FINAL • OCTOBER 2024 Terrestrial Habitat Management Plan for the Carmen-Smith Hydroelectric Project (FERC No. 2242)



PREPARED BY

Stillwater Sciences 850 G Street, Suite K Arcata, CA 95521

and

Eugene Water & Electric Board 4200 Roosevelt Blvd Eugene, OR 97402



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Cover photos: From top left counter-clockwise—Roosevelt elk and rough-skinned newt (species documented on the Carmen-Smith Hydroelectric Project, Oregon), and the Carmen-Smith transmission line corridor.

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ACRONYM LIST

Acronym	Definition
BMP	Best management practice
CCU	Cogswell Creek Unit
dbh	Diameter-at-breast-height
EWEB	Eugene Water & Electric Board
FERC	Federal Energy Regulatory Commission
Fund	Terrestrial Wildlife Habitat Fund
GIS	Geographic Information System
MB&G	Mason, Bruce & Girard Natural Resource Consultants
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
ODFW	Oregon Department of Fish and Wildlife
Project	Carmen-Smith Hydroelectric Project
RMP	Resource management plan
Stewardship Plan	Leaburg Forest Project Stewardship Plan
TLMP	Transmission Line Management Plan
трр	Treatment for Noxious/Invasive Non-Native Weeds and
IKP	Revegetation/Enhancement Plan
USFS	U.S. Department of Agriculture Forest Service
USFWS	U.S. Fish and Wildlife Service
VMP	Vegetation Management Plan
VWG	Vegetation Work Group
WMP	Wildlife Management Plan
Work Groups	Vegetation Work Group and Wildlife Work Group
WWG	Wildlife Work Group
Weeds	Noxious/invasive non-native weeds

1 INTRODUCTION AND PURPOSE

The Eugene Water & Electric Board (EWEB) owns and operates the 92-megawatt Carmen-Smith Hydroelectric Project (Project) in Linn and Lane Counties, Oregon under License No. 2242 from the Federal Energy Regulatory Commission (FERC). In 2016, EWEB signed an Amended and Restated Settlement Agreement with federal agencies, state agencies, tribes, and environmental organizations (collectively "Parties") for relicensing the Project (EWEB 2016a). EWEB developed the Carmen-Smith *Wildlife Management Plan* (WMP; EWEB and Stillwater Sciences 2020) and *Vegetation Management Plan* (VMP; EWEB 2016b) in consultation with the Parties to address wildlife and vegetation issues at the Project during the term of the new 40-year FERC License. The new Carmen-Smith License was issued on May 17, 2019 (FERC 2019) (hereafter referred to as "License") and incorporates both the WMP and VMP.

Section 4.5 of the WMP requires EWEB to manage a minimum of 343 acres of terrestrial wildlife habitat, develop a Wildlife Habitat Management Plan to provide the habitat objectives and management activities thereon, and fund a Terrestrial Wildlife Habitat Fund (Fund) for the term of the License that will be used for the creation and management of terrestrial wildlife habitat, including early seral habitat. In addition, Section 4.7 of the VMP requires EWEB to develop a comprehensive plan and schedule for promoting recruitment of dead wood habitat (i.e., snags and downed wood) to increase habitat quality and connectivity for terrestrial wildlife species. EWEB developed this *Terrestrial Habitat Management Plan* (referred to hereafter as "Plan") to meet the requirements of those sections of the WMP and VMP.

A number of other resource management plans (RMPs)¹ address wildlife habitat-related management issues. For example, enhancement of early seral vegetation and habitat restoration using native plant species are also objectives of the VMP and accomplished as part of the vegetation management conducted under the VMP. In that way, these various RMPs are inherently interconnected and applicable to lands managed under this Plan. The objective of this Plan is to provide an integrative and holistic approach to managing habitat by integrating existing RMPs, ensuring that management activities across the 343 acres are consistent with the various objectives and requirements in the RMPs, and ensuring safe operation of the Project and associated transmission line. To ensure integrative management and effective communication among all stakeholders, EWEB will draw from the various plans to prioritize and implement management activities. The Parties will resolve any inconsistencies between this Plan and other RMPs by following the dispute resolution process in Section 7 of the Settlement Agreement.

This Plan describes the requirements, specific lands to be managed for terrestrial wildlife habitat, prescriptions for enhancing wildlife habitat, timeline of the implementation, monitoring, guidance to manage the Fund, and compliance documentation.

¹ Related resource management plans include, but may not be limited to, the following: Carmen-Smith management plans for vegetation, wildlife, aquatics, recreation, roads, and historic properties, and transmission line management; *Carmen-Smith Treatment for Noxious/Invasive Non-Native Weeds and Revegetation/Enhancement Plan; Carmen-Smith Riparian, Wetland, and Meadow Restoration and Enhancement Plan;* and *Leaburg Forest Project Stewardship Plan.* The Carmen-Smith resource management plans will be updated and modified. Land managers are required to refer to and use the most up to date versions of these plans.

2 PLAN REQUIREMENTS

2.1 Management of Terrestrial Habitat

EWEB has committed to managing a minimum of 343 acres for the benefit of terrestrial wildlife habitat for the duration of the License and providing annual updates to the Carmen-Smith Wildlife Work Group (WWG). These acres will include a combination of the following sources: (1) the existing Carmen-Smith transmission line right-of way on U.S. Department of Agriculture Forest Service (USFS) land; (2) widened transmission line right-of way corridor on all USFS land; (3) widened transmission line right-of way corridor on select private lands (referred to as "conservation easements"); and (4) a portion of the EWEB-owned Leaburg Forest. Requirements identified in Section 4.5 of the WMP include the following:

- *EWEB shall manage the 79 acres of the existing Carmen-Smith 115-kV transmission line right-of-way on USFS land for early seral habitat for the term of the License.*²
- EWEB shall manage the acres of the widened transmission line right-of-way corridor on USFS land for the benefit of terrestrial wildlife habitat for the term of the License. EWEB, in consultation with the WWG and subject to approval by the USFS, shall identify the portion of the widened transmission line right-of-way that can be managed for early seral habitat, and EWEB shall manage that portion for early seral habitat for the term of the License.
- EWEB shall, with the WWG's assistance, use best efforts to acquire conservation easements on private lands located along the Project's 115 kV transmission line that qualify as terrestrial wildlife habitat, as determined by EWEB, in consultation with the WWG and subject to approval by the USFS, and manage these lands for their appropriate terrestrial wildlife habitat objectives for the term of the License.
- EWEB shall manage terrestrial wildlife habitat on appropriate EWEB-owned lands above the Leaburg Canal for the term of the License in accordance with a Wildlife Habitat Management Plan that will be developed by EWEB in consultation with the WWG and subject to approval by the USFS. EWEB, in consultation with the WWG and subject to approval by the USFS, shall determine the number of acres to be managed and the habitat objectives for those acres.

2.2 Management of Dead Wood Habitat

EWEB is required to complete a baseline snag and downed wood survey of the Project within three years of License issuance, develop a comprehensive plan and schedule for promoting recruitment of dead wood habitat, monitor the presence and condition of created snags and the condition of placed downed wood habitat at least every five years, use results from the monitoring in future planning, and maintain and update a dead wood database. The recruitment of dead wood is designed to increase habitat quality and connectivity for terrestrial wildlife species that include invertebrates, amphibians, woodpeckers, and mammals (e.g., squirrels, bats).

² The requirement to create early seral habitat along the transmission line corridor is described in the Carmen-Smith *Wildlife Management Plan* (EWEB and Stillwater Sciences 2020) and *Vegetation Management Plan* (EWEB 2016b). Information about implementation and benefits to wildlife habitat are provided in this Plan, as these acreages count towards managed terrestrial wildlife habitat.

2.2.1 Snag creation

EWEB's requirements for creating and managing snags are summarized below (see Section 4.7 of the VMP for a complete description).

- Create and manage 500 snags with a minimum diameter of 14 inches during the License term as mitigation for snags that will continue to be precluded from areas due to Project-related activities. Diameters greater than 20 inches are preferred. EWEB shall create the snags in consultation with the Carmen-Smith Vegetation Work Group (VWG), and subject to approval by the USFS, within five years after License issuance.
- Create snag habitat from identified hazard trees adjacent to the transmission line right-of-way to the extent reasonably practicable (i.e., while still allowing access to the transmission line corridor and in conjunction with other efforts to manage weeds, promote elk forage, and reduce wildfire fuel loading). Additional snags may be created in other areas within the Project boundary, when and where suitable (e.g., along stream reaches and within the Leaburg Forest).
- Monitor the presence and condition of created snags at a minimum of every five years for the License term. EWEB shall maintain and update a database that tracks the creation of snags within one year of receiving the monitoring data.
- *EWEB shall replace snags that have fallen (as determined in the five-year survey) within two years.*
- Replace snags cut during Project-related activities on a 1:1 basis within two years of loss and within a reasonable distance to both the lost snag and the Project boundary. Snags created will have a minimum diameter of 14 inches as described in Section 4.7 of the VMP. Diameters greater than 20 inches and heights with a minimum of 40 feet are preferred. The number and location of snags created shall be determined by EWEB, in consultation with the VWG and subject to approval by the USFS. EWEB shall leave snags felled in place if reasonably practicable but may move snags that may interfere with or create a hazard to use of the transmission line road or other Project-related activities. Snags felled, if left in place, will be felled towards wherever the least amount of large logs exist at the time of felling.

2.2.2 Downed wood placement

EWEB is required to provide for the movement and placement of any large downed wood generated by a variety of Project-related activities. The requirements for the plan and schedule are summarized below (see Section 4.7 of the VMP for a complete description).

- Design the plan in a manner that is consistent with Section 4.5 (Large Woody Debris Management) of the Carmen-Smith Aquatics Management Plan (EWEB 2016c) and will provide for leaving any additional, terrestrial downed wood (i.e., from natural recruitment or felling of hazard trees) in and adjacent to the transmission line corridor right-of-way to the extent reasonably practicable.
- The goal of the plan shall be to place 300 linear feet/acre of downed wood in terrestrial habitat within the Project boundary, counting only wood with a minimum diameter of 12 inches or greater of decay class I and class II.³

³ Decay class I: boles and branches with bark, twigs and needles intact and no moss or other vegetation growing on them; decay class II: boles and branches with bark mostly intact but lacking needles and minimal moss or vegetation (Daniels et al. 1997).

- Prioritize large logs longer than 20 feet and at least 12 inches in diameter at 4.5 feet from the large end to instream fish habitat enhancement measures.
- Include measures to identify wood that is not needed or not acceptable for instream placement and to move that wood to terrestrial areas deficient in large downed wood habitat in the Project area.
- Monitor the condition of placed downed wood habitat at a minimum of every five years during the term of the License. As a part of the monitoring, EWEB shall estimate the condition of placed downed wood using a sub-sampling approach. EWEB shall maintain and update a database that tracks the placement of downed wood within one year of receiving the monitoring data.

3 LANDS MANAGED FOR TERRESTRIAL WILDLIFE HABITAT

3.1 Determination of Lands to Include

A stepwise approach was applied to identify lands to manage for terrestrial wildlife habitat under this Plan.

Step 1: Identify acreage within the existing transmission line right-of-way

• 135.4 acres (83.2 acres USFS lands and 52.2 acres private lands)

Step 2: Identify acreage that could be obtained from the widened transmission line corridor right-of way on USFS and private lands (collectively referred to as the "expanded easements")

• 87.5 acres (82.4 acres USFS lands and 5.1 acres private lands)

Step 3: Identify remaining acreage needed to meet requirement of managing at least 343 acres

 120.1 acres (343 acres needed – 135.4 existing transmission line right-of-way – 87.5 expanded easements)

Step 4: Identify where remaining acreage would be applied

An evaluation to identify potential locations for the remaining acreage included site visits in February and April 2021, where WWG members were invited and attended by Oregon Department of Fish and Wildlife (ODFW), Rocky Mountain Elk Foundation, and USFS, and coordination with the WWG through conversations, meetings, and ranking polls. To ensure that EWEB secured a minimum of 343 acres, fulfilled the FERC deadline for completing this Plan, and could begin habitat management for wildlife, EWEB decided to manage a portion of the Leaburg Forest under this Plan. This update was provided to the WWG in an email on March 23, 2022. The management of a portion of Leaburg Forest for terrestrial wildlife habitat is required by the Settlement Agreement and FERC License. EWEB remains open to funding other terrestrial wildlife land management opportunities (e.g., high-quality early seral habitat) that become available in the future, either through the Fund or another source.

The areas covered under this Plan include a minimum of 343 acres, composed of the existing transmission line right-of-way, the expanded easements, and a portion of the Leaburg Forest (Table 1; Figure 1). The majority of the acreage is public lands managed by the USFS, a large portion is within the EWEB-owned Leaburg Forest, and a small portion is privately owned lands along the Project's transmission line corridor right-of-way and expanded easements. These areas

are described below in Sections 3.2, 3.3, and 3.4, and the habitat prescriptions to benefit terrestrial wildlife (Section 4) include opportunities identified for these areas.

Location	Ownership	Acres
Transmission line comider right of year	Public	83.2
Transmission line corridor right-or-way	Private	52.2
Expanded easements to the transmission	Public	82.4
line corridor right-of-way ¹	Private	5.1
Leaburg Forest	EWEB	138.0
Total		360.9

Table 1. Acreage managed for terrestrial wildlife habitat under the
Carmen-Smith Terrestrial Habitat Management Plan.

¹ Assumes 70-foot addition (i.e., 35 feet on each side).

Adaptive Management: In the face of uncertainty, incorporating adaptive management into this Plan will provide opportunities to adjust future decision making, objectives, and priorities as needed in coordination with the WWG. Circumstances over the term of the License may result in necessary modifications to the lands managed under this Plan. Any updates or modifications to lands or other management policies included in this Plan will be discussed with and approved by the WWG in accordance with Section 4 of the Settlement Agreement ("Coordination and Decision Making"). In submitting the final, revised Plan to FERC for approval, EWEB shall also submit documentation of all WWG and agency consultation; agency approvals; copies of comments and recommendations on the draft revised Plan; and specific descriptions of how the comments and recommendations were accommodated by the final revised Plan. If EWEB does not adopt a recommendation, the filing shall include EWEB's reasons, based on Project-specific information. Revisions to the Plan will not be required to be implemented until EWEB is notified by FERC that the revisions to the Plan are approved. Upon FERC approval, EWEB shall implement the revised Plan, including any changes required by FERC, according to the appropriate terrestrial wildlife habitat objectives consistent with concepts discussed in this Plan.



Figure 1. Areas managed under the Carmen-Smith Terrestrial Habitat Management Plan.

3.2 Transmission Line Corridor Right-of-Way

The Carmen-Smith transmission line corridor right-of-way, as identified within the FERC Project boundary, is an existing transmission line that spans from the Trail Bridge Dam at its northern end, downstream and generally paralleling the McKenzie River, to just southwest of the town of Rainbow (transmission line poles 6 through 144) (Figure 2). The original right-of-way of the 19-mile transmission line corridor is 70 feet wide (i.e., 35 feet on either side of the line).

This Plan includes 135.4 acres along the original right-of-way that EWEB actively manages, which includes USFS public lands (83.2 acres) and private lands (52.2 acres) (Figure 2).

- Areas included: The Carmen-Smith transmission line corridor crosses developed areas at several small private or public locations (e.g., mowed grass along private driveways, Highway 126 [0.1 acre]). However, these areas were determined to be minor and not excluded from the total acreage, since EWEB will exceed the total amount of acres required, which will more than compensate for this small area.
- Areas excluded: The Carmen-Smith transmission line corridor crosses a few larger areas that are either developed or not managed for terrestrial wildlife habitat and were excluded from the Plan: (1) the right-of-way on the Tokatee Golf Club (about 7.1 acres), (2) where the transmission line overlaps public roads (0.7 acres), and (3) where the transmission line spans over the McKenzie River (0.6 acres).

Existing conditions along the transmission line corridor right-of-way primarily consist of upland vegetation dominated by Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western red cedar (*Thuja plicata*) (Stillwater Sciences 2006), and also include red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*), westside lowland riparian, and montane and alpine meadow vegetation types (Oregon Natural Heritage Information Center 2010). The transmission line occasionally crosses or is adjacent to riparian and aquatic habitats (McKenzie River and Deer Creek).

EWEB manages the vegetation along the transmission line right-of-way for habitat enhancements while ensuring safe operation of the transmission line. The vegetation is managed to be consistent with North American Electric Reliability Corporation (NERC) clearance safety requirements, which includes pruning vegetation to a compliance height of 4–6 feet. In 2011, EWEB transitioned from managing the vegetation height from mowing to a more selective approach consisting of hand cutting and topping of woody species. The decision to switch to hand management was made specifically to meet the goals of the Settlement Agreement in anticipation of the License, including the requirement in the WMP to manage the right-of-way for early seral habitat. Annual efforts included manually sweeping the entire corridor and removing target noxious/invasive non-native weeds (weeds), re-visiting and assessing previously treated areas, and identifying the need for additional weed management approaches. In many areas, remnant native species existing within the corridor have been allowed to re-colonize as a response to sun and nutrients "released" following weed removal. Some taller native plants (e.g., red alder, dogwood [Cornus spp.], red elderberry [Sambucus racomosa], and hazel [Corvlus cornuta]) have also been shaped/pruned to allow them to remain under the transmission line. The shift in vegetation management along the right-of-way for more than a decade has increased the overall cover, abundance, and diversity of native species, which has created early seral habitat for terrestrial wildlife and helped to suppress weeds (EWEB 2020). EWEB will continue to enhance the habitat within the transmission corridor through prescriptions and protections described in Section 4.

