlife personnel.
    b) Plantation stands located within riparian areas and adjacent to streams lacking in large wood may be selected as "riparian felling" stands. Trees from these stands are directionally hand felled into an adjacent stream. Tree felling only occurs along the stand edge that borders a stream and does not measurably decrease stream shading.
    c) "Natural" (non-plantation) stands consisting of mixed conifer age classes and species are selected as "mature tree" wood sources for helicopter wood placement into streams. These stands are selected according to proximity to wood placement streams, and proximity to existing roads. Only Douglas fir trees ranging from 28 to 36" dbh located alongside existing roads (openings) are selected for this treatment. Tree selection follows project design criteria described under the Aquatic Restoration Biological Opinion (ARBO II) to minimize potential adverse effects to terrestrial wildlife species and their habitats.
8) **Archaeology** and heritage survey the recommended stands for impacts to heritage and archeologic resources. Any sites are avoided.

3 How are specific treatments selected?

Specific treatments are not selected, they are identified and then the decision on what is selected is documented in the Decision Notice and FONSI. Transitioning stands into LSR will have impacts to many resources. Treatments are identified with the understanding that short-term impacts may be considered to achieve an expected long term benefit. Public involvement and collaboration help form the decisions around how to balance these impacts.

A. **Silviculture Treatment Recommendations:** Management triggers, Criteria, and Appropriate Activities within LSR are defined in Table 7 of the Late-Successional Reserve Assessment (LSRA) for Oregon Coast Province - Southern Region (November 2000) (PG 42-46).

1) Silviculture; LSR Management Allocation: Landscape position, stand density, composition, and current structure are taken into account to help determine the best approach(es) to move a stand towards LSR conditions. Other resources and their concerns contribute to this process.
2) Silviculture; Matrix Management Allocation: regen, early seral, other?

B. Wildlife:
1) Regulatory Framework that Guides Wildlife Treatments
   i. Northwest Forest Plan (1994)
   ii. Siuslaw National Forest Land Management Resource Plan (1990)
   iii. National Forest Management Act (1976)
   iv. Migratory Bird Treaty Act (1918)
   v. Bald and Golden Eagle Protection Act (1940)
   vi. Forest Service Manual 2670 – Sensitive Species
2) Silviculture and Layout recommendations are assessed, informed, and potentially revised by wildlife specialists based on habitat conditions within and adjacent to stands planned for treatment, including the presence and proximity of habitat features associated with priority wildlife species (e.g., large diameter trees, epicormic branching and other structures capable of supporting nest platforms, naturally-occurring snags and dead wood, etc.).

C. **Treatments recommended by individual resources are reviewed for impacts to other resources as well as logging and transportation feasibility, and prioritized based on site-specific habitat conditions per stand.** Ultimately, the Threatened and Endangered Species species and the habitat they depend on get priority. If a recommended stand is in proximity to NSO nest(s) or MAMU habitat, the stand will be given a wildlife priority for treatment.

4 [OCCFC roads subgroup is] Interest in seeing map layers that show not only the treatment proposals but also the identification of stands adjacent to those selected stands (listing whether the stands had been previously thinned etc.)

All preliminary potential units to be treated (and deferred) have been provided (GIS) for NF Smith. This GIS data will be shared for all changes to the NF Smith project and future projects.

Adjacent mature stands that are not plantations do not have stand ID numbers like plantations.

5 Can Howard [or an appropriate specialist] go through a map and the selection process in the next month or so?

The appropriate specialist(s) will go over our approach (our response for #1 and #2) after we get the bullet points identified.

6 How will the FS reconcile all of the competing habitat needs of T&E species? Is there a process for this?

Species of Concern in a given Project Area may include (but are not limited to):

- Federally listed species (e.g., Marbled Murrelet, Northern Spotted Owl, Pacific Marten)
- Forest-Sensitive species: (e.g., Red Tree Vole, Fringed Myotis, Bald Eagle, and additional species)
- Migratory Birds: nesting and foraging habitat for multiple species associated with early to late seral stages in forest stands

We do not think of this as competing habitat needs, but rather balancing the tradeoffs of short-term versus long-term benefits and consequences of management actions. Wildlife specialists consider and prioritize both stand selection and treatment based on habitat conditions within and adjacent to managed units, with the objective of maintaining and improving those conditions over time for multiple species of concern (including T&E species). These considerations are included in the process of stand selection and stand treatment determination discussed in the responses to How Stands are Selected and How Treatments are Selected.