3.3 Expanded Easements to the Transmission Line Corridor Right-of-Way

EWEB was required to widen the Carmen-Smith transmission line corridor in accordance with Sections 4.5 of the WMP and 1.1 of the Carmen-Smith *Transmission Line Management Plan* (TLMP; EWEB 2022a). These lands are now included in the FERC Project boundary⁴ and managed for the benefit of terrestrial wildlife habitat. To widen the corridor, an additional 35 feet was added to each side of the transmission line corridor right-of-way along all USFS portions of the transmission line (about 82 acres) (Table 1, Figure 2). Similar to the transmission line corridor right-of-way, excluded areas are where the expanded easements to the transmission line corridor right-of-way cross roads and streams (0.9 acres) on public lands. EWEB has used best efforts to obtain similarly expanded easements along private portions of the transmission corridor through the acquisition of conservation easements (see Section 3.3.1). The existing right-of-way (70 feet) plus the expanded easements (35 feet on each side, 70 feet total) makes the newly expanded corridor a total of 140 feet wide (Figure 3). The additional 35 feet on each side is intended to double the total width of the transmission line corridor, although there is no License requirement for a specific distance.

Section 4.5 of the WMP requires EWEB to develop a plan for widening the transmission line right-of-way, and to manage portions of the widened transmission line for early seral habitat for the term of the License. The plan for creating early seral habitat within the expanded easements is described in Section 4.3 and the timeline to implement is described in Section 5, Table 5.

⁴ Lands covered under the FERC Carmen-Smith Project boundary are subject to terms per the License requirements (e.g., historic resource protection, special-status plant surveys).



Figure 2. Existing transmission line corridor right-of-way and expanded easements managed under the Carmen-Smith *Terrestrial Habitat Management Plan*.

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Figure 3. Detail of a portion of public and private properties along the transmission line corridor right-of-way and expanded easements managed under the Carmen-Smith *Terrestrial Habitat Management Plan*.

3.3.1 Expanded Easements on Private Lands

EWEB has coordinated with private landowners whose property overlaps the expanded easements to inform them of the intent to widen the transmission line corridor. In February 2020, EWEB sent a letter to all recorded property owners noting that the proposed conservation easement would include up to an additional 35 feet on each side of the existing transmission line corridor right-of-way, sharing potential future benefits (e.g., enhancing native vegetation, removing weeds and hazardous trees, providing monetary compensation, and creating a transitional buffer zone for wildlife), and inquiring about their interest. Following the initial letter, six landowners responded that they were interested, nine were not interested, and four did not respond. EWEB mailed a follow-up letter in September 2021 to the six interested landowners and the four landowners that did not respond, requesting their contact information to discuss next steps. EWEB received contact information from two landowners, and in February 2022, emailed a pamphlet with additional information about the conservation easement program. EWEB also mailed a final letter along with the pamphlet to the four interested landowners who did not respond to the September 2021 letter and received contact information from one additional landowner.

Three private landowners (about 5 acres) located in Blue River near the western terminus of the Carmen-Smith transmission line have established a conservation easement with EWEB (Figure 2). EWEB conducted site visits to the three properties in March and June 2022. Following a formal agreement being recorded with Lane County, these lands will be included in the FERC Project boundary⁴ and managed over the term of the License for generally the same terrestrial habitat objectives as the expanded easements on USFS lands (e.g., removing weeds, promoting native plant species, and creating snags). EWEB will aim to maintain ongoing and open communication with landowners, as requested and/or as needed, to discuss how the land has improved for wildlife or additional habitat enhancements that could be made.

3.4 Leaburg Forest

The Leaburg Forest, located 17 miles east of Springfield, Oregon, includes approximately 925 acres in the West Cascade foothills. The lands were mostly acquired by EWEB in the 1920s during construction of the Leaburg Canal. The Leaburg Forest borders the Leaburg Hydroelectric Project and represents a large concentration of mature forest. The Leaburg Forest is located in the WC-06 McKenzie River Conservation Opportunity Area, as identified in the Oregon Department of Fish and Wildlife (ODFW) Oregon Conservation Strategy. Key habitats identified for conservation within the WC-06 area include aquatic, late successional forest, and riparian areas (Trout Mountain Forestry 2016).

The Leaburg Forest is situated on generally south-facing lower slopes at 600–1,600 feet in elevation, with soils being well suited to conifer and mixed conifer-hardwood forests. Dry, south-facing slopes are dominated by the Douglas-fir/oceanspray plant association, while moister east and north-facing slopes are dominated by western hemlock, low Oregon grape (*Mahonia nervosa*), and salal (*Gaultheria shallon*). Two principal streams, Cogswell Creek and Johnson Creek, cross Leaburg Forest lands along with numerous smaller intermittent and perennial streams. Cogswell Creek, a portion of which will be managed under this Plan, is a low-gradient stream with a floodplain and channel substrate composed of fine sediment, gravels, and large cobbles. It is classified by the Oregon Department of Forestry as a medium-sized Type F stream (i.e., has fish and may also be used for domestic water), with origins on neighboring lands and ultimately draining into the Leaburg Canal and McKenzie River (Trout Mountain Forestry 2016).

The Leaburg Forest is dominated by conifers, primarily Douglas-fir, with young (1-39 years), middle-aged (40–69 years), and mature (70 years and older) stands. Of the 925 acres, 319 acres are currently identified as managed forest lands (241 are mature, 45 are middle-aged, and 33 are young stands). The remaining 606 acres consist of parks, facilities, infrastructure, and non-forested habitat. Other species include western red cedar, western hemlock, grand fir (Abies grandis), black cottonwood (Populus balsamifera ssp. trichocarpa), golden chinquapin (Chrysolepis chrysophylla), Oregon ash (Fraxinus latifolia), and Pacific madrone (Arbutus menziesii). Hardwood trees (primarily big-leaf maple and red alder) dominate around springs, seeps, forested wetlands, and larger streams. Common understory species include western sword fern (Polystichum munitum), salal, vine maple (Acer circinatum), trailing blackberry (Rubus ursinus), low Oregon grape, and hazel. Red huckleberry (Vaccinium parvifolium), salmonberry (Rubus spectabilis), bracken fern (Pteridium aquilinum), red elderberry, clustered wild rose (Rosa pisocarpa), and oceanspray (Holodiscus discolor) are also present. Past soil disturbance and nearby weed seed sources (neighboring English holly [Ilex aquifolium] orchard) have resulted in widespread weeds that threaten native vegetation, reduce quality and diversity of browse for wildlife, and impact stream hydrology. These species include false brome (Brachypodium sylvaticum), exotic blackberry (Rubus armeniacus and R. laciniatus), scotch broom (Cytisus scoparium), English holly, and English ivy (Hedera helix) (Trout Mountain Forestry 2016).

3.4.1 Determination of lands to include

The acreage to manage for wildlife habitat within the Leaburg Forest (about 120 acres) was based on the remaining amount needed to attain a minimum of 343 acres (see earlier Section 3.1).

To identify which areas of the Leaburg Forest to include in this Plan, the following priorities were considered:

- 1. areas that are not within the existing Leaburg-Walterville Hydroelectric Project FERC boundary;
- 2. a single larger area to enhance wildlife connectivity, as opposed to multiple smaller areas; and
- 3. habitats not found or lacking along the Carmen-Smith transmission line corridor, including reserve forest, wetlands, and riparian areas.

Applying the criteria above, the Cogswell Creek Unit (CCU) of the Leaburg Forest was determined to be the most appropriate to manage for wildlife habitat under this Plan. The CCU is large enough to meet the remaining acreage needed and has a diversity of habitat components, including stream (Cogswell Creek), wetland, a mix of recently harvested and mature forest, and forest openings. These habitat components are either managed through active forest management activities or identified as reserve forests (see definitions below). While these acreages will be primarily managed for late-successional habitat and other habitat types (e.g., hardwood stands), additional and ongoing opportunities include promoting native species, managing weeds, and enhancing riparian/wetland habitats (see Table 3).

3.4.2 Managed and Reserve Areas within Cogswell Creek Unit

In 2016, the EWEB Board of Commissioners approved the *Leaburg Forest Project Stewardship Plan* (Stewardship Plan) to demonstrate conservation-based forest management practices and guide management of the Leaburg Forest (Trout Mountain Forestry 2016). The Stewardship Plan (planned to be updated in 2024) includes desired future conditions, silvicultural approaches, and management recommendations that are intended to enhance and/or protect water quality, forest health, and wildlife habitat. The Stewardship Plan classifies areas within the Leaburg Forest as "Managed" or "Reserve" based on their characteristics and management objectives, with each area assigned a unique identifier and stand boundary.

- **Managed** Areas include even-aged and uneven-aged stands in which a variety of silvicultural approaches have been and will continue to be employed. The goal is to create more complex forest structure, provide for crown development, establish a new age cohort, provide early seral conditions, and conduct sustainable timber harvest. Proceeds are reinvested in the Leaburg Forest and support source water protection programs in the McKenzie Watershed. Several Managed Areas were treated in 2017 and 2022 (Table 2). The approach used is a site-specific decision based on existing stand conditions and management objectives. The Managed Areas encompass 111.5 acres and include seven stands: 201, 202, 203, 205, 207, 208, and 209 (Table 2, Figure 4).
- **Reserve** Areas are lands that have been identified as sensitive sites (unstable soils, steep slopes, and riparian areas), as either having late successional characteristics (i.e., structurally complex stand structure) or on track to naturally develop within a reasonable period of time, or as having uncommon forest types such as hardwoods or forested wetlands. These Reserve Areas are not based on size and are "reserved" from commercial timber harvest. The goal is to protect mature and diverse stands, water quality, and other sensitive resources within these Reserve Areas. The Reserve Areas encompass 26.5 acres and include six stands: 102, 103, 106, 107, 204, and 206 (Table 2, Figure 4).

Within the CCU, EWEB decided to include in this Plan the Managed and Reserve Areas located west of the "dump road" (i.e., the road to the Lane County Transfer Station). These lands are now included in the FERC Project boundary⁵ and managed for the benefit of terrestrial wildlife habitat. Although this acreage (138 acres) provides more than needed to attain a minimum of 343 acres, it allows EWEB to manage one large contiguous area that includes Reserve Areas of interest (e.g., Cogswell Creek [Stands 102 and 107]) and maintains approximately⁶ the same stand boundaries as identified in the Stewardship Plan. Retaining the same stands will ensure effective communication with the Leaburg Forest land managers and an integrated approach that allows these lands to be managed concurrently under both this Plan and the Stewardship Plan.

⁵ Lands covered under the FERC Carmen-Smith Project boundary are subject to terms per the License requirements (e.g., historic resource protection, special-status plant surveys).

⁶ Some stand boundaries were slightly adjusted by the surveyor for mapping purposes and incorporation into the Carmen-Smith FERC boundary.

Stand	Description	Acres
Managed A	reas	
201	~85-year-old Douglas-fir (<i>Pseudotsuga menziesii</i>) dominated stand. Additional age classes and species were established following a 2017 thinning and variable retention harvest that resulted in about 10 acres of openings (early seral habitat). Western red cedar (<i>Thuja plicata</i>), incense cedar (<i>Calocedrus decurrens</i>), and Douglas-fir seedlings were planted in harvest openings. The understory shrub layer includes red huckleberry (<i>Vaccinium parvifolium</i>), salal (<i>Gaultheria shallon</i>), hazel (<i>Corylus cornuta</i>), cascara (<i>Frangula purshiana</i>), vine maple (<i>Acer circinatum</i>), western sword fern (<i>Polystichum munitum</i>), thimbleberry (<i>Rubus parviflorus</i>), native trailing blackberry (<i>Rubus ursinus</i>), exotic blackberry (<i>R. armeniacus</i> and <i>R. laciniatus</i>), and various forbs.	30.0
202	~85-year-old Douglas-fir dominated stand with a mixture of western hemlock (<i>Tsuga heterophylla</i>), western red cedar, and grand fir (<i>Abies grandis</i>) in localized areas. Occasional hardwoods include big-leaf maple (<i>Acer macrophyllum</i>) and red alder (<i>Alnus rubra</i>). The understory is dominated by vine maple, salal, low Oregon grape (<i>Mahonia nervosa</i>), hazel, red huckleberry, and ferns. The stand was treated in 2022 with thinning and variable retention harvest to maintain stand vigor and encourage development of additional age classes. Some portions of the stand (larger, older trees) may be suitable for snag creation.	50.6
203	Dominated by a younger (~40-year-old) age class of planted Douglas-fir with occasional larger conifers and big-leaf maple pockets. The stand was thinned in 2017 to maintain live crown depth and stand vigor.	10.0
205	Dominated by a younger (~40-year-old) age class of planted Douglas-fir with occasional big-leaf maple and red alder pockets. The stand was thinned in 2017 to maintain live crown depth and stand vigor.	5.2
207	A variable retention harvest unit that was planted in 2018 with a mixture of Douglas-fir, western red cedar, western hemlock, grand fir, and incense cedar. Early seral conditions include big-leaf maple sprouts and a mix of forbs and grasses along with planted conifer seedlings and occasional scattered mature Douglas-fir.	9.4
208	An aggregated retention block associated with the 2017 variable retention harvest Stands 207 and 209. Dominated by mature Douglas-fir and occasional big-leaf maple.	2.3
209	A variable retention harvest unit that was planted in 2018 with a mixture of Douglas-fir, western red cedar, western hemlock, grand fir, and incense cedar. Early seral conditions include big-leaf maple sprouts and a mix of forbs and grasses along with planted conifer seedlings and occasional scattered mature Douglas-fir.	4.0
Total Man	aged Areas	111.5

 Table 2. Managed and Reserve Areas within the Cogswell Creek Unit of the Leaburg Forest managed under the Carmen-Smith Terrestrial Habitat Management Plan.

Stand	Description	Acres
Reserve Are	285	
102	Hardwood riparian stand surrounding Cogswell Creek. The overstory is dominated by red alder with occasional scattered Douglas-fir, western red cedar, grand fir, big-leaf maple, and black cottonwood (<i>Populus</i> <i>balsamifera</i> ssp. <i>trichocarpa</i>). The understory shrub layer is dominated by salmonberry (<i>Rubus spectabilis</i>), vine maple, and osoberry (<i>Oemleria</i> <i>cerasiformis</i>), with occasional shade-tolerant sapling conifers (grand fir, western red cedar, and western hemlock). Weed species include occasional pockets of Himalayan blackberry (<i>Rubus bifrons</i>) and occasional English holly (<i>Ilex aquifolium</i>).	5.5
103	A fairly open-canopy hardwood patch dominated by red alder surrounded by a Douglas-fir dominated stand. Understory species include vine maple, hazel, nettle (<i>Urtica dioica</i>), and Himalayan blackberry.	1.2
106	A closed-canopy hardwood patch dominated by red alder bisected by a seasonal unnamed stream. There is also a small wetland and occasional big-leaf maple. Historical disturbances related to construction of the Leaburg Canal have heavily impacted this site and resulted in realignment of the stream channel and a heavy weed component, which may require significant restoration effort.	1.4
107	~84-year-old conifer-dominated stand with trees of varying ages adjacent to and including portions of the Cogswell Creek riparian area. This stand is dominated by Douglas-fir with lesser components of grand fir, western hemlock, and western red cedar. Scattered hardwoods include big-leaf maple and red alder. There are frequent canopy openings that support a shrub layer dominated by vine maple, western sword fern, low Oregon grape, and red huckleberry. Occasional grand fir and western red cedar saplings are also present in the understory. There is an obvious deficit of snags and downed wood, and weed species include spurge laurel (<i>Daphne</i> <i>laureola</i>), false brome (<i>Brachypodium sylvaticum</i>), Himalayan blackberry, and occasional English ivy (<i>Hedera helix</i>).	7.1
204	This mixed hardwood/conifer stand is likely at least 70 years old, bisected by a seasonal stream, and dominated by big-leaf maple and scattered large conifers (mostly Douglas-fir, with occasional western red cedar, western hemlock, and grand fir). Vine maple, hazel, western sword fern, red huckleberry, and oxalis dominate the understory.	9.6
206	Big-leaf maple and woody-shrub dominated stand at the headwall of a seasonal stream.	1.7
Total Rese	rve Areas	26.5
Total Acre	age	138.0



Figure 4. Cogswell Creek Unit of the Leaburg Forest managed under the Carmen-Smith Terrestrial Habitat Management Plan.