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7 Is the proposed regen. harvest to create specific habitat. (There was no concern expressed about this proposal, just curiosity)

No regen proposed in NF Smith. Stands typically culminate (MAI-PAI) at around 90 years on the Siuslaw National Forest. Our plantations within matrix have not yet reached culmination. The general landscape goal for our projects is to create or maintain 'a contiguous habitat for species depent upon structural complex forest' and we currently have a limited amount of this habitat; therefore, regeneration harvest runs counter to our landscape goals in older stands (even with matrix). Also, most of our matrix is covered by critical habitat designations and Riparian Reserves.

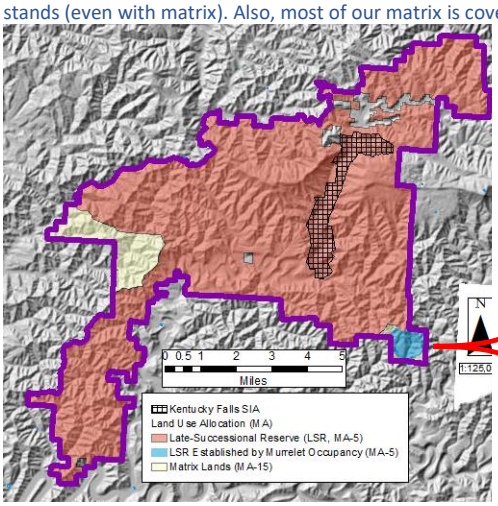

Figure 1. Landuse Allocation in NF Smith Project Area

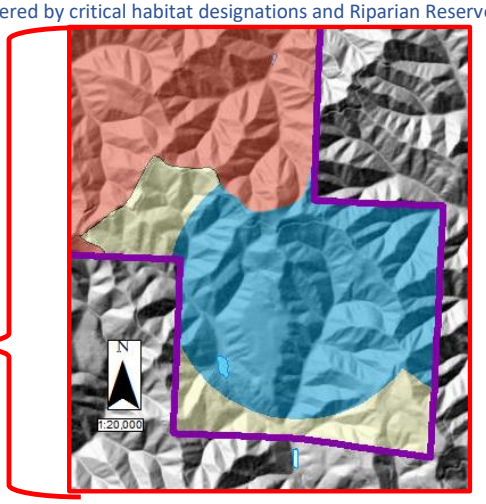

Figure 2. Zoom of southeast corner of NF Smith Project Area.

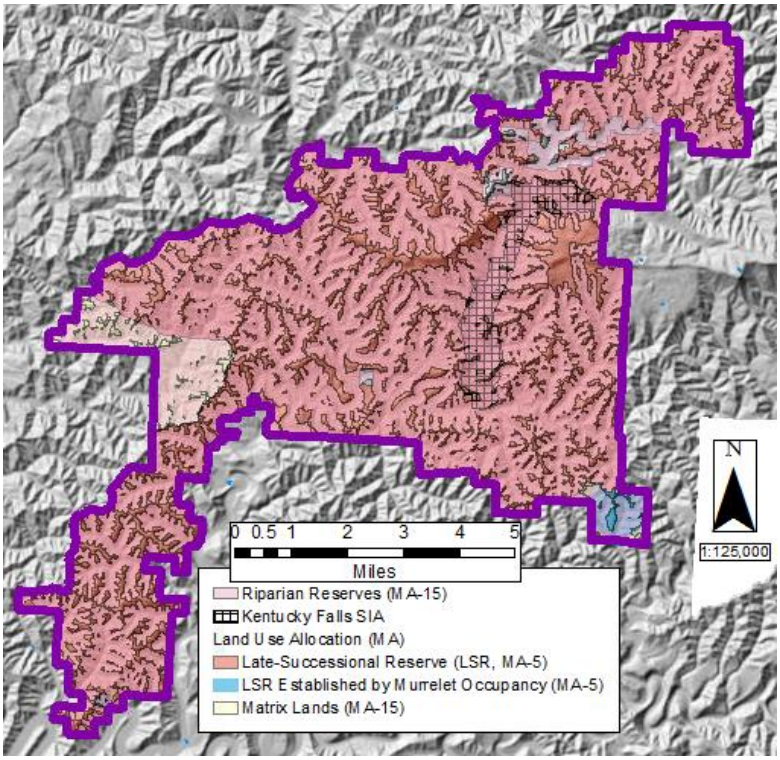

Figure 3. Riparian Reserves in the NF Smith Project Area

8 Is red tree vole impacted by treatment in the project area?

The project area (North Fork Smith River Restoration Project) is outside of the North Oregon Coast Distinct Population Segment (DPS) designated boundary for red tree vole, but the species beyond the DPS has been documented within the watershed. Red tree vole are generally associated with mature older forest stands featuring multi-layered canopies that provide nesting and foraging habitat, but the species has also been documented using younger managed stands featuring high stem counts and overstory canopy connectivity. Thinning could result in short-term and localized declines in abundance for the species; however, suitable red tree vole habitat would increase in the long-term, after structural features associated with older mature forests are reestablished in stands following treatment.

9 Is there currently thinning in the riparian buffer?

Thinning will be considered within the Riparian Reserve areas (Figure 3) as has been the case with past planning areas. Project design criteria (PDC) would be in place that would restrict restoration activities within specified stream buffers based on the stream class. Table 1 is an example from the Deadwood EA, Appendix A – PDCs that shows the outer, inner, and no equipment zones based on stream class. Within the inner zone for all stream classes, only non-commercial restoration is allowed. Please see Table 2 for associated design criteria from the Deadwood EA. The information in Table 1 and Table 2 that was included in the Deadwood EA are from the Programmatic Vegetation and Aquatic Restoration Biological Opinion (BO); Endangered Species Act Section 7 and Magnuson-Stevens Act Consultation; Vegetation and Aquatic Restoration, September 20, 2019.

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Table 1. Riparian Restoration Zones by stream class within the Riparian Reserves.

Stream Class/Definition†	Riparian Restoration Zones		
	Outer Zone	Inner Zone	No Equipment Zone
Class 1 A waterbody containing species listed under the Endangered Species Act (ESA), or municipal water source	100 feet - two SPTH vegetation and aquatic restoration activities	0-100 feet aquatic restoration only	50 feet
Class 2 Fish bearing streams and ponds.	75 feet - two SPTH vegetation and Aquatic restoration activities	0-75 feet Aquatic restoration only	50 feet
Class 3 Non-fish bearing streams and ponds that flow perennially	30 – one SPTH Vegetation and aquatic restoration activities	0-30 feet Aquatic restoration only	30 feet
Class 4 Non-fish bearing streams and ponds that flow intermittently	15 – one SPTH Vegetation and aquatic restoration activities	0-15 feet Aquatic restoration only	15 feet

†Table from the Programmatic Vegetation and Aquatic Restoration Biological Opinion (BO); Endangered Species Act Section 7 and Magnuson-Stevens Act Consultation; Vegetation and Aquatic Restoration, September 20, 2019.

Design criteria Series 300 from the Deadwood EA (Appendix A) are shown in Table 2.

Table 2. Design criteria from Deadwood EA adressing riparian treatments within the riparian zones identified in Table 1