FINAL

4 HABITAT PRESCRIPTIONS TO BENEFIT WILDLIFE

The management objective of this Plan is to provide a diversity of high-quality habitats, rather than to manage for any particular wildlife species. Enhancing and diversifying existing conditions is intended to create a greater variety of natural structure that will support the needs and niches of multiple terrestrial species (e.g., pollinators, amphibians, raptors, woodpeckers, songbirds, deer, elk, and bats). Habitat enhancements are intended to support perching, roosting and nesting, cover from environmental elements and predators, traveling routes/connectivity, prey base, and foraging opportunities. While the existing habitats managed under this Plan and the habitat objectives can generally be summarized (Table 3), several site-specific factors may be considered when evaluating and determining which wildlife habitat enhancements to implement. These factors may include, but are not limited to, the following:

- site-specific environmental conditions (e.g., slope, solar and wind exposure, proximity to water/wetlands, proximity to timber harvests and previously burned areas, plant community composition, and tree stand characteristics);
- anthropogenic considerations (distance to roads/trails);
- safety concerns (fire hazard, height of transmission line);
- expected future decline in a particular wildlife species or habitat type;
- feasibility of implementation (e.g., access and costs);
- compatibility with requirements/objectives in other RMPs; and/or
- adaptive management (lessons learned from the implementation or effectiveness of treatments [e.g., certain types of created snags are more effective at providing future nesting habitat or last longer than others]).

4.1 Opportunities for Wildlife Habitat Enhancement Prescriptions

Means to enhance habitats (referred to hereafter as "prescriptions") were discussed during site visits with some WWG representatives in February and April 2021 and ongoing conversations with the USFS, and/or were developed based on literature review and anecdotal knowledge. Prescriptions, their benefit to terrestrial wildlife, and locations where the prescriptions are intended to be implemented are described in Table 3 and Sections 4.2, 4.3, and 4.4. Table 3 includes both License-required actions that are to be implemented in accordance with a management plan and opportunities that are intended to further enhance habitats and will be considered as part of this Plan on a site-specific basis. New opportunities and techniques for restoring or enhancing areas, especially those that are cost-effective and provide a unique benefit to wildlife habitat, may be considered and discussed with the WWG in the future. Prescriptions included in Table 3 include the following:

- 1. Protect and/or enhance areas of early seral habitat
- 2. Reduce forest edge effect
- 3. Enhance/promote late successional forest
- 4. Protect and/or enhance hardwood components
- 5. Manage noxious/invasive non-native weeds
- 6. Educate the public and reduce anthropogenic effects
- 7. Stabilize soils
- 8. Create and manage snags
- 9. Place and manage downed wood

- 10. Enhance bat roosting and bird nesting and perching opportunities
- 11.Create brush and wood piles
- 12. Protect and/or enhance riparian and wetland sites

Implementation of prescriptions, specifically ground disturbance during transmission line widening and snag creation activities, will follow best management practices to the extent possible to avoid or minimize adverse effects on sensitive biological resources (e.g., archaeological sites, native vegetation, rare plants, wetlands and waters, and special-status wildlife species that include northern spotted owl [*Strix occidentalis*], harlequin duck [*Histrionicus histrionicus*], and American peregrine falcon [*Falco peregrinus*]). Best management practices may include implementing a physical buffer, modifying heavy equipment activities, and/or adjusting the timing of activities. EWEB or EWEB's designated forester will coordinate with the USFS prior to commencing work activities on USFS lands.

Table 3. Opportunities	s for wildlife I	habitat enhancemen	t prescriptions.
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				Орро	rtunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
1. Protect and/or enhance areas of early seral habitat	Protect existing areas of early seral stage vegetation (e.g., native grasses, forbs, low-growing shrubs) created as a result of hand-management along the Carmen-Smith transmission line corridor right-of-way, tree topping and/or removal along the expanded easement, and canopy openings (patch cuts) in the Leaburg Forest. Create and maintain new early seral habitat, in coordination with the Carmen-Smith Vegetation Work Group (VWG) and Wildlife Work Group (WWG) (collectively "Work Groups") and consistent with the objectives and requirements in the Carmen-Smith Vegetation Management Plan (VMP; EWEB 2016b). The existing transmission line corridor right-of-way will continue to be managed for native early seral habitat. In addition, EWEB will identify and manage for the term of the License the portions of the expanded easement that can be managed for early seral habitat. Opportunities for further enhancement will be considered (e.g., increasing native plant diversity or early seral species that benefit wildlife).	 Enhancing forb and shrub growth will increase the abundance and diversity of wildlife species that may use the habitats for foraging, perching, nesting, and cover. The lack of a closed canopy in early seral areas will also allow light and heat to penetrate the ground, which is an essential habitat feature for reptiles (NRCS 2007). Benefits of increased native vegetation: Enhances invertebrate production to sustain insect-eating bats (BiodiversityWorks 2021), birds (Helden 2012), and mammals that are known to eat insects (e.g., squirrels, chipmunks, foxes) (North American Nature 2022) Enhances flowering species/nectar for pollinators (native bees and butterflies); see Appendix B for a list of native plants with their known association with North American Lepidoptera (butterflies and moths) in Lane County, Oregon Increases structure (nesting habitat, perching, and escape cover) for birds associated with early seral habitat, such as warblers (e.g., MacGillivray's [<i>Geothlypis tolmiei</i>] and orange-crowned [<i>Leiothlypis celata</i>]), rufous hummingbird (<i>Selasphorus rufus</i>), willow flycatcher (<i>Empidonax traillii</i>), warbling vireo (<i>Vireo gilvus</i>), purple martin (<i>Progne subis</i>), swallows (tree [<i>Tachycineta bicolor</i>] and violet-green [<i>T. thalassina</i>]), bushtit (<i>Psaltriparus minimus</i>), house wren (<i>Troglodytes aedon</i>), ruby-crowned kinglet (<i>Corthylio calendula</i>), American robin (<i>Turdus migratorius</i>), Swainson's thrush (<i>Catharus ustulatus</i>), western bluebird (<i>Sialia mexicana</i>), white-crowned sparrow (<i>Zonotrichia leucophrys</i>), and American goldfinch (<i>Spinus tristis</i>) (Coe and Woodward 2015) Prowides top-down browsing opportunities (e.g., forbs, legumes, shrubs) for deer and elk Increases quality of elk forage to maintain caloric requirements Supports small mammal populations, which promotes healthy populations of their predators 	 Preventing ground disturbance of protected native vegetation to the extent possible (e.g., confining heavy equipment to access roads, training work crews, and other best management practices [BMPs]). Pruning/topping woody vegetation and small trees (e.g., red alder [<i>Alnus rubra</i>], dogwood [<i>Corrus spp.</i>], red elderberry [<i>Sambucus racomosa</i>], and hazel [<i>Corylus cornuta</i>]) such that they do not extend above about 5 feet in height, which maintains early seral habitat. Removing all vegetation, except for native grasses, within 20 feet of transmission line tower pads—to maintain tower access and establish native plants in disturbed areas. Monitoring and removal of noxious/invasive non-native weeds (weeds) (e.g., scotch broom [<i>Cytisus scoparium</i>], spotted knapweed [<i>Centurea stobel</i>] that outcompete native early seral species, consistent with the VMP and associated plans. Updating EWEB's Geographic Information System (GIS) database with weed spatial data documented in surveys. Removing and/or topping trees to create early seral habitat conditions, or expand existing areas of early seral habitat (e.g., where the transmission line corridor abuts U.S. Department of Agriculture Forest Service [USFS] timber harvests). Implementing patch cuts in the Leaburg Forest with wide seedling spacing to encourage early seral habitat development. Monitoring of native vegetation and natural regeneration/ response as a result of enhancement efforts, consistent with the VMP. Updating the GIS database and documenting shifts (e.g., new or expanded plant populations) that impact the habitat value. In areas required for revegetation, re-vegetating with early seral stage species where appropriate, and monitoring performance standards per the VMP and associated plans. Identifying opportunities for areas that could benefit from further enhancement, in coordination with the Work Groups. Examples include identifying re-seeding	Х	X	X

				Oppo	ortunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
2. Reduce forest edge effect	The transmission line corridor is primarily bordered by mixed conifers, which form an abrupt edge between the open transmission line and adjacent forested areas (Figure 13). Wildlife, particularly larger species, hesitate when entering into an open corridor from the cover and safety of the forest. The goal is to promote vertical structure of larger shrubs and small trees within the expansion area (i.e., 35 feet on each side of the existing right-of-way), which will enhance the understory and create a softened, "feathered" edge to the corridor. The creation of a feathered-edge effect is shown in Figures 14 and 15. Opportunities for further enhancement will be considered (e.g., increasing native plant diversity or planting specific early- and mid-seral native species that benefit wildlife).	 Developing more vertical structure within the understory (i.e., multi-tier) will enhance the diversity of habitat along the corridor edge and make the corridor more inviting by creating a diversity of cover and/or foraging opportunities for a variety of wildlife species. Deciduous shrubs such as cascara, oceanspray (<i>Holodiscus discolor</i>), dogwood, snowberry, hazel, and osoberry (<i>Oemleria cerasiformis</i>) are especially beneficial to songbirds (Coe and Woodward 2015). Benefits of increased structure and diverse herbaceous vegetation: Improves habitat connectivity of the transmission corridor with adjacent forest Increases wildlife movement/activity (willingness to enter in and out of the corridor and travel along the corridor) Provides cover for deer, elk, and other mammals to escape predators Enhances foraging opportunities (fruit, seeds, nuts) and structure (nesting habitat, perching, and escape cover) for birds. For example, the ruby-crowned kinglet forages almost exclusively in shrubby habitats (Coe and Woodward 2015), and flowering shrubs such as salal, salmonberry, huckleberry, and low Oregon grape (<i>Mahonia nervosa</i>) provide fruits for American robin and Swainson's thrush (Altman and Hagar 2007). Promotes a diversity of insect prey for bats (Taylor et al. 2020) Attracts birds that use understory to midstory-level vegetation, which will diversify the bird community along the corridor Supports small mammal populations, which promotes healthy populations of their predators 	 Removing and/or topping trees within the expanded corridor is expected to reduce forest edge effect by opening the canopy (i.e., removing competition) and providing sunlight and space to the newly opened areas. This will allow remnant native plants in the understory to re-colonize and/or grow more robust and develop a feathered edge. It will also increase clearance and protection to the powerlines. Seeding or restoring areas impacted by the harvest, in accordance with the VMP and associated plans. Protecting the native plant populations that establish and preventing ground disturbance to the extent possible (e.g., confining heavy equipment to access roads, training work crews, and other BMPs). Monitoring and removal of weeds, consistent with the VMP and associated plans, to allow remnant native vegetation to recolonize. Updating the GIS database with weed spatial data. Monitoring of native vegetation and natural regeneration/ response as a result of enhancement efforts, consistent with the VMP. Establishing fixed photo monitoring locations prior to commencing transmission line corridor harvest activities, and re-visiting the same locations over time to document habitat changes along the corridor edge. Updating the GIS database and documenting shifts (e.g., new or expanded populations) that impact the habitat value. In areas required for revegetation, re-vegetating with species that will enhance structural diversity in areas where that is lacking, and monitoring for performance standards per the VMP. Identifying opportunities for areas that could benefit from further enhancement, in coordination with the Work Groups. Examples include planting and/or encouraging large shrubs and small trees (e.g., dogwood, hazel, vine maple [<i>Acer circinatum</i>], big-leaf maple [<i>A. macrophyllum</i>]), re-vegetating areas that lack remnant native species, and planting areas with low species diversity or little wildlife value. 		X	

				Орро	ortunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
3. Enhance/promote late successional forest	The Leaburg Forest represents a large concentration of mature forest habitat in the area and is located in the WC-06 McKenzie River Conservation Opportunity Area, which identifies late successional forest as a key habitat for conservation. Within the Leaburg Forest, areas are classified as "Managed" or "Reserve" based on their characteristics and management objectives (<i>Leaburg Forest Project Stewardship Plan</i> [Stewardship Plan; Trout Mountain Forestry 2016]). One of the goals of the Stewardship Plan is to enhance the forest health and structure by diversifying with a variety of different ages and species and promoting late successional characteristics (e.g., large live trees, multiple canopy layers, snags, large down logs, and well-developed native understory vegetation).	 Enhancing forest health and structure will promote a mix of native vegetation and diversity of habitats that will support multiple wildlife species. Benefits of a diverse, complex forest: Bats roost in voids and crevices found in trees as a result of disease, decay, and damage (e.g., woodpecker holes, squirrel holes, wounds, compression forks, butt rots, lighting strikes, and subsidence cracks) (Andrews 2018). Older-aged and larger trees are more likely to reach a state of decay or experience damage that would support cavities. Late-successional conifers are important for wildlife, including the Oregon Department of Wildlife Strategy Species (Oregon Conservation Strategy 2022) found in the vicinity of the Carmen-Smith Hydroelectric Project (e.g., the Oregon slender salamander [<i>Batrachoseps wright</i>], northern spotted owl [<i>Strix occidentalis</i>], and red tree vole [<i>Arborimus longicaudus</i>]]. Silvicultural treatments (e.g., thinning and patch cuts) are intended to enhance forest health and structure by improving the quality of forest stands (e.g., promoting crown development, multi-aged stands, tree diversity and growth, structural complexity, and understory vegetation) (Trout Mountain Forestry 2016). These elements allow the stand to develop multiple canopy layers, which increases vertical diversity may support a more diverse bird assemblage than conifer-dominated, closed canopy stands (Chambers et al. 1999 as cited in Altman and Hagar 2007). Increased crown development supports overstory-dwelling wildlife, while greater herbaceous cover supports understory-dwelling wildlife (Moorman 2007) and insect prey for bats (Taylor et al. 2020). Thinning promotes retention of lateral branches and allows conifers to form deep crowns. Thick lateral branches (providing substrate for nests) and deep crowns are unique ol-growth characteristics important to several bird species (Altman and Hagar 2007). Thinning also accelerates the development of large diameter trees for wildlife (Zob	 Implementing silvicultural treatments within Managed stands based on site-specific conditions and management objectives, and in accordance with the Stewardship Plan (Trout Mountain Forestry 2016). Implementing habitat enhancements in conjunction with silvicultural treatments and/or as appropriate (e.g., snag creation, piled logs/slash, and plantings). Identifying and preserving trees with high wildlife value (e.g., woodpecker holes, upper-canopy defects such as a forked/broken top, existing snags), and existing stands with late successional characteristics (i.e., structurally complex structure). Managing the native vegetation as protected areas and preventing ground disturbance to the extent possible (e.g., confining heavy equipment to access roads, training work crews, and other BMPs). Monitoring and removal of weeds (e.g., flase brome [<i>Brachypodium sylvaticum</i>], Himalayan blackberry [<i>Rubus bifrons</i>], English ivy [<i>Hedera helix</i>]), consistent with the VMP and associated plans. Updating the GIS database with weed spatial data. Monitoring of native vegetation and natural regeneration/response as a result of enhancement efforts, consistent with the VMP. Updating the GIS database and documenting shifts (e.g., new or expanded populations) that impact the habitat value. Performing an onsite assessment of the stands managed under this Plan by a qualified forester to evaluate general condition (e.g., vigor, seedling survival, shrub development) and any habitat enhancement or adaptive management needs. Bird surveys in Managed stands or other wildlife monitoring that can inform effectiveness of treatments or management practices¹. Breeding bird point count surveys have previously been conducted in the Leaburg Forest, including a pre-treatment survey in 2022 within Managed Stand 202. To maintain consistency, EWEB intends to conduct the post-treatment breeding bird survey within Stand 202. If additional bird surveys are proposed for future silvicu			X