Series 300: Tree Felling, Snag Creation, and Fell and Leave

PDC #	Design Criteria	BO† PDC
301	Any project including tree felling or snag creation within the riparian restoration zones (Table A - 1) must be developed by or reviewed and approved by a fisheries biologist and must be consistent with the Aquatic Conservation Strategy Objectives. This requirement is in addition to any other requirements. *To ensure C1 is achieved and that any individual treatment or any combinations of treatments do not lead to stream warming trends or sedimentation as a result of treatments, all such treatments will include PDCs #309 - #312 (C2-C5).*	C1
302	No tree felling/tipping, fell and leave, and/or snag creation treatment(s) within the riparian restoration zones (Table A-1) of a stand will reduce the live canopy cover below 40%.	C2
303	The combined amount of felling/tipping, fell and leave, and/or snag creation treatment(s) within the riparian restoration zones and within the upland areas (areas outside of riparian reserves) will not exceed the acre values presented in Table A - 6 *(Table 5 of the Aquatic Species Biological Assessment; Endangered Species Act Section 7 and Magnuson-Stevens Act Consultation; Vegetation and Aquatic Restoration)*	C3
304	No tree felling/tipping, fell and leave, and/or snag creation treatment(s) within all riparian restoration zones will create a gap or expand an existing gap to greater than 0.25 acre.	C4
305	Trees for removal must be felled away or parallel to the stream. Trees that are inadvertently felled into the stream, fall and leave trees, or trees felled to create yarding corridors or non-system roads within the stream buffer, must be left on site.	C5

†Programmatic Vegetation and Aquatic Restoration Biological Opinion (BO); Endangered Species Act Section 7 and Magnuson-Stevens Act Consultation; Vegetation and Aquatic Restoration, September 20, 2019. This applies to all project design criteria that shares BO criteria as noted in the BO PDC column.

Appendix A

Table 3. Breeding periods for the Northern Spotted Owl and Marbled Murrelet used in the analysis of project activities.

SPECIES	BREEDING PERIOD	CRITICAL BREEDING PERIOD
Northern Spotted Owl	March 1 – September 30	March 1 – July 7
Marbled Murrelet	April 1 – September 15	April 1 – August 5

Table 4. Disturbance and disruption distances for spotted owls during the breeding period.

Distances are measured from the edge of the 300-meter nest patch unless the nest tree is known, in which case the distance is measured from that tree. Disruption distances have both a spatial and temporal component.

Disturbance Source (Activity)	Disturbance Distances During the Nesting Season (Mar 1 – Sep 30) *NLAA when distance is beyond disruption distances (shown in column to the right)*	Disruption Distances During the Early "Critical" Nesting Season (Mar 1–Jul 7)	Disruption Distances During the Late Nesting Season (Jul 8–Sep 30)
Light maintenance of roads, campgrounds, and administrative facilities	0.25 mile	NA[1]	NA
Log hauling on open roads	0.25 mile	NA[1]	NA
Chainsaws (includes felling hazard/danger trees)	0.25 mile	65 yards[2]	NA
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, etc.	0.25 mile	65 yards[2]	NA
Pile-driving (steel H piles, pipe piles) Rock Crushing and Screening Equipment	0.25 mile	120 yards[3]	NA
Blasting	1 mile	0.25 mile[3] 100 yards (injury)[4]	100 yards (injury)[4]
*Helicopter: Chinook 47d (described as a large helicopter in the rest of this document)	0.5 mile	265 yards[5]	100 yards[6] (hovering only)
*Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	0.25 mile	150 yards[7]	50 yards[6] (hovering only)
*Helicopters: K-MAX, Bell 206 L4, Hughes 500	0.25 mile	110 yards[8]	50 yards[6] (hovering only)
*Small fixed-wing aircraft (Cessna 185, etc.)	0.25 mile	110 yards	NA
Tree Climbing	25 yards	25 yards[9]	NA

Disturbance Source (Activity)	Disturbance Distances During the Nesting Season (Mar 1 – Sep 30) *NLAA when distance is beyond disruption distances (shown in column to the right)*	Disruption Distances During the Early "Critical" Nesting Season (Mar 1–Jul 7)	Disruption Distances During the Late Nesting Season (Jul 8–Sep 30)
Burning (prescribed fires, pile burning)	0.25 mile	0.25 mile[10]	NA