				Орро	ortunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
4. Protect and/or enhance hardwood components	Hardwood trees within the Leaburg Forest (e.g., red alder, big-leaf maple, black cottonwood [<i>Populus</i> <i>balsamifera</i> ssp. <i>trichocarpa</i>], and Pacific madrone [<i>Arbutus menziesii</i>]) dominate around springs and seeps, forested wetlands, and along streams. Having been identified as an uncommon forest type, these hardwood/hardwood-riparian stands are classified as "Reserve Areas". They are managed for their unique and/or sensitive habitat characteristics and generally reserved from silvicultural treatments. Habitat enhancement actions should be applied to these Reserve Areas to increase habitat features for wildlife (Trout Mountain Forestry 2016).	 Hardwood trees such as dogwood, red alder, and big-leaf maple provide mostly foraging benefits to wildlife and are important to supporting diverse bird populations. Benefits of hardwood trees: A stand composed of 6–10% of hardwoods greatly increases the abundance and diversity of early seral- dependent songbirds (Coe and Woodward 2015). For example, the abundance of the warbling vireo is related to the presence of hardwoods (Hagar et al. 1996). Enhances foraging opportunities for birds, including early in nesting season. For example, chestnut-backed chickadees (<i>Poecile rufescens</i>) disproportionately feed in hardwoods in conifer-dominated stands (Weikel 1997). Some hardwood species produce nuts and berries (Zobrist and Hinckley 2012) and support herbivorous insects (e.g., caterpillars and aphids) (Altman and Hagar 2007) that serve as important wildlife food sources. Supports nesting habitat as some species of hardwoods, such as big-leaf maple, often feature cavities that attract cavity-nesting birds (Hayes et al. 1997). Red alder and big-leaf maple provide forage (seeds, buds, flowers, twigs) eaten by small birds, mammals, deer, and elk (Native Plants PNW 2014 and 2015). In coniferous forests in western Oregon, more than half of all butterfly and moth species are associated with deciduous trees and shrubs (Hammond and Miller 1998 as cited in Altman and Hagar 2007). See Appendix A for a list of plants included in EWEB's approved seed mix and other local native plants that benefit terrestrial wildlife species, and Appendix B for a list of native plants with their known association with North American Lepidoptera (butterflies and moths) in Lane County, Oregon.	 Protecting existing stands (i.e., Reserve Areas) and retaining/ stabilizing hardwood conditions. Monitoring and removal of weeds, consistent with the VMP and associated plans, to allow native hardwood/ hardwood-riparian vegetation to proliferate. Updating the GIS database with weed spatial data. Monitoring of native vegetation and natural regeneration/ response as a result of enhancement efforts, consistent with the VMP. Updating the GIS database and documenting shifts (e.g., new or expanded populations) that impact the habitat value. In areas required for revegetation, re-vegetating with species that will enhance the hardwood component or structural diversity in the understory, and monitoring for performance standards per the VMP. Performing an onsite assessment of the Reserve stands managed under this Plan, by a qualified forester in coordination with EWEB, to evaluate general stand condition and any habitat enhancement or adaptive management needs. Identifying opportunities for areas that could benefit from further enhancement, in coordination with the Work Groups and EWEB's designated forester. Examples include targeting areas with heavy weeds, multi-species plantings (e.g., competitive native vegetation, planting specific species that provide foraging and/or nesting opportunities for forest birds, and improving stream health and function in hardwood stands. 			Х

				Орра	rtunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
5. Manage noxious/invasive non-native weeds	In 2010, EWEB transitioned from mowing to hand management along the entire Carmen-Smith transmission line corridor right-of-way. Annual efforts included manually sweeping the right-of-way and removing noxious weeds, re-visiting previously treated areas, and assessing the need for additional weed management approaches. In many areas, existing remnant native plants and seeds have been allowed to re-colonize as a response to sun and nutrients "released" following weed removal. The increase in native vegetation has created enhanced wildlife habitat and helped to suppress weed species. Where repeated hand-removal of weeds has not been successful, limited herbicide application may occur in these targeted areas. Monitoring and removal of weeds will also be implemented along the expanded easement to the transmission line corridor right-of-way and within the Leaburg Forest, in accordance with the VMP and associated plans. Past soil disturbance, a nearby English holly (<i>Ilex aquifolium</i>) plantation, and lack of a coordinated weed control effort have resulted in widespread noxious weeds within the Leaburg Forest. However, invasive weed control is a priority identified in the Stewardship Plan (Trout Mountain Forestry 2016) and will be managed under the VMP and associated plans. The objectives of the VMP include reduction/treatment of noxious/ invasive non-native weeds on Project-affected lands, and revegetation with native vegetation and enhancement of areas selected for weed removal.	 Many weeds exclude native vegetation, which then reduces the diversity of vegetative structure that many birds need. Thus, aggressive non-native vegetation can negatively impact bird species (Altman and Hagar 2007). Removing weeds will restore the area to a more natural condition by allowing existing remnant native plants to re-colonize and/or grow more robust in place of the weeds. Benefits of increased native vegetation: Enhancing the quantity and quality of native vegetation will diversify the physical structure, which will increase the abundance and diversity of species that may use these habitats for foraging, perching, nesting, and cover. Native plants harbor more insects than weeds, since these plants have coevolved with insects. The increased abundance of insects provides more foraging opportunities and prey to support species higher in the food chain, such as amphibians, reptiles, birds, and bats (BiodiversityWorks 2021). See early seral habitat (prescription 1) above for additional benefits. 	 Monitoring and removal of weeds (e.g., scotch broom, spotted knapweed, reed canary grass [<i>Phalaris arundinacea</i>], and Himalayan blackberry) and monitoring the effectiveness of control measures, consistent with the VMP and associated plans. Following surveys, updating the GIS database with weed spatial data to document and track populations and detect new populations and/or species. Applying any herbicides outside the flowering period, when possible, to reduce adverse effects on wildlife (e.g., treating Himalayan blackberry in late fall, just before dormancy, when no berries or flowers will be present). Ensuring that all areas cleared of weeds are restored with existing remnant native plants or by supplementing treated areas with native seed and/or plantings, as appropriate. Updating the Carmen-Smith <i>Treatment for Noxious/Invasive Non-Native Weeds and Revegetation/Enhancement Plan</i> (TRP; EWEB 2022b) with weed management actions implemented the previous year and projects/target goals for the upcoming year. Integrating weed treatment and prevention into all Carmen-Smith Projects. Appropriate BMPs to prevent establishment and spread include, but are not limited to, training work crews, evaluating proposed work activities, using weed-free seed and mulching mixes, and ensuring that equipment is washed and inspected. Identifying opportunities for areas that could benefit from further enhancement, in coordination with the VWG. Examples include targeting priority areas with heavy weeds (e.g., near streams and within early seral habitat), multi-species plantings (e.g., competitive native vegetation) to establish new populations and enhance understory vegetation, and re-vegetating with plant species. 	Х	Х	Х

				Орро	rtunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
6. Educate the public and reduce anthropogenic effects	The goal is to develop and implement management actions to educate the public and reduce anthropogenic effects on wildlife from the public (e.g., dispersed camping, vehicle access, vegetation/wood removal, or other adverse activity). Creating and maintaining visual and/or physical barriers between humans and wildlife should increase wildlife use of those areas.	 Educating the public and reducing anthropogenic effects provide direct and indirect benefits for terrestrial wildlife species. Examples of benefits for wildlife: Limits impediments to wildlife movement/access Reduces disturbance to resident wildlife Reduces nest abandonment/failure and improves foraging opportunities Limits fragmentation of habitat Increases quality of habitat Decreasing anthropogenic effects could also reduce noise disturbance and/or habitat impacts that would adversely affect wildlife. Maintaining a more natural, less disturbed state will increase wildlife use of the areas that EWEB is managing for wildlife benefit. 	 Installing and maintaining educational signs periodically along the transmission corridor, where there is potential for greater human disturbance or use (e.g., roads, campsites) in coordination with the Work Groups, to educate the public that the area is protected and managed for wildlife habitat. Considering similar signs for appropriate areas within the Leaburg Forest (e.g., along the "dump road" adjacent to Reserve Stand 107). Identifying the boundary of the newly expanded corridor for work crews to ensure that habitat prescriptions occur within the expanded easement. Preventing dispersed camping by placing boulders, large wood, gates, and/or no access signs at identified locations (e.g., along the spur road between transmission line towers 47 and 48). Revegetating dispersed camp sites with appropriate site-specific vegetation. Inspecting all gates installed pursuant to the Carmen-Smith <i>Wildlife Management Plan</i> (WMP; EWEB and Stillwater Sciences 2020) annually to maintain high quality habitat patches for elk with as little human disturbance as possible. Educating private landowners and establishing conservation easement agreements to prevent vegetation removal/disturbance within the expanded easement on private lands. Increasing tree/shrub cover to buffer the view between the transmission corridor and roads. Addressing new areas of concern as they are identified, in coordination with the Work Groups. 	Х	Х	Х
7. Stabilize soils	The goal is to stabilize soils in locations that are impacted by construction activities or identified as vulnerable (e.g., along stream banks or slopes in areas recently impacted by fires).	Stabilization measures will protect the topsoil (which is where nutrients are delivered to plants and water is absorbed) and reduce pollution and sedimentation in streams and rivers. Maintaining healthy soils will protect native vegetation, which will increase the habitat quality and diversity for both aquatic and terrestrial wildlife species.	 Minimizing soil disturbance (e.g., confining heavy equipment to access roads, avoiding ground disturbance where possible, training work crews, and other BMPs). Preventing erosion during work activities (e.g., placing jute, silt fencing, erosion control blankets). Following operations, seeding and/or mulching areas of disturbed soil using a site-appropriate grass/forb mix. Planting native shrubs and trees to further stabilize soils and increase structural complexity for wildlife. When felling trees in steep areas or near a stream, leaving the down tree perpendicular to the slope to catch sediment during periods of runoff (pers comm. Ann Gray, U.S. Fish and Wildlife Service [USFWS], March 2021). Maintaining roads to prevent erosion and sedimentation. Monitoring and ensuring proper function of ditches, culverts, and road closures/gates. Preventing or suspending ground-disturbing activities during inclement weather conditions (e.g., only hauling when roads are dry or sufficiently rocked to minimize potential for mud/soil compaction). 	Х	Х	Х

				Оррс	ortunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
8. Create and manage snags	Per the VMP, EWEB shall create and manage 500 snags over the term of the 40-year License as mitigation for Project-related activities. The snags will be created adjacent to the transmission line corridor right-of-way to the extent reasonably practicable (i.e., while still allowing access to the transmission line corridor and in conjunction with other efforts to manage weeds, promote elk forage, and reduce wildfire fuel loading), but may also be created in other suitable areas within the Carmen-Smith Project (e.g., along stream reaches and within the Leaburg Forest). See Section 4.2.2 and Figures 5–7 for additional information on snag creation.	 The creation of snags is intended to increase habitat quality and complexity for wildlife species such as woodpeckers, cavity-nesting birds, raptors, tree-roosting bats, and other mammals (e.g., fishers, raccoons, squirrels). Snags have features valuable to wildlife, including cavities, hollow stems, and/or forks and crooks in the stem (Altman and Hagar 2007). Hollow cavities and crevices can be used for nesting/denning, hiding, and storing food. Higher branches offer lookouts for raptors when foraging. Insects that break down the wood provide protein-rich food sources for wildlife, especially in winter when snow covers the ground. Benefits of snags (Washington Department of Fish and Wildlife 2011): Create perching habitat on dead limbs or broken tops (e.g., resting perches for swallows, song perches for flycatchers, hunting perches for eagles and owls) Create foraging habitat for birds and mammals (e.g., nuthatches eat ants, beetles, and spiders within outer bark, and woodpeckers eat insect larvae and pupae within inner bark) Create roosting habitat for bats (e.g., fringed myotis [<i>Myotis thysanodes</i>], long-legged myotis [<i>M. volans</i>], silver-haired bat [<i>Lasionycteris noctivagans</i>], big-brown bat [<i>Eptesicus fuscus</i>]) under sluffing bark or in cavities Create nesting habitat for birds (e.g., brown creepers [<i>Certhia americana</i>] roost behind loose bark and bark slits, woodpeckers excavate nest cavities, and secondary cavity users such as swallows, chickadees, and purple martins [<i>Progne subis</i>] use abandoned cavities) Create hollow structure for denning, resting, and winter warmth for a variety of wildlife (e.g., owls, fishers, ringtails, raccoons, squirrels, bears) 	 Creating 500 snags with a minimum diameter of 14 inches from identified conifers (e.g., hazard trees along the expanded easements to the transmission line corridor right-of-way and within the Leaburg Forest) through a diversity of methods, in coordination with the VWG and subject to approval by the USFS. Creating some larger diameter snags (i.e., greater than 20 inches) to support nesting for woodpeckers. Topping additional trees as a 'next generation' that can have snag creation treatments in the future, as needed, to replace lost snags (i.e., snags that have fallen). Considering snag creation in conjunction with silvicultural treatments at the Leaburg Forest. Identifying and preserving existing snags with a minimum diameter of 14 inches and trees with high wildlife value (e.g., woodpecker holes, upper-canopy defects such as a forked/ broken top that often lead to natural snag development). Monitoring created snags at a minimum of every 5 years during the term of the License, as required by the VMP. As snags decay over time, monitoring is expected to document decay and condition. Maintaining and updating a GIS database that documents and tracks the creation of snags. Replacing snags that have fallen (as determined in the five-year survey) within two years. Replacing snags cut during Project-related activities on a 1:1 basis within two years of loss. Considering future cost-effective opportunities and/or partnerships to evaluate wildlife use of created snags (e.g., surveying a subset of snags across different creation methods for wildlife sign or use of cavities)¹. 		X	Х

				Opportunities for Application		n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
9. Place and manage downed wood	Per the VMP, EWEB shall place 300 linear feet/acre of downed wood in terrestrial habitat over the term of the 40-year License, counting only wood with a minimum diameter of 12 inches or greater of decay class I and II (healthy and declining live trees, respectively; see description in Section 2.2.2 and Section 4.7.1 of the VMP). Class II logs (i.e., lacking twigs and needles) will be prioritized within the transmission line corridor to reduce fuels/fire risk. Downed wood (i.e., large enough tree tops and/or whole trees) will be prioritized adjacent to the transmission line corridor right-of-way to the extent reasonably practicable, but may also be placed in other suitable areas within the Carmen-Smith Project (e.g., along stream reaches and within the Leaburg Forest). Any downed wood within the Project boundary meeting the diameter and decay criteria will count towards the minimum requirement. Large logs longer than 20 feet and at least 12 inches in diameter at 4.5 feet from the large end will be prioritized to instream fish habitat enhancement projects at the Project; however, it is expected that adequate numbers of logs of this length will be left within the Project boundary. See Section 4.2.3 and Figures 9–11 for additional information on downed wood placement.	 Placing downed wood is intended to increase structural diversity in riparian and upland forest and enhance habitat quality and complexity for wildlife species, such as invertebrates, birds, amphibians, reptiles, and mammals. A downed log can support various habitat needs, including nesting, overwintering sites, dens, roosting, foraging, and food storage. In addition, mosses and fungi in decaying logs protect the soil and new seedlings on the forest floor. Benefits of downed wood (Washington State DNR 2017): Provides habitat for invertebrates (e.g., overwintering sites and food for beetles, which support decomposition of the wood) Supports insects that are prey for many bird species (Altman and Haga 2007; Coe and Woodward 2015) Provides shelter and cover for amphibians Provides structure and habitat connectivity for small to medium-sized mammals (e.g., escape cover for voles and skunks) Provides perching and foraging opportunities for ground-dwelling birds such as wrens Provides interstitial spacing beneficial for wildlife foraging and cover, when placed in complex arrangements (Type 2 and Type 3); see Figure 9 	 Placing at least 300 linear feet/acre of downed wood as it becomes available (e.g., from hazard trees along the expanded easements to the transmission line corridor right-of-way and trees within the Leaburg Forest, other Carmen-Smith projects resulting in tree removal, naturally fallen trees, and trees that accumulate in the reservoirs and need to be removed). Identifying and preserving existing pieces of large downed wood in the Leaburg Forest. Considering downed wood placement in conjunction with silvicultural treatments at the Leaburg Forest (e.g., putting rotten or otherwise not merchantable trees and tops from created snags in the woods). Identifying opportunities for appropriate areas within the Leaburg Forest and other locations at the Carmen-Smith Project to place complex arrangements of downed logs (Types 2 and 3), which may not be practical within or adjacent to the transmission line corridor right-of-way due to fuels concerns¹. Planting and/or maintaining hardwoods in riparian areas to enhance future instream woody debris. Felling trees along streams to enhance downed wood along the bank and riparian area (e.g., between the road and the Smith Bypass Reach). Monitoring placed downed wood using a sub-sampling approach at a minimum of every 5 years during the term of the License, as required by the VMP. As logs decay over time, monitoring is expected to document decay and condition. Using results from the monitoring effort to plan any additional downed wood such that agreed or specified levels, in coordination with the Work Groups, are retained during the License term (per Section 4.7.3 of the VMP). Maintaining and updating a GIS database that documents and tracks the placement of downed wood. Leaving any terrestrial downed wood (e.g., surveying a subset of logs with cameras for wildlife sign or use of cavities/interstilal spaces)¹. Considering future cost-effective oppor		X	Х