Error! Reference source not found. **(Spotted Owl) Footnotes:**

1. NA = not applicable. Based on information presented in Tempel and Gutiérrez (2003, p. 700), Delaney et al. (1999, p. 69), and Kerns and Allwardt (1992, p. 9), we anticipate that the few spotted owls that select nest sites in close proximity to open roads either are undisturbed by or habituate to the normal range of sounds and activities associated with these roads.
2. Based on Delaney et al. (1999, p. 67) which indicates that spotted owl flush responses to above-ambient equipment sound levels and associated activities are most likely to occur at a distance of 65 yards (60 m) or less.
3. Impulsive sound associated with blasts and pile-driving is highly variable and potentially injurious at close distances. We selected a 0.25-mile radius around blast sites as a disruption distance based on observed prairie falcon flush responses to blasting noise at distances of 0.3 – 0.6 miles from blast sites (Holthuijzen et al. 1990, p. 273). We have conservatively chosen a distance threshold of 120 yards for impact pile-driving and rock-crushing operations to avoid potential hearing loss effects and to account for significant behavioral responses (e.g. flushing) from exposure to continuous sounds from impact pile driving.
4. Exposure to peak sound levels that are >140 dBA are likely to cause injury in the form of hearing loss in birds (Dooling and Popper 2007, pp. 23-24). We have conservatively selected 100 yards as an injury threshold distance based on sound levels from experimental blasts reported by Holthuijzen et al. (1990, p. 272), which documented peak sound levels from small blasts at 138 – 146 dBA at a distance of 100 m (110 yards).
5. Based on an estimated 92 dBA sound-contour from sound data for the Chinook 47d presented in Newman et al. (1984, Table D.1).
6. Rotor-wash from large helicopters is expected to be disruptive at any time during the nesting season due the potential for flying debris and shaking of trees located directly under a hovering helicopter. Hovering rotor-wash distance is based on a 300-ft radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
7. Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6).
8. Based on Delaney et al. (1999, p. 74), which concluded that a buffer of 105 m (115) yards for helicopter overflights would eliminate flush responses from military helicopter overflights. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX (100 feet) (USFS 2008, chapters 5, 6), and Bell 206 (85-89 dbA at 100 m) (Grubb et al. 2010, p. 1277).
9. Based on Swarthout and Steidl (2001, p. 312) who found that 95 percent of flush responses by spotted owls due to the presence of hikers on trails occurred within a distance of 24 m.
10. Based on recommendations presented in *Smoke Effects to Northern Spotted Owls* (USFWS 2008, p. 4).

*Aircraft normally use above ground level (AGL) as a unit of measure. For instance, to not cause a disruption by medium and small helicopters during the late breeding season, the AGL would be 350 feet. 350 feet AGL would account for 200-foot tall trees that NSOs would be occupying plus the 50 yards disruption distance.

Table A - 1. Disturbance and disruption distances for murrelets during the breeding period from the edge of unsurveyed or known occupied stand or nest structure in younger stands

Disturbance Source	Disturbance Distances During the Breeding Period (Apr 1 – Sep 15) *NLAA when distance is beyond disruption distances (shown in column to the right)*	LAA Disruption Distances During the Breeding Period (Apr 1 – Sep 15)	LAA Disruption Distances with daily timing restrictions *, unless noted otherwise (Aug 6 – Sep 15)
Light maintenance of roads, campgrounds, and administrative facilities	0.25 mile	NA[1]	0 yards with no daily timing restrictions
Log hauling on open roads	0.25 mile	NA[1]	0 yards with no daily timing restrictions
Chainsaws (includes felling hazard/danger trees)	0.25 mile	110 yards[2]	N/A with daily timing restrictions
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, etc.	0.25 mile	110 yards[2]	N/A with daily timing restrictions
Pile-driving (steel H piles, pipe piles) Rock Crushing and Screening Equipment	0.25 mile	120 yards[3]	N/A with daily timing restrictions
Blasting	1 mile	0.25 mile[3]	0.25 mile[3]
** Helicopter: Chinook 47d (described as a large helicopter in the rest of this document)	0.5 mile	265 yards[5]	100 yards[6] (hovering only)
** Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	0.25 mile	150 yards[7]	50 yards[6] (hovering only)
** Helicopters: K-MAX, Bell 206 L4, Hughes 500	0.25 mile	110 yards[8]	50 yards[6] (hovering only)
** Small fixed-wing aircraft (Cessna 185, etc.)	0.25 mile	110 yards	N/A with daily timing restrictions
Tree Climbing	110 yards	110 yards[9]	N/A with daily timing restrictions
Burning (prescribed fires, pile burning)	1 mile	0.25 mile[10]	N/A with daily timing restrictions
Drones	0.25 mile	110 yards from nest structure	110 yards from nest structure
Other Activities	0.25 mile	110 yards[2]	N/A with daily timing restrictions