				Орро	ortunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
10. Enhance bat roosting and bird nesting and perching opportunities	 EWEB will create and maintain 500 snags, some of which may last long enough to decay and naturally develop defects (e.g., cavities and broken limbs) that would support roosting bats and nesting and perching birds. In addition, EWEB will implement notched or jagged topping cuts on the majority of the snags (USFS 2022; Figure 7). Based on approval by the WWG, cost, and feasibility, EWEB may consider incorporating additional habitat features (e.g., bat-roosting cavities and perches) into suitable snags that are climbed during the snag creation process. Creating bat roosting opportunities: select snags that are located in ideal habitat may be considered for the creation of bat roosting habitat (cavity cuts). Ideal habitat includes snags that are south or southeast-facing (i.e., receive substantial solar exposure), located in low canopy closure (i.e., no impeding branches/adjacent trees), and tall and wide enough in diameter to accommodate the cuts. Creating bird nesting and perching opportunities: a broken top will be constructed on the majority of the snags via notched or jagged cuts and tall tree branches (ideally below the broken top) may be modified as perch limbs to enhance nesting and perching habitat for birds. 	Adding chainsaw cuts to created snags is designed to mimic habitat that is formed by natural means (e.g., woodpeckers, squirrels, wounds, cankers, shearing cracks [separation between parts of a tree]) (Andrews 2018). These artificial cavities, if created according to specifications and they persist, may be used by bats year-round (i.e., as a winter roost, maternity roost during the mating season, and during transitory periods). In addition, other wildlife species such as brown creepers and amphibians may also take cover in the cavities. Turning tall branches into perch limbs will enhance perching habitat for birds (e.g., resting perches for swallows, song perches for flycatchers, hunting perches for eagles and owls).	 Implementing notched or jagged topping cuts on the majority of the snags, as directed by EWEB or EWEB's designated forester While incorporating additional habitat features (e.g., bat-roosting cavities and perch limbs) into snags is not required in the WMP or VMP, EWEB may consider future opportunities that are cost-effective, approved by the WWG, and can be effectively implemented in conjunction with other required activities¹. When a worker is climbing trees, the worker could use a chainsaw to create multiple upward diagonal cuts, at varying heights in suitable snags, to create bat cavities. Similarly, a tall branch could be modified as a perch limb.¹ Coordinating with the WWG and onsite contractor and/or EWEB's designated forester regarding the selection of trees that would support the creation of bat cavities¹. Constructing broken tops, cavity cuts¹, and/or perch limbs¹ per the specifications provided in Figure 6, or as directed by EWEB or EWEB's designated forester. Considering future cost-effective opportunities and/or partnerships to evaluate wildlife use of constructed cavities (e.g., surveying bats at a subset of cavities via acoustic monitoring and/or flyout surveys, surveying broken tops for use by raptors)¹. 		Х	Х

				Орро	rtunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
11. Create brush and wood piles	During the creation of snags, processing ('delimbing') of downed logs, silvicultural treatments at the Leaburg Forest, weed removal, and/or Project maintenance activities, twigs and limbs from shrubs and trees or small-diameter trees/tops may be gathered and placed as wildlife habitat. They may be deliberately placed in suitable wildlife areas or be a byproduct of management activities (e.g., managing excessive woody debris). The goal is to place larger diameter limbs/materials in the lowest layers of the pile to form the base and smaller materials such as fine branches and boughs on the top, with the overall dimensions of the pile ideally being about 10 feet wide and 6 feet tall. An example of a created habitat pile is shown in Figure 12.	 Brush and wood piles (collectively "habitat piles") provide some of the same functions and benefits for wildlife as large down logs. Benefits of habitat piles (NNRG 2021): Provide habitat for invertebrates (e.g., overwintering sites and food for beetles, which support decomposition of the wood) Provide dens or nest sites, shelter from inclement weather, escape cover, and foraging and perching opportunities for a variety of wildlife, such as amphibians (e.g., salamanders), reptiles (e.g., lizards, snakes), birds (e.g., bushtits, dark-eyed juncos [<i>Junco hyemalis</i>], song sparrows [<i>Melospiza melodia</i>]), and mammals (e.g., rabbits, voles, foxes, chipmunks) Used as singing perches for birds associated with early seral forest, such as American robin and western bluebird (Altman and Hagar 2007) Larger materials at the bottom can provide interstitial spacing and tunnels for smaller creatures to hide/ escape predators Smaller materials on the top can provide ground-nesting birds with forage, cover, and nest sites 	 Placing a diversity of habitat piles in targeted locations using existing debris on the ground and/or material moved from other locations¹. Prioritizing forested areas and stream reaches at other Carmen-Smith Project areas and the Leaburg Forest for placement of habitat piles, which may not be practical within the transmission line corridor right-of-way due to fuels concerns¹. Placing habitat piles to reduce fire risk (e.g., placing within a gap in the forest, well away from other trees, and never at the base of a tree or beneath the reach of a tree's crown)¹. Placing habitat piles within 100 feet of surface water (e.g., streams and wetlands), if possible, to provide an additional benefit to semiaquatic amphibians and reptiles¹. In conjunction with silvicultural treatments at the Leaburg Forest, piling non-merchantable trees in variable retention units to create planting space or a means of slash disposal¹. Although habitat piles do not qualify toward the downed wood requirement and no monitoring is required, considering creating an inventory of habitat piles created and periodic monitoring (e.g., for condition, wildlife use, and/or maintenance needs)¹. 		Х	Х

				Орро	rtunities for Applicatio	n
Prescription/Goal	Description	Benefit to Terrestrial Wildlife	Actions	Transmission Line Corridor Right-of-way	Expanded Easement to the Transmission Line Corridor Right-of-way	Leaburg Forest
12. Protect and/or enhance riparian and wetland sites	Per the VMP, EWEB shall provide for the protection, restoration, and enhancement of selected riparian and wetland areas within the Carmen-Smith Project. The goal is to provide a high degree of native cover appropriate to the habitat, establish ecological function, and establish self-sustaining vegetation. EWEB shall restore or enhance at least two riparian or wetland sites every five years for the term of the 40-year License and monitor revegetation sites per the protocol provided in the VMP and associated plans. The Stewardship Plan (Trout Mountain Forestry 2016) also aims to protect and enhance healthy streams with high quality water and good aquatic habitat for native fish and other stream dwellers. Riparian and wetland sites within the Leaburg Forest are incorporated into Reserve Areas that are managed as unique and/or sensitive habitat and generally reserved from silvicultural treatments. Opportunities for further enhancement of riparian and wetland sites (e.g., seasonal streams featuring channel incision and heavy weeds) will be considered, consistent with the Carmen-Smith <i>Riparian, Wetland and Meadow Restoration and Enhancement Plan</i> (EWEB 2020).	 Riparian and wetland areas provide valuable habitat for wildlife species that prefer moist shrubby or forested habitats. In addition, they provide other important ecological functions (e.g., filter runoff, protect banks from erosion, increase habitat complexity, connect upland and aquatic habitats, and provide nutrients to support both terrestrial and aquatic life) (Oregon Conservation Strategy 2016). Benefits of riparian and wetland habitat: Have abundant insects, plants, and moisture throughout the year that provide a drinking source, cover, and foraging and nesting habitat for songbirds, waterbirds, bats, and other wildlife Contribute leaf litter, which supports aquatic organisms eaten by wildlife Increase woody debris, which provides basking and perching sites for reptiles and birds and supports fish eaten by terrestrial wildlife Provide shading that maintains favorable water temperature for fish, which in turn supports their prey and predators Provide essential wintering habitat and travel corridors for birds, amphibians, reptiles, and mammals 	 Protecting existing or re-establishing riparian and wetland sites and retaining/stabilizing healthy condition and function. Avoiding ground disturbance (e.g., confining heavy equipment to access roads, training work crews, maintaining a buffer around streams during silvicultural treatments at the Leaburg Forest, and other BMPs). Monitoring and removal of weeds (e.g., Eurasian watermilfoil [<i>Myriophyllum spicatum</i>], curly leaf pondweed [<i>Potamogeton crispus</i>]), consistent with the VMP and associated plans, to allow native riparian and wetland vegetation to establish. Updating the GIS database with weed spatial data. Monitoring of native vegetation and natural regeneration/ response as a result of enhancement efforts, consistent with the VMP and associated plans. Updating the GIS database and documenting shifts (e.g., new or expanded populations) that impact the habitat value. In areas required for revegetation, using an appropriate native emergent wetland or riparian seed mix as agreed to by the USFS, and monitoring for performance standards per the VMP. Promoting taller native trees and shrubs, where appropriate, to increase leaf litter, woody debris, stream shading, and cover/ food sources for wildlife. Adding complexity to streams, where appropriate, to slow the water and reduce incision. Placing large diameter logs along streams and wetlands to enhance wildlife habitat. Identifying opportunities for areas that could benefit from further enhancement, in coordination with the Work Groups. Examples include identifying a weed removal and/or revegetation plan for targeted sites (e.g., disturbed streams such as Reserve Stand 106 within the Leaburg Forest), and seeding and/or planting wetland and riparian vegetation (e.g., hardwoods, willows, yellow skunk cabbage [<i>Lysichiton americanus</i>], salmonberry, currants) or other native species that will enhance structural diversity, bank stability, and/or stream shading. 	Х	Х	Х

¹ Actions to be considered for implementation and implemented if cost-effective and supported by EWEB as feasible and beneficial for wildlife habitat based on site-specific conditions.

4.2 Dead Wood Plan

Per Section 4.7 of the VMP, EWEB is required to promote the recruitment of dead wood (i.e., snags and downed wood) habitat within the Project boundary. Creation of snags and placement of downed wood provides diverse nesting and foraging habitat for a variety of terrestrial wildlife species, such as raptors, woodpeckers and other cavity-nesting birds, squirrels, and bats. Hollow cavities and crevices can be used for nesting, hiding, and storing food, higher branches offer lookouts for raptors, insects that break down the wood provide a good source of prey, and mosses and fungi in decaying logs protect the soil and new seedlings on the forest floor (Washington Department of Fish and Wildlife 2011 and Wisconsin Department of Natural Resources 2017).

4.2.1 Preliminary surveys

4.2.1.1 Baseline dead wood survey

A baseline dead wood survey of the Project, as required in Section 4.7.1 of the VMP, was conducted from August 10 to September 3, 2021 by Mason, Bruce & Girard Natural Resource Consultants (MB&G). Since EWEB has not yet initiated downed wood placement and recruitment, MB&G performed a direct count of all downed wood and did not use a sub-sampling approach. Downed wood occurrences were labeled with the number of pieces, how many pieces may be used for terrestrial habitat, and how many pieces may be used for aquatic habitat (i.e., over 20 feet in length), per the VMP criteria for each. A total of 145 pieces were observed, 124 of which were identified as suitable for instream fish habitat enhancement (MB&G 2021). Most of the downed wood was in a lower section of the transmission line corridor (approximately tower 130 to the terminus) in an area affected by the Holiday Farm Fire. Since the Holiday Farm Fire, the majority of the wood has either been removed or moved to the margins of the transmission line corridor right-of-way to reduce fuels directly under the transmission line.

4.2.1.2 Tree survey

In spring 2022, a survey was conducted by MB&G to identify the existing trees within the expanded easements to the transmission line corridor right-of-way on USFS-managed land⁷. The intent of the survey was to assess trees that could be used to meet EWEB's snag and downed wood requirements and to identify the level of effort for widening the transmission line right-of-way. Survey data were collected according to the following parameters:

• 6–11.9 inches diameter-at-breast-height (dbh): the total number of trees in each of three diameter classes (6–7.9, 8–9.9, and 10–11.9 inches dbh) was estimated between each tower span. These trees were not mapped, as they are too small to meet the dead wood criteria, and are intended to be removed or chipped to allow space for natural establishment of a diverse understory, or for use in brush and wood piles as described in prescription 11 in Table 3.

⁷ The USFS requested that EWEB skip areas of the expanded transmission line corridor that are adjacent to the planned "W" timber harvest and provided a conservative estimate of which areas to avoid (i.e., towers 71–76, 86–88, and 93–98). During the survey, the surveyors were able to locate USFS harvest markings on the ground and precisely map trees right up to the harvest boundary.

- 12–13.9 inches dbh: represents trees large enough to meet the minimum downed wood criteria. Each tree within this diameter class was marked with a tag⁸, mapped, and the following data recorded: species, dbh, total height, and topping height⁹.
- ≥ 14 inches dbh: represents trees large enough to meet downed wood and snag criteria. Each tree within this diameter class was marked with a tag⁸, mapped, and the following data recorded: species, dbh, total height, and topping height⁹.
- Wildlife habitat trees ≥ 12 inches dbh: when mapping trees, the surveyors made note of any trees that were dead/strongly declining or with existing dead wood features, such as cavities (e.g., holes, cracks, cankers, fissures) or evidence of beetle kill. These trees may currently provide habitat for wildlife or are in a transitional state of decay such that they may provide habitat in the future. The goal will be to retain these trees in their existing condition, if possible, and only top them if they are a hazard to the transmission line.

The survey documented 4,007 trees 6–11.9 inches and 5,307 trees \geq 12 inches dbh within the expanded transmission line corridor (Table 4). A total of 43 existing wildlife habitat trees were recorded, the largest being a 25.2-inch incense cedar. Seventeen trees are 12–13.9 inches, 20 trees are 14–18.9 inches, and 6 trees are 19–25.9 inches dbh. EWEB has shared the survey data with the USFS to coordinate and plan snag creation and transmission line widening efforts.

Tree Diameter Class	Tree Count
6–7.9 inches	258
8–9.9 inches	2,977
10-11.9 inches	772
Subtotal	4,007
12-13.9 inches	1,139
\geq 14 inches	4,168
Subtotal	5,307 ¹
Grand total	9,314

Table 4. Number of trees by diameter class within expanded easements to the Carmen-Smith
transmission line corridor right-of-way.

Five additional conifer trees were mapped but are not included in the total, as the Geographic Information System (GIS) data were corrupted.

4.2.2 Snag creation

The VMP requires EWEB to create 500 snags in consultation with the VWG and subject to approval by the USFS. To the extent reasonably possible, the snags will be created from identified hazard trees that are adjacent to the transmission line right-of-way. Creating snags in a younger to middle-aged forest is intended to emulate features prominent in older/dying trees or trees that have been weathered by natural conditions (e.g., wind breaking branches, lighting strikes, insects) and provide diverse vertical habitat for terrestrial wildlife. Snags, as defined for

⁸ Different colored tags were used to delineate 12–13.9-inch dbh trees suitable for downed wood placement and \geq 14-inch dbh trees suitable for snag creation, per criteria identified in the VMP.

⁹ Height that would need to be topped to prevent the tree from striking the power line (if the tree were to fall) and achieve line clearance.
the purpose of this document, are trees that are dead or were subjected to a treatment that will eventually kill the tree (primarily girdling). The majority of the snags will be girdled, but other snag creation treatments will be pursued and incorporated using the best available science to create different types of snags and contribute to state-of-the-art knowledge. Other treatments may include hinge cuts on hardwoods (cutting halfway through the trunk to where the tree falls over and stays alive for a period of time), inoculating conifers with a fungus in the mid- to upper canopy to promote internal heart rot (allowing for the creation of nest cavities, as well as a deadwood foraging substrate), or a combination of inoculation and girdling. When a tree is girdled properly (outer layer of the bark is removed), the tree can no longer transport nutrients from the leaves, located above the girdle, to the roots, and over time the tree dies (Figure 5). Research compiled by the USFS found that snags that are girdled at the base may only stand for 5–10 years (Miller 2019). Therefore, EWEB anticipates that new snags will need to be created to replace those that are lost, and will consider girdling at different heights to try to create longer lasting snags (USFS 2022).



Figure 5. Example of girdling tree trunks to create snags (Stillwater Sciences).

EWEB evaluated the 4,168 trees \geq 14 inches dbh to determine the best trees to select for snags. The abundance of suitable trees within the expanded corridor will allow EWEB to be more selective and aim to create larger diameter snags, which is preferred by the VMP and WWG, and more beneficial for wildlife. A subset of approximately 1,600 trees was identified based on the following:

- Conifers that would provide the largest and tallest snags (i.e., > 19-inches dbh and ≥ 40 feet tall, after topping cut),
- Existing wildlife habitat trees noted during the survey (which will be further evaluated to assess if future wildlife habitat will be best supported by turning the tree into a snag or retaining the tree in its existing condition for possibly a longer life), and
- Conifers that do not need to be topped because they are in specific areas (e.g., down in a valley where the terrain naturally drops low) where they are already below transmission line height.

These trees, collectively referred to as "mitigation snags", will be used to create 500 snags as well as 'next generation'¹⁰ snags for the future. This ensures that EWEB can maintain 500 snags over the term of the License, as required by the VMP. The mitigation snags will be topped at the specified height so as not to become a hazard to the powerlines, and 500 trees will have snag creation treatments to create the initial 500 snags. In coordination with the USFS, girdling will occur at a variety of heights to create a diversity of snags.

Based on the large number of trees present, EWEB anticipates that all 500 snags will be created within the expanded easements to the transmission line corridor right-of-way. Additional snags may be created in other areas of the Carmen-Smith Project, when and where suitable (e.g., along stream reaches and within the Leaburg Forest in conjunction with silvicultural treatments). Final identification of trees for snag creation will be in consultation with the VWG and subject to approval by the USFS, while taking into account the considerations described below. EWEB and/or EWEB's designated forester will coordinate with the contractor on the specific trees (i.e., tag numbers) to be used and the treatment to be implemented on those trees.

Considerations for identifying where and which individual trees to turn into snags, with the goal of diversifying existing conditions, include the following:

- 1. Although a minimum diameter of 14 inches is required, diameters greater than 20 inches are preferred (EWEB 2016b). Larger diameter trees will be prioritized to girdle and/or inoculate to create a dead wood feature.
- 2. Consider wildlife benefits from turning wildlife habitat trees into snags, enhancing the tree (e.g., create a broken top or perching limb if topped for safety reasons), and/or retaining in its existing condition. The presence of natural and already established habitat features (e.g., visible cracks and crevices) may currently support wildlife (e.g., woodpeckers) and the life of the tree may be longer if left living, while creating a snag from a tree with existing habitat features may also enhance the opportunity to support wildlife.
- 3. The location, solar exposure, and tree density will be considered relative to site-specific topography and adjacent habitats. For example, snags along a stream may be beneficial to some mammals and birds, some wildlife may prefer snags located within a grove of trees or in a more open area, and south-facing trees that receive the greatest solar exposure may be best for bat roosting habitat.
- 4. In accordance with the VMP, tops removed from snag trees will be given priority for instream fish habitat enhancement or will be used as terrestrial downed wood if they meet the size criteria.
- 5. Due to the limited availability of hardwoods, it is anticipated that these trees will not be turned into snags, in order to support stand diversity.
- 6. Additional considerations by the USFS include:
 - a. Consider USFS land management allocations along the transmission corridor; for example, northern spotted owl nest patches (i.e., MSNO 2449 and 0823) and Riparian Reserves would be good locations to top and/or create snags rather than removing hazard trees.
 - b. Consider modelled watershed large snag habitat levels.

¹⁰ The intent is to retain additional trees within the expanded transmission line corridor that can have snag creation treatments in the future, as needed, to replace snags that have fallen. Until such time, these 'next generation' trees will remain standing in a safe manner (i.e., topped at a height below the powerlines) and have a broken top or other features that provide habitat for terrestrial wildlife.

- c. Aim to create snags \geq 200 feet from an existing road so they do not pose a future safety hazard to vehicles.
- d. Reduce the level of ground-disturbing activities 30 feet from waterways to minimize impacts on sensitive habitats.
- e. Focus on creating snags that are larger diameter and greater than 40 feet tall (after being topped).
- f. Consider the age and species of the tree. Douglas-fir snags have deeper roots that will allow them to remain standing longer than true firs or hardwoods. Bigger and taller snags will last longer.
- g. Notched or jagged cuts will be prioritized when topping mitigation snags (USFS 2022; Figure 7).
- h. De-prioritize snag creation along transmission line corridor areas within one mile of past or recently sold timber sale areas, which may already have snag creation planned and funded.
- i. Focus snag creation in locations that haven't been affected by fires (i.e., the 2020 Holiday Farm Fire, which affected areas near the western end of the Carmen-Smith transmission line, and the 2021 Knoll Fire near Deer Creek). Generally, fire-affected areas are expected to have plenty of naturally occurring snags, and therefore dead wood is not expected to be a limiting factor in these surrounding areas.
- j. Aim for 1–4 snags per acre to create an even distribution across the transmission line corridor; however, a clumped distribution pattern is preferred by some wildlife species and can help shelter the snags from exposure. Access in steep areas may be difficult and snag creation and subsequent monitoring in those areas can be skipped if necessary.
- k. Use a variety of treatments (e.g., girdling at different heights and inoculation), as well as combinations of treatments (e.g., girdling paired with inoculation).

Notched or jagged topping cuts that resemble a more natural feature will be implemented on the majority of the mitigation snags (USFS 2022; Figure 7). Constructing a broken top will allow water to collect and seep into the trunk, further enhancing heart rot and future nesting habitat potential. Incorporation of additional features to provide perching and nesting/roosting habitat for wildlife may be considered during snag creation, where appropriate. When climbing a tree, a worker may employ methods to enhance wildlife habitat. Methods may include using a chainsaw to create multiple upward diagonal cuts at varying heights to create bat roosting cavities (Section 4.2.2.1) and/or cutting prominent branches near the top of the tree to create perch limbs for birds.

EWEB will adhere to the timeline in Section 5, Table 5 for topping, snag creation, and monitoring. Snags will be monitored at a minimum of every five years for the License term, in accordance with Section 4.7.3 of the VMP. In addition, EWEB may consider future opportunities and potential partnerships to monitor wildlife use of snags and/or success of various snag creation methods.



Figure 6. Snag and bat roosting cavity creation guidelines.



Figure 7. Topping tree using a jagged cut (Bevis and Brown 2016).

4.2.2.1 Bat habitat

During the creation of snags (i.e., when a worker is climbing trees), selected trees located in high-quality habitat may be considered for the creation of bat habitat. The best candidates are trees that are southward-facing (typically south or southeast-facing) to the transmission line corridor and receive maximum morning and daytime solar exposure. The purpose of creating these crevices and cavities is to mimic habitat used by bats that may have been created by natural means (e.g., woodpeckers, squirrels, wounds, cankers, shearing cracks [separation between parts of a tree]) (Andrews 2018). Bats may use roosts in trees year-round—as a winter roost (January–February), maternity roost (females raising non-volant [non-flying] young) (May–August), during the mating season (September–October), and during transitory periods (March–August and November–December) (Andrews 2018). Other wildlife species such as birds and amphibians may also take cover in crevices and cavities (Andrews 2018).

While creating a snag, workers can use a chainsaw to create multiple cavities (upward diagonal cuts) at varying heights in individual trees, mimicking natural features (Figures 6 and 8). Methods for creating a cavity and dimensions were developed using advice from Dr. Joe Szewczak, bat biologist and professor at Humboldt State University. Multiple cavities can be created in a single snag, with the lower-most cut at a minimum height of 12 feet, with additional cuts vertically spaced at 3-foot intervals (Figure 6). The ideal upward angle is 30 degrees from horizontal, with a minimum angle of 5 degrees, to prevent rain from entering the roost and facilitate drainage. The ideal depth of the cut is 12 inches or more, with a minimum depth of 9 inches; the depth will not penetrate beyond the snag trunk center to avoid compromising the structural integrity of the snag,

unless otherwise directed by EWEB or EWEB's designated forester. The width and height of the cavity will be determined by the size of the chainsaw, while the ideal height will be $\frac{1}{2}-\frac{3}{4}$ inches.

Installing human-made structures to provide wildlife habitat (e.g., bird boxes) is not generally supported by the USFS (pers. comm. Ruby Seitz, USFS), and instead effort should focus on creating snags and other more natural habitat features. In the USFS' experience, the use of bird boxes is not effective, they provide habitat for wasps/hornets, and continuous repair is required to maintain the degrading structure that may fall down over time. Should human-made features to create bat roosts be considered in the future, EWEB will choose a type of feature through consultation with the WWG.



Figure 8. Example of crevices that can be created to support roosting bats (Source: Ryan Kilgren, City of Portland, Oregon).

4.2.3 Downed wood placement

As required in Section 4.7 of the VMP, EWEB will place at least 300 linear feet/acre of terrestrial downed wood habitat. As a result, there needs to be at least 66,870 linear feet¹¹ of downed wood within the Project boundary. EWEB may place more than the minimum amount based on availability of wood from other Project sources and suggestions from the WWG. Within the Project boundary, downed wood (i.e., large enough tree tops and/or whole trees) will be prioritized within the newly widened transmission line corridor to the extent reasonably practicable, but may also be placed in other areas of the Carmen-Smith Project (e.g., along stream reaches and within the Leaburg Forest), when and where suitable. Any downed wood within the Project boundary meeting the diameter and decay criteria will count towards the minimum requirement. The size and condition requirements for downed wood

¹¹ This calculation is based on 222.9 terrestrial habitat acres (transmission line corridor right-of-way [135.4] and expanded easements [87.5]) x 300 linear feet/acre = 66,870 linear feet.

include a minimum diameter of 12 inches of decay class I or II¹². Downed wood may include a single log (Type 1, as shown in Figures 9 and 10) or multiple logs placed on top of each other (Types 2 and 3, as shown in Figures 9 and 11). Complex arrangements of logs (Types 2 and 3) may provide interstitial spaces for wildlife to find cover and food.

A baseline survey, as required in Section 4.7.1 of the VMP, was conducted in 2021 to document existing downed wood within the Project (see earlier Section 4.2.1.1). In addition, a tree survey was conducted in spring 2022 within the expanded easements to the transmission line corridor right-of-way to identify existing trees ≥ 12 inches dbh that could be used to meet the downed wood requirement (see earlier Section 4.2.1.2). EWEB and/or EWEB's designated forester will coordinate with the contractor on the specific trees (i.e., tag numbers) to be used for downed wood.

Considerations for placing downed wood include the following:

- 1. Ensure safety and logistical considerations, such as fire risk, timing for when downed wood becomes available, and access limitations. For example, in locations with poor access, downed wood may be felled in place with a chainsaw to reduce environmental impacts, while areas that are easy to access along a road will provide opportunities for staging wood for future use and/or placing logs in specific configurations.
- 2. Move or prioritize downed wood placement in areas of the Project that are deficient in large down wood habitat, such as Reserve Stand 107 in the Leaburg Forest.
- 3. Prioritize Type 1 decay class II wood (i.e., delimbed log) in the expanded easements to reduce fire fuels and weeds management, as Himalayan blackberry tends to overtake complex structures without herbicide control.
- 4. Consider opportunities to place Type 2 and 3 logs, as well as brush and wood piles (collectively "habitat piles") (see prescription 11 in Table 3 and Figure 12), within the Leaburg Forest or other suitable areas in the Carmen-Smith Project (e.g., along stream reaches).
- 5. As required in the VMP and AMP, prioritize large logs longer than 20 feet and at least 12 inches in diameter at 4.5 feet from the large end for instream fish habitat enhancement projects at the Project. Logs not needed for instream or terrestrial habitat at the Project may then be offered to be used in other projects jointly managed by EWEB Water Source Protection, the USFS, and other partners.
- 6. Identify and preserve existing pieces of large downed wood in the Leaburg Forest.
- 7. Consider downed wood placement in conjunction with future silvicultural treatments in the Leaburg Forest (e.g., felling rotten or otherwise not merchantable trees and tops from created snags).
- 8. Plant and/or maintain hardwood trees in riparian areas to enhance future instream woody debris.
- 9. Fall trees along streams to enhance downed wood along the bank and riparian area (e.g., between the Smith Bypass Reach and the adjacent road).
- 10. Additional considerations by the USFS include:
 - a) Focus downed wood placement in locations that haven't recently been affected by fires (i.e., the 2020 Holiday Farm Fire, which affected areas near the western end of

¹² Decay class I: boles and branches with bark, twigs and needles intact and no moss or other vegetation growing on them; decay class II: boles and branches with bark mostly intact but lacking needles and minimal moss or vegetation (Daniels et al. 1997).

the Carmen-Smith transmission line, and the 2021 Knoll Fire near Deer Creek). Generally, fire-affected areas are expected to have plenty of naturally occurring snags, and therefore dead wood is not expected to be a limiting factor in these surrounding areas.

b) Downed wood could be evenly distributed as shown in Figure 9, while the distribution within the transmission line corridor may be based on topography, diameters of available trees in the area, and other factors.

11. Additional considerations by the USFWS include:

a) Fall trees perpendicular to the slope to catch sediment or into creeks to provide instream habitat (pers comm. Ann Gray, USFWS, March 2021).

Downed wood may be obtained from a variety of sources. Based on the large number of mitigation snags that are planned to be topped, EWEB anticipates meeting the minimum amount of downed wood (i.e., 66,870 linear feet) with the tops of these trees (if they meet the diameter and decay criteria). Other sources of wood may include intentional falling of whole trees (e.g., conifers along the expanded easements to the transmission line corridor right-of-way), natural recruitment from falling snags and/or live trees (e.g., brought down in a storm), silvicultural treatments in the Leaburg Forest, and as wood is obtained from future EWEB activities (e.g., clearing trees adjacent to dams, infrastructure, and reservoir margins). Appropriately sized logs not needed for instream placement at the Project may be allocated or staged, as needed, to retain downed wood levels as agreed upon or specified in coordination with the Work Groups throughout the License term.

EWEB will adhere to the timeline in Section 5, Table 5 for downed wood placement and monitoring. Downed wood will be monitored at a minimum of every five years for the License term, in accordance with Section 4.7.3 of the VMP.



Figure 9. Downed wood placement guidelines.



Figure 10. Example of downed wood placement (Type 1) in Oregon (left) (Grotta 2013) and with fox scat (right) (Stillwater Sciences).



Figure 11. Examples of complex arrangements of downed wood (Types 2 and 3) (Stillwater Sciences).



Figure 12. Example of a habitat pile placement (Bevis 2019).

4.3 Plan for Widening Transmission Line Corridor Right-of-Way

Per Section 4.5 of the WMP, EWEB is required to widen the transmission line corridor right-of-way, manage those acres for the benefit of terrestrial wildlife habitat, and identify and manage for the term of the License the portions of the widened right-of-way that can be managed for early seral habitat. The right-of-way is primarily bordered by mixed conifers (mostly Douglas-fir), which suppress the understory and create an abrupt change (i.e., hard edge) between the open transmission corridor and adjacent forest (Figure 13). Hard edge zones lack intermediate stand structure and many of the essential components that wildlife species depend on (e.g., protective escape cover, plant species diversity, and insects). Wildlife do not have access to readily available food sources and are more susceptible to predation and weather, making them less likely to enter or use hard edge areas (Bowers 2021).

One management technique to improve this habitat is to reduce tree cover (i.e., thinning overstory trees) to increase the gradual edge between the forest and transmission line corridor right-of-way. Removing canopy cover will allow additional light to penetrate to the forest floor and create openings to promote early seral habitat. This will 'release' understory natives (e.g., red huckleberry, vine maple, hazel, and dogwood) and allow existing populations to grow more robust. Native shrubs, forbs, and/or grasses may also be planted to provide greater control of species composition or in areas where remnant native vegetation is lacking. Enhancing understory structure and diversity will create a softened, "feathered" edge to the transmission line corridor (Figures 14 and 15), reducing the existing edge effect and providing a greater diversity of habitat for wildlife (e.g., pollinators, songbirds, small mammals, and elk). A variety of vegetation types and layers provides more places where wildlife can feed, nest, retreat, and travel by reducing habitat edge barriers along the forest and open corridor. Benefits provided by a feathered edge may include increased cover for wildlife to escape from predators (e.g., larger mammals or raptors), a diversity of habitat components that provide shelter from the elements, and a mixture of native plants that produce a greater diversity of species than currently found in either the Douglas-fir dominated forest or the early seral corridor (e.g., more nesting habitat for small mammals and birds, areas to rest/perch, and foraging opportunities [fruit, seeds, nuts]) (Kentucky Department of Fish and Wildlife 2022). A feathered edge along both sides of the transmission

line corridor is also expected to enhance habitat connectivity and wildlife movement for these species.

EWEB has widened the transmission line corridor right-of-way from 70 feet to 140 feet on USFS lands and included 3 private conservation easements through revised Exhibit G drawings and Project Boundary Descriptions (submitted November 14, 2022 and approved by FERC April 23, 2024) and in accordance with the updated Intergovernmental Agreement between EWEB and the USFS dated January 14, 2021. While the management plans do not stipulate a deadline or requirement to remove trees within the widened corridor boundary, EWEB will continue to identify opportunities to complete tree removal as part of the management technique described above; this excludes mitigation snags that will be retained to meet snag creation requirements (see Section 4.2.2). The long-term goal is to remove conifers in appropriate sections of the widened corridor (i.e., 35 feet on each side of the right-of-way) to create the desired feathered edge. Trees within the widened portion will remain available for removal, for potential use on future EWEB approved and budgeted habitat restoration projects or in support of other resource agencies or non-profit partners. If particular trees cannot feasibly be removed (e.g., located in hard to access areas or riparian reserve buffers), EWEB may top these trees, which will open the canopy for the understory while providing clearance to the powerlines and improving line resiliency.

All harvest activities will be scoped and coordinated with the USFS, managed by EWEB, and implemented by qualified contractors. Timing and/or locations of activities may be affected by a number of factors, including identification and coordination around habitat restoration projects, proximity to sensitive resources (e.g., riparian reserves, special-status wildlife, and archaeological sites), access limitations, contractor availability, inclement weather conditions, and fire season restrictions. As required in the VMP, large logs longer than 20 feet and at least 12 inches in diameter at 4.5 feet from the large end will be given priority to Carmen-Smith instream fish habitat enhancement. Appropriately sized logs not needed for instream placement will be moved to terrestrial areas within the Project boundary deficient in large downed wood habitat. EWEB anticipates meeting the minimum amount of terrestrial downed wood (i.e., 300 linear feet/acre) with the tops of the mitigation snags or other sources of wood described in Section 4.2.3. Logs not needed for instream or terrestrial habitat at the Project may then be offered for use in other projects jointly managed by EWEB Water Source Protection, the USFS, and other partners. Slash and small diameter tops and trees may be removed, chipped, or possibly retained to create habitat piles in appropriate Project areas.

Following harvest activities, the disturbed areas will be monitored and/or restored in accordance with Section 4.5 of the VMP. To identify the habitats that are created within the widened corridor and further enhance the habitats, EWEB will conduct photo monitoring at fixed locations before and after the harvest, monitor native plant populations and weeds at a minimum of every five years, and annually manage weeds in accordance with the VMP. See Section 5, Table 5 for a timeline of monitoring activities. Changes in species composition (e.g., expanded or new native plant populations and reduced weeds) are anticipated and will be documented over time to demonstrate the effectiveness of creating a feathered edge or areas that could benefit from further enhancement. Dominant vegetation within sections of the transmission line will be updated, as needed, within the GIS database and planned updates of the TLMP.



Figure 13. Existing hard edge between the open Carmen-Smith transmission line corridor right-of-way and similar-aged Douglas-fir stand (poles 46-48).



Figure 14. Example of creating greater vertical structure (layers of vegetation) and feathered edge with small broadleaf trees and shrub component along the Carmen-Smith transmission line.



Figure 15. Example of a feathered edge (Texas Parks and Wildlife 2022).

4.4 Leaburg Forest Habitat Enhancements

The Managed and Reserve Areas under this Plan (138 acres) will be managed in accordance with the applicable Carmen-Smith management plans (e.g., historic resource and botanical surveys, and managed as terrestrial wildlife habitat). In addition, goals identified in the Stewardship Plan (Trout Mountain Forestry 2016) will enhance wildlife habitats (late successional forest, hardwood stands, wetland and riparian areas, and habitat openings). These goals include:

- Reserve Areas to protect mature and diverse stands, water quality, and other sensitive resources;
- Forests of a variety of ages and types that provide for long-term timber harvest opportunities and a diversity of wildlife habitats;
- Native plant communities that are vigorous and resilient to disturbance and climate change;
- Healthy streams with high quality water and good aquatic habitat; and
- Forest structure that includes large trees, multi-aged stands, and biological legacies such as snags, cavity trees, down logs, hardwoods, and shrubby openings.

To achieve these goals, particular actions will occur within both the Managed and Reserve Areas. An onsite assessment of Managed and Reserve Areas will be conducted by a qualified forester in coordination with EWEB, at a minimum of every two years, to evaluate general stand condition and any habitat enhancements or adaptive management needs. A comprehensive forest inventory will be established in 2022 and maintained over time by a qualified forester through ongoing field sampling or application of growth model projections. Forest inventory measurements will focus on species composition, diameter and height distributions, and stand density measures (e.g., trees per acre). Field measurements will typically occur at a minimum of every ten years, and inventory updates using growth model projections will occur at least every five years.

Enhancements in both areas are anticipated to include diversifying forest structure where appropriate, creating understory plantings to enhance diversity and wildlife habitat, retaining trees with existing wildlife value, mapping and monitoring of native and non-native plant populations at a minimum of every five years, removing target weeds, recruiting snags, and placing downed wood (as described in Table 3). For example, placement of downed wood in Managed Areas may occur from rotten or otherwise non-merchantable trees, while placement of downed wood in Reserve Areas may be recommended by EWEB's designated forester in locations where downed wood (existing snags, downed wood, slash piles) will be conducted in 2023, and these results will guide future management decisions and priorities. Management of weeds will occur annually within both the Managed and Reserve Areas in accordance with the VMP requirements (similar to the transmission line). Additional enhancements are discussed below.

4.4.1 Silvicultural treatments within Managed Areas

The objective of Managed Areas includes enhancing even-aged and uneven-aged stands in which a variety of silvicultural approaches may be employed to create more complex forest structure, provide for crown development, establish a new age cohort, and/or provide early seral conditions. Treatments in these stands may include different types of thinning (e.g., conventional, variable density, and group selection), variable retention, patch cuts, and planting new seedlings. The treatment will be site-specific based on existing stand conditions and management objectives. All harvests will be conducted using conservation-based practices (e.g., wide riparian buffers, smaller harvest openings, light-touch harvest equipment, and minimal herbicide use). Per the Stewardship Plan, silvicultural treatments at the stand level are expected to occur approximately once every 20 years (intervals planned between 2016–2025 and 2035–2045) (Trout Mountain Forestry 2016). By the filing of this Plan, all Managed Areas in the CCU will have received an initial silvicultural treatment during the first interval. Portions of Stands 201, 203, and 205 were treated in 2017 and a portion of Stand 202 was treated in 2022. Future treatments are anticipated to occur as needed during the next planned interval of 2035–2045 (subject to change based on future updates to the Stewardship Plan). As identified in the Stewardship Plan, future silvicultural treatments will be site-specific and dependent on stand conditions (even- and uneven-aged stands) identified by a qualified forester. Treatments may include:

- 1. *Pre-commercial thinning*: thinning non-merchantable trees to reduce stocking and modifying species composition by slashing and leaving trees on site;
- 2. *Conventional thinning*: removing suppressed, damaged and defective trees, and allocating growth to dominant, healthy trees, while removing commercial products;
- 3. *Variable density thinning*: varying thinning density across small scales to create more complex forest structure—wider spacing allows recruitment of new age cohorts by planting or natural seeding;
- 4. *Group selection*: removing small groups of trees (< 0.5 acre) within a stand in conjunction with thinning to provide for crown development at the edge of the group opening, and establishment of an additional age cohort;
- 5. *Patch cut*: creating small openings (0.5–5 acres) removing most or all dominant trees to allow tree regeneration and/or provide early seral conditions; and
- 6. *Variable retention*: harvesting while retaining 10–30% of the original stand, and establishing a new age cohort; retained portion can be grouped or dispersed; used when thinning is not effective or feasible, or when forest pathogens severely impact the stand (generally no larger than 20 acres, possibly up to 30 acres).

Additional habitat enhancements as described above in Section 4.4 may occur in conjunction with the silvicultural treatments or as identified during stand evaluations by EWEB's designated forester, EWEB, or contractors.

4.4.2 Enhancement of Reserve Areas

The goal of Reserve Areas is to protect and/or enhance sensitive sites (e.g., riparian areas), late successional and mature stands, uncommon forest types such as hardwoods or forested wetlands, and water quality. Preliminary site visits have demonstrated Reserve Stand 106 as a prime opportunity to remove weeds, establish native species, and reduce incision of this historically impacted stream channel. Enhancements listed below are intended to benefit wildlife in this stand as well as the Cogswell Creek riparian area (Stands 102 and 107). In coordination with the VWG and WWG (collectively "Work Groups"), opportunities will be considered to enhance Reserve Areas (see Table 3), including:

- 1. Placing complex arrangements of downed wood (Types 2 and 3; see Section 4.2.3)
- 2. Placing habitat piles
- 3. Placing large diameter logs along streams and wetlands to enhance wildlife habitat
- 4. Reseeding and planting to enhance the hardwood component, structural diversity in the understory, competitive/native vegetation that will outcompete weeds, bank stability/stream shading, and native wetland/riparian species (e.g., Stand 106):

- Using weed-free, native seed mixes appropriate to the habitat area that is being seeded, as required in the VMP and associated plans
- Seeding and/or planting hardwoods, willows, yellow skunk cabbage (*Lysichiton americanus*), salmonberry, currants, or other native species
- Promoting taller native trees and shrubs, where appropriate, to increase leaf litter, woody debris, stream shading, and cover/food sources for wildlife
- Seeding and/or planting specific species that provide foraging and/or nesting opportunities for forest birds (e.g., salmonberry, osoberry [*Oemleria cerasiformis*], low Oregon grape, salal)
- 5. Controlling areas with heavy weeds with repeated applications
- 6. Retaining/stabilizing hardwood conditions
- 7. Improving stream health and function in hardwood stands
- 8. Adding complexity to streams to slow the water and reduce channel incision (e.g., Stand 106)

Additional habitat enhancements as described above in Section 4.4 are anticipated to occur as identified during stand evaluations by EWEB's designated forester, contractors, or EWEB.

5 TIMELINE FOR IMPLEMENTATION AND MONITORING

EWEB has met the VMP requirement that 500 snags be created within five years after License issuance (May 16, 2024). While there is no deadline or requirement for tree removal in the transmission line corridor right-of-way expansion, EWEB will continue to identify opportunities to complete tree removal and/or topping in appropriate sections of the widened corridor. These opportunities are likely to occur either in conjunction with future EWEB approved and budgeted habitat restoration projects or in support of other resource agencies or non-profit partners.

The schedule for implementation of snag creation, transmission line corridor widening, and ongoing monitoring is provided in Table 5. In accordance with Section 4.7.3 of the VMP, EWEB will also monitor dead wood habitat at a minimum of every five years for the License term (i.e., monitor the presence and condition of created snags and estimate the condition of placed downed wood using a sub-sampling approach). A GIS database will be maintained and updated, and results from the monitoring effort will be used to plan any additional downed wood habitat and snag creation.

While wildlife surveys are not required in the WMP or VMP (only to manage terrestrial wildlife habitat), EWEB may consider future opportunities that are cost-effective and/or in partnership with others to collect meaningful wildlife data to assess the effectiveness of habitat prescriptions and/or inform management decisions. EWEB's implementation of this Plan is expected to create additional monitoring opportunities for partners, such as USFS, H. J, Andrews Experimental Forest, and Oregon State University, or interns. Survey data could be collected during site-specific surveys, vegetation surveys, and/or incidental observations. Surveys may include passive surveys (e.g., motion sensor cameras, bat acoustic detectors), auditory surveys (e.g., point count surveys), or visual observation surveys. Examples of data that could be collected include wildlife use of different types of created snags and their longevity (e.g., woodpecker foraging/nesting, owl pellets, bat use of cavities, and evidence of cavities); wildlife use of downed wood (e.g., mammal scat); wildlife use of native vegetation (e.g., pollinators, early seral-associated songbirds, or deer/elk browsing); and continuing pre- and post-harvest bird surveys at Leaburg Forest. Since

snag and downed wood creation are required, will be implemented long term, and will involve a variety of methods and locations, these would be priority elements for EWEB to focus any wildlife-specific monitoring that is conducted. EWEB is open to new ideas and considerations proposed by the WWG and discussing future opportunities.

Teals	Action		
1 ask	Timing	Description	
	Spring 2022 (completed)	Conduct a tree survey of the expanded transmission line corridor to inform the scope of work for the transmission line corridor widening.	
	Summer 2022–fall 2022 (completed)	Acquire expanded conservation easements for private lands and widen the transmission line corridor right-of-way by November 16, 2022 FERC deadline (completed through revised Exhibit G drawings and Project Boundary Descriptions approved by FERC April 23, 2024 and in accordance with the updated Intergovernmental Agreement between EWEB and the USFS dated January 14, 2021).	
Widening the	Summer 2022–spring 2023 (completed)	Conduct scoping for National Environmental Policy Act (NEPA) analysis (e.g., logging plan, roads plan, and agency consultations), prepare NEPA document, and maintain ongoing coordination/ planning with the USFS.	
transmission Conduct habitat tree to (completed). Identify line corridor 2023–ongoing ¹ Conduct habitat tree to (completed). Identify right-of-way 2023–ongoing ¹ of the widened corridor After harvest activities in sections of the widened corridor boundary Seed or restore disture (VMP; EWEB 2016b) As needed Manage hazardous ve topped trees that have	Conduct habitat tree topping and associated removal as part of snag creation activities by May 2024 (<i>completed</i>). Identify opportunities to complete tree removal and/or topping in appropriate sections of the widened corridor to create the desired feathered corridor edge, either in conjunction with future EWEB approved and budgeted habitat restoration projects or in support of other resource agencies or non-profit partners.		
	After harvest activities in sections of the widened corridor boundary	Seed or restore disturbed areas in accordance with the Carmen-Smith <i>Vegetation Management Plan</i> (VMP; EWEB 2016b).	
	As needed	Manage hazardous vegetation within the expanded corridor as it is identified (e.g., previously topped trees that have grown taller may again pose a threat to the powerlines).	
	As needed	Manage hazardous vegetation within the expanded corridor as it is identified (e.g., previously topped trees that have grown taller may again pose a threat to the powerlines).	

 Table 5. Anticipated timeline for implementation and monitoring actions under the Carmen-Smith Terrestrial Habitat Management Plan.

¹ Tree harvest activities are expected to occur primarily during dry months, which the USFS generally defines as May 15 to October 15. Several factors may affect the feasibility and/or timing of activities. These may include, but are not limited to, identification and coordination around habitat restoration projects, proximity to sensitive resources, access limitations, inclement weather conditions, and fire season restrictions.

Togl	Action		
1 85K	Timing	Description	
	Spring 2022 (completed)	Conduct a tree survey of the expanded transmission line corridor to inform snag creation activities.	
Snag creation	Summer 2022–spring 2023 (completed)	Maintain ongoing coordination/planning with the Vegetation Work Group (VWG) and the USFS regarding snag creation methods and locations. Consult with the Wildlife Work Group (WWG) on the opportunity of creating bat-roosting cavities within the expanded corridor.	
	Summer 2023–spring 2024 (completed)	Top and/or girdle a minimum of 500 identified hazard trees within the Project boundary ² and create 500 snags by the May 16, 2024 FERC deadline.	
	2024	Conduct a baseline survey at Leaburg Forest to inventory created snags; update the Geographic Information System (GIS) database with survey data within one year of receiving the data.	
	At a minimum of every 5 years	Conduct a survey ³ to monitor the presence and condition of created snags; update the GIS database with survey data within one year of receiving the data.	
	Within 2 years	Ensure a minimum of 500 snags with a minimum diameter of 14 inches during the License term; create new snags to replace snags that have fallen (as determined in the five-year survey) within two years.	

² The VMP requires that 500 snags are maintained throughout the License term and to replace any snags that have fallen within two years. EWEB will aim to top approximately 1,500 identified hazard trees, which will create the initial 500 snags as well as a 'next generation' that can have snag creation treatments in a future year, as needed, to replace lost snags. This ensures that EWEB can fulfill the License requirement in the long term and creates additional wildlife habitat.

³ Results from the survey will be used to plan any additional snag creation such that agreed or specified levels, in coordination with the Work Groups, are retained during the License term.

Tool	Action		
Task	Timing	Description	
Downed wood placement	2021 (completed)	Conduct a baseline downed wood survey.	
	Summer 2022–spring 2023 (completed)	Maintain ongoing coordination/planning with the VWG and USFS regarding downed wood placement.	
	2024	Conduct a baseline survey at Leaburg Forest to inventory placed downed wood habitat; update the GIS database with survey data within one year of receiving the data.	
	2023–ongoing	Promote the recruitment of downed wood (minimum diameter of 12 inches of decay class I or II) within the Project boundary. Placement of downed wood is anticipated to begin in 2023 (in conjunction with tree removal and snag creation activities within the widened transmission corrido and to be ongoing as wood becomes available from future Carmen-Smith projects (e.g., reservoirs and roads) until a minimum of 300 linear feet/acre is in place.	
	At a minimum of every 5 years	Conduct a survey ⁴ to monitor the condition of placed downed wood habitat; as a part of the monitoring, estimate the condition of placed downed wood in the Project boundary using a sub-sampling approach; update the GIS database with survey data within one year of receiving the data. Any additional, terrestrial downed wood (i.e., from natural recruitment or felling of hazard trees) not needed for instream fish habitat measures at the Project will be left in and adjacent to the transmission line corridor right-of-way to the extent reasonably practicable (i.e., while allowing access to the transmission line corridor and in conjunction with other efforts to manage weeds, promote elk forage, and reduce wildfire fuel loading), or other terrestrial areas deficient in large downed wood habitat in the Project area.	

⁴ Results from the survey will be used to plan any additional downed wood placement such that agreed or specified levels, in coordination with the Work Groups, are retained during the License term.

Taala	Action				
I ask	Timing	Description			
	At a minimum of every 5 years	Monitor native plant populations and noxious/invasive non-native weeds (weeds) along the transmission corridor and within the Leaburg Forest, in accordance with the VMP and associated plans; update the GIS database with survey data within one year of receiving the data.			
	Annually	Manage weeds and monitor weed-treated areas along the transmission corridor and within the Leaburg Forest, in accordance with the VMP and associated plans.			
Vegetation management	Annually	Update the Carmen-Smith <i>Treatment for Noxious/Invasive Non-Native Weeds and Revegetation/</i> <i>Enhancement Plan</i> (TRP; EWEB 2022b) with weed management actions implemented the previor year and projects/target goals for the upcoming year.			
	Annually	Coordinate with the VWG and WWG (collectively "Work Groups") to identify opportunities and recommendations for areas that could benefit from further enhancement (e.g., planting species that provide forage for birds or elk, enhancing Leaburg Forest Reserve Areas, or increasing tree/shrub cover to buffer the view between the roads and transmission line corridor).			
	As needed	Stabilize soils at Project-affected areas following operations by seeding and/or mulching disturbed soils in accordance with the VMP.			

Teels	Action			
1 ask	Timing	Description		
	2022 (completed)	Conduct a breeding bird survey prior to silvicultural treatments within Managed Stand 202.		
	2022	Implement silvicultural treatments and habitat enhancements (e.g., snags, slash piles), as appropriate, within portions of Managed Stand 202. A qualified forester will update the existing forest inventory, including new plot measurements and compiling of stand-level metrics.		
	2024	Conduct noxious weed, special-status plant, and high-density native plant surveys according to the protocols in the VMP and associated plans.		
Leaburg Forest	2026 or 2027	Conduct one breeding bird survey following the 2022 silvicultural treatments within Managed Stand 202 (consistent with the pre-treatment survey methodology).		
management	At a minimum of every 2 years	A qualified forester will perform an onsite assessment of general forest health and condition (e.g., vigor, seedling survival, shrub development) in the stands managed under this Plan, provide a report or results to EWEB, and coordinate with EWEB on any habitat enhancement or adaptive management needs planned for the upcoming year.		
	Ongoing	A qualified forester will maintain and update the forest inventory through plot measurements or growth model projections, as necessary, to inform management decisions and assess development of stand structure. Field measurements will typically occur at a minimum of every ten years, and inventory updates using growth model projections will occur at least every five years.		
	2035-20455	Implement silvicultural treatments and habitat enhancements (e.g., snags, slash piles), as appropriate, within Managed Stands 201, 202, 203, 205, 207, 208, and 209 ⁶ .		
Public education and Anthropogenic effects management	As deemed necessary in coordination with the Work Groups	In coordination with the Work Groups, install and maintain educational signs periodically along the transmission corridor, where there is potential for greater human disturbance or use, to educate the public that the area is protected and managed for wildlife habitat.		
	Periodically, as described in WMP Section 4.4.1	Inspect all gates installed pursuant to Section 4.4 of the Carmen-Smith <i>Wildlife Management Plan</i> (EWEB and Stillwater Sciences 2020) to determine if they are functional or need maintenance.		
	End of 2024	Address/prevent access to dispersed camping site identified near transmission line towers 47-48.		
	Ongoing	Identify any new areas of concern; within one year of the observation, develop a plan in consultation with the Work Groups to rectify the problem (e.g., remove trash or place boulders to prevent dispersed camping).		

⁵ The schedule for future silvicultural treatments is subject to change based on future updates to the *Leaburg Forest Project Stewardship Plan*.

⁶ To be managed by a qualified forester and implemented in accordance with the current *Leaburg Forest Project Stewardship Plan*.

6 TERRESTRIAL WILDLIFE HABITAT FUND

Per Section 4.5 of the WMP, EWEB has committed to managing a minimum of 343 acres of terrestrial wildlife habitat, and funding and managing a Terrestrial Wildlife Habitat Fund (Fund) for the term of the License. The money in the Fund shall be used for the creation and management of terrestrial wildlife habitat, including early seral habitat. To create the Fund, EWEB shall deposit \$20,000 per year (adjusted annually for inflation, as provided in the WMP) into an interest-bearing account for the duration of the License. Guidelines for expenditures from the Fund, as required by the WMP, are described below.

EWEB will use money from the Fund only for wildlife enhancement activities that are not explicitly stated in the License or Settlement Agreement. For example, EWEB will not use the Fund for vegetation and wildlife management actions already required in the VMP and WMP. The Fund will be used for additional habitat enhancement, either within the EWEB-managed 343 minimum acres, if it is an additional action that EWEB did not originally commit to; or to fund habitat enhancement by other entities, outside of the EWEB-managed 343 minimum acres. Any lands that are enhanced using money from the Fund in areas outside of the 343 minimum acres would not be included into the Carmen-Smith Project FERC boundary. EWEB will consider the intent of a proposed action and the scope of effort for implementation, and consult with the WWG as needed, to determine if the action qualifies as an existing requirement or would be considered "out of scope" and funded by the Fund. Examples of activities that would be paid from the Carmen-Smith Project budget versus the Fund are provided below. These examples are not intended to be an exhaustive list, as additional wildlife enhancement ideas or uses of the Fund that were not foreseen at the time of this Plan may be proposed in the future.

Examples of activities within the 343 minimum acres to be paid from the Carmen-Smith implementation budget (already specified in a management plan):

- Creating snags using various methods (e.g., girdling at different heights, inoculation)
- Topping the majority of snags using notched or jagged cuts
- Creating bat roosting cavities, if tree cutter is already climbing trees and has the necessary expertise/skill (i.e., do not need to secure a separate, specialized contractor)¹³
- Establishing downed wood along the transmission line and banks of Project reaches
- Removing weeds and reseeding and planting native species along the transmission line
- Widening the transmission line corridor right-of-way and managing the vegetation within the expanded easements to reduce the edge effect (feathering)
- Monitoring the status or effectiveness of wildlife habitat (not wildlife-specific) components required by the License
- Installing and maintaining elk gates and flight diverters
- Issuing payments to private landowners to acquire conservation easements and for any merchantable conifers topped or removed within the expanded easements (i.e., compensating for timber value), as these would be considered best efforts made by EWEB and meeting the WMP requirement of managing these lands for their appropriate terrestrial wildlife habitat objectives.

¹³ While creating bat-roosting cavities is not stated in the WMP, EWEB will look for opportunities to implement this technique, where appropriate and in conjunction with other required activities (i.e., when a worker is already climbing a tree).

Examples of activities that may be paid using the \$20K/year Fund, all within the general vicinity of the Carmen-Smith Project:

- Restoring, managing, and maintaining early seral vegetation outside of the 343 minimum acres; for example, measures to create and/or enhance high-quality early seral habitat including reduction/treatment of weeds, site preparation, and re-vegetation
- Implementing early seral or other terrestrial habitat improvement projects in the general vicinity of the Project, including the vicinity of the Carmen-Smith 115-kV transmission line (e.g., payments for restoration activities within the McKenzie River Valley, separate from management of the 343 minimum acres already set aside)
- Creating bat roosting cavities, if the tree cutter is not already climbing trees or does not have the necessary expertise/skill
- Surveying to assess wildlife use of created or managed habitat (e.g., bird or bat use of snags or wildlife sign along the transmission corridor)¹⁴
- Purchasing and managing conservation easements separate from easements that were acquired as part of the 343 minimum acres
- Installing road gates and managing for improved wildlife habitat quality outside of the 343 minimum acres
- Implementing additional actions to benefit terrestrial wildlife within the 343 minimum acres that are not specified in a Carmen-Smith management plan such as the WMP or VMP.

For the term of the License, expenditures from the Fund will be proposed by any member of the WWG, will be discussed through consultation and collaboration with the WWG per Settlement Agreement Section 4 (Coordination and Decision Making), and are subject to approval by EWEB and the USFS. For example, money from the Fund can be spent annually on smaller efforts, or accrue over time and be spent as a larger sum on a larger enhancement effort. In some cases, funding fewer, large habitat improvement projects may be more beneficial to wildlife than funding more, smaller habitat enhancements. Therefore, if internal financial conditions allow, EWEB may consider alternative payment schedules during the License period, such as making a large "lump sum" payment (covering multiple annual payments) upfront to fund an extensive project. Unless a unique opportunity arises, in which case consultation with the WWG would occur, EWEB will maintain an annual payment of \$20,000 into the Fund, adjusted for inflation as described in WMP Section 4.5. Money remaining in the Fund at the conclusion of any given calendar year shall be maintained in the interest-bearing account for use in successive years. EWEB will track all expenditures from the Fund and report on those actions as part of the annual update provided to the WWG.

At the time of filing this Plan, the 2020 through 2023 payments have been made with no expenditures. As of December 31, 2023, the Fund balance was approximately \$107,000.

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¹⁴ Breeding bird point count surveys have previously been conducted in the Leaburg Forest in conjunction with silvicultural treatments, including a pre-treatment survey in 2022 within Managed Stand 202. To maintain consistency, EWEB intends to conduct the post-treatment breeding bird survey within Stand 202. If additional bird surveys are proposed for future silvicultural treatments, the goal, scope, and budget may be discussed with the WWG prior to implementation.

7 ANNUAL REPORTING

The status of implementing this Plan will be reported annually to the WWG. In accordance with Section 4.5.1 of the WMP, EWEB shall report on the number of acres of terrestrial wildlife habitat being managed under this Plan, the location and current condition of the habitat, and any habitat improvement activities undertaken during the previous year. Any results from survey and monitoring efforts will also be reported as part of the annual update, which may include native plant and weed monitoring, snag and downed wood surveys, photo station monitoring, and stand assessments or silvicultural treatments conducted within the Leaburg Forest. Information on the status of implementing this Plan will be included in the Carmen-Smith Annual Report and presented at the annual WWG meeting. Annual meetings will also provide an opportunity to discuss further opportunities for areas to be enhanced, methods to be employed, or potential options for Fund expenditures, in coordination with the Work Groups. Agency staff will have the opportunity to comment and provide feedback.

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Appendices

Appendix A

Plant Species with Known Benefit for Terrestrial Wildlife Species

This list includes native plant species listed in the EWEB/USFS Approved Seed Mix and EWEB's 'Standard mix for riparian areas' (EWEB 2020) with known wildlife habitat value, as well as other common local plants that provide a wildlife benefit.

Scientific Name	Common Name	Benefit to Terrestrial Wildlife		
EWEB/USFS Approved Seed Mix				
Elymus glaucus	blue wildrye	Provides habitat for mammals and birds (including waterfowl); provides good forage early in the season (NRCS 2005).		
Bromus sitchensis var. carinatus	California brome	Provides food for Roosevelt elk (<i>Cervus</i> <i>elaphus</i>), black bears (<i>Ursus americanus</i>), geese, squirrels, pocket gophers, and other rodents; birds consume the seeds; provides good cover for small mammals, small non-game birds, and upland game birds (NRCS 2008).		
Festuca roemeri	Romer's fescue	Forage value for wildlife is unknown, but likely similar to <i>Festuca idahoensis</i> , which is good year-round forage for elk and spring forage for deer (<i>Odocoileus</i> spp.) (NRCS 2007).		
Solidago spp.	Goldenrod	Canada goldenrod (<i>Solidago canadensis</i>) provides important sources of pollen and nectar for bees and other insects in late summer and fall; provides forage for deer in late summer and fall (NRCS 2012).		
Sidalcea cusickii	Cusick's checkermallow	Provides nectar for butterflies, bees, other insect pollinators, and hummingbirds; serves as a caterpillar host plant/larval food source; supports beneficial insects/pest-eating insects (Oregon Flora 2022a).		
Gilia capitata	bluehead gilia	Provides nectar for butterflies and bees (Native Plants PNW 2019).		
Prunella vulgaris var. lanceolata	native heal all	Provides nectar for butterflies, bees, and other insect pollinators; supports beneficial insects/pest eating insects (Oregon Flora 2022b).		
Clarkia pulchella	elkhorns clarkia	Attracts large numbers of native bees (Lady Bird Johnson Wildflower Center 2016).		
Lupinus rivularis	riverbank lupine	Provides nectar for butterflies, bees, other insect pollinators, and hummingbirds; serves as a caterpillar host plant/larval food source; supports beneficial insects/pest-eating insects (Oregon Flora 2022c). <i>Lupinus</i> support about 55 native Oregon native butterflies and moths (Shropshire and Tallamy in prep).		
Achillea millefolium	common yarrow	Provides nectar for butterflies, bees, and other insect pollinators; serves as a caterpillar host plant/larval food source; supports beneficial insects/pest-eating insects (Oregon Flora 2022d).		

Scientific Name Common Name		Benefit to Terrestrial Wildlife	
Other local native species			
Trees			
Acer macrophyllum	big-leaf maple	The seeds, buds, and flowers are favored by many small birds and mammals (Douglas squirrels [<i>Tamiasciurus douglasii</i>] will cache the seeds); deer and small mammals eat seedlings and saplings (Native Plants PNW 2015a). This species is among the earliest to leaf-out in spring and thus, provides critical habitat for early-spring migrant birds that forage on the herbivorous insects available (Altman and Hagar 2007).	
Alnus rubra	red alder	Finches eat seeds; deer and elk eat leaves, twigs, and buds (Native Plants PNW 2014a).	
Populus balsamifera ssp. trichocarpa	black cottonwood	Provides cover for deer and elk, nesting and perching habitat for numerous bird species (eagles, owls, ospreys, hawks, woodpeckers, hummingbirds), and used by beavers for building dams (Native Plants PNW 2014b).	
Cornus nuttallii	Pacific dogwood	Leaves browsed by deer and elk; fruit consumed by small mammals and birds (grosbeaks, cedar waxwings [Bombycilla cedrorum], pileated woodpeckers [Dryocopus pileatus], northern flickers [Colaptes auratus]) (Native Plants PNW 2015b). Cronus (specifically dogwood and bunchberry [C. canadensis]) support almost 60 native Oregon native butterflies and moths (Shropshire and Tallamy in prep).	
Fraxinus latifolia	Oregon ash	Seeds consumed by small mammals and birds, and butterfly larvae consume foliage (Native Plants PNW 2015c).	
Pseudotsuga menziesii	Douglas-fir	Seeds found inside the cones are eaten by rodents (e.g., Douglas squirrels) and birds (pine siskins [<i>Spinus pinus</i>], crossbills [<i>Loxia</i> spp.]), foliage and twigs are browsed by deer in the winter, and needles and cones provide winter food for sooty grouse (<i>Dendragapus fuliginosu</i>) and red tree voles (<i>Arborimus longicaudus</i>) (Native Plants PNW 2014c).	
Thuja plicata	western red cedar	Seeds eaten by pine siskins and deer eat foliage (Native Plants PNW 2014d).	
Tsuga heterophylla	western hemlock	Wildlife eat the bark (e.g., Douglas squirrels), foliage (deer and elk), and seeds (crossbills, chickadees [<i>Poecile</i> spp.]) (Native Plants PNW 2014e).	
Abies grandis	grand fir	Needles provide forage for grouse, deer, and elk, while seeds are eaten by birds and small mammals (chipmunks and squirrels) (Native Plants PNW 2014f).	
Frangula purshiana	cascara	Berries are consumed by birds (especially pileated woodpeckers) and small mammals, and occasionally provides browse for deer and other mammals (Native Plants PNW 2015d).	

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Scientific Name	Common Name	Benefit to Terrestrial Wildlife
Shrubs		
Acer circinatum	vine maple	Leaves are a preferred food for deer and elk, while seeds, buds, and flowers provide food for rodents and birds (Native Plants PNW 2015e).
Cornus sericea	red-twig dogwood	Important source of forage for elk and deer, and while berries are less desirable compared to others, their season extends longer than other berries and they continue to provide a food source (Native Plants PNW 2016a).
Ribes bracteosum	stink currant	Butterflies eat the foliage, hummingbirds pollinate the flowers, and currants are an important food for songbirds, chipmunks, and ground squirrels (Native Plants PNW 2016b).
Ribes lacustre	prickly currant (or black swamp gooseberry)	Berries eaten by birds, rodents, and bears; foliage eaten by elk and deer; and structure provides habitat for birds and small mammals (Native Plants PNW 2016c). Currants and gooseberries support about 115 native Oregon native butterflies and moths (Shropshire and Tallamy in prep).
Ribes sanguineum	red-flowering currant	Berries are eaten by songbirds and small mammals, flowers are pollinated by insects and hummingbirds, and foliage is eaten by butterfly larvae (Native Plants PNW 2016d).
Ceanothus sanguineus	redstem ceanothus	Provides significant wildlife value by supporting browse for elk and deer; seeds are foraged on by birds, rodents, and insects; flowers are pollinated by bees; a larval host for the pale swallowtail butterfly; and provides cover for birds and small mammals (Native Plants PNW 2016e).
Rubus spectabilis	salmonberry	Flowers are known to be attractive to the rufous hummingbird, berries are eaten by numerous mammals, leaves and stems are eaten by deer, and thickets provide habitat for small mammals (Native Plants PNW 2016f).
Salix spp.	willows (e.g., Scouler's willow, Sitka willow)	Deer eat leaves and bark and catkins produce nectar that attracts bees and other pollinators (Native Plants PNW 2014g). Willows support over 300 native Oregon native butterflies and moths (Shropshire and Tallamy in prep).
Spiraea douglasii	Douglas spiraea	Provides cover for waterbirds (e.g., marsh wrens [<i>Cistothorus palustris</i>]), is occasionally browsed by deer, and is pollinated by insects (Native Plants PNW 2016g).
Symphoricarpos albus	common snowberry	An important browse for deer and elk, forage for birds (including wild turkeys [<i>Meleagris</i> <i>californica</i>]), cover for birds and small mammals, and a host plant for butterfly and moth species. Flowers attract insects and hummingbirds. (Native Plants PNW 2017a, Calscape 2022a, McWilliams 2000).

Scientific Name	Common Name	Benefit to Terrestrial Wildlife
Rosa pisocarpa	clustered wild rose	Attracts various insects and birds to the flowers and fruits (Calscape 2022b).
Holodiscus discolor	oceanspray	Provides good cover for amphibians, birds, and small mammals; pollinated by insects (Native Plants PNW 2016h). Supports an abundance of caterpillars, which is an important source of prey for insectivorous birds (Altman and Hagar 2007).
Gaultheria shallon	salal	Winter forage for deer and elk, preferred food for beavers, fruit eaten by numerous bird species and mammals (e.g., Douglas squirrel), and provides nectar for hummingbirds (Native Plants PNW 2015f).
Sambucus racomosa	red elderberry	Berries provide forage for birds (thrushes, robins, grouse) and mammals (squirrels, bears), foliage provides food for bears, and the buds and bark are eaten by porcupines and hares in the winter; not a preferred browse by deer and elk (Native Plants PNW 2017b). Provides pollinating habitat for bees.
Corylus cornuta	hazel (also referred to as beaked hazelnut)	Provides cover and nuts/forage for many mammals (e.g., Douglas squirrels) and birds (Steller's jays [<i>Cyanocitta stelleri</i>]) (Native Plants PNW 2016i).
Vaccinium parvifolium	red huckleberry