Example: Chainsaws are being used adjacent to a murrelet occupied stand during the period of April 1 to September 15, less than 110 yards from the stand. In this scenario (within the disruption distance), murrelets could be disrupted to the point of likely adversely affecting the murrelets or their young. However, if the chainsaws were being used further than 110 yards away from the occupied stand during the same time period (within the .25-mile disturbance distance, but beyond the 110-yard disruption distance), this chainsaw use would only slightly disturb murrelets, not disrupt their normal behavior. In this case, the chainsaw use is not likely to adversely affect the murrelets because of the further distance the chainsaw use is away from them.

Table A - 1 (Marbled Murrelet) Footnotes:

1. NA = not applicable. We anticipate that the few marbled murrelets that select nest sites in close proximity to open roads either are undisturbed by or habituate to the normal range of sounds and activities associated with these roads

(Hamer and Nelson 1998, p. 21).

2. Based on recommendations from murrelet researchers that advised buffers of greater than 100 meters to reduce potential noise and visual disturbance to murrelets (Hamer and Nelson 1998, p. 13, USFWS 2012c, pp. 6-9).
3. Impulsive sound associated with blasts and pile-driving is highly variable and potentially injurious at close distances. We selected a 0.25-mile radius around blast sites as a disruption distance based on observed prairie falcon flush responses to blasting noise at distances of 0.3 – 0.6 miles from blast sites (Holthuijzen et al. 1990, p. 273). We have conservatively chosen a distance threshold of 120 yards for impact pile-driving and rock-crushing operations to avoid potential hearing loss effects and to account for significant behavioral responses (e.g. flushing) from exposure to continuous sounds from impact pile driving.
4. Exposure to peak sound levels that are >140 dBA are likely to cause injury in the form of hearing loss in birds (Dooling and Popper 2007, pp. 23-24). We have conservatively selected 100 yards as an injury threshold distance based on sound levels from experimental blasts reported by Holthuijzen et al. (1990, p. 272), which documented peak sound levels from small blasts at 138 – 146 dBA at a distance of 100 m (110 yards).
5. Based on an estimated 92 dBA sound-contour (approximately 265 yards) for the Chinook 47d (Newman et al. 1984, Table D.1).
6. Because murrelet chicks are present at the nest until they fledge, they are vulnerable to direct injury or mortality from flying debris caused by intense rotor wash directly under a hovering helicopter. Rotor-wash from large helicopters is expected to be disruptive at any time during the breeding season due to the potential for flying debris and shaking of trees located directly under a hovering helicopter. Hovering rotor-wash distance is based on a 300-ft radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
7. Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6).
8. Based on Delaney et al. (1999, p. 74), which concluded that a buffer of 105 m (115) yards for helicopter overflights would eliminate flush responses from military helicopter overflights. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX (100 feet) (USFS 2008, chapters 5, 6), and Bell 206 (85-89 dbA at 100 m) (Grubb et al. 2010, p. 1277).
9. Based on recommendations from murrelet researchers that advised buffers of greater than 100 meters to reduce potential noise and visual disturbance to murrelets (Hamer and Nelson 1998, p. 13, USFWS 2012c, pp. 6-9).
10. Based on recommendations presented in *Smoke Effects to Northern Spotted Owls* (USFWS 2008, p. 4).

* Daily timing restrictions: Activities would not begin until two hours after sunrise and would end two hours before sunset.
**Aircraft normally use above ground level (AGL) as a unit of measure. For instance, to not cause a disruption by medium and small helicopters during the late breeding season, the AGL would be 350 feet. 350 feet AGL would account for 200-foot tall trees that murrelets would be occupying plus the 50 yards disruption distance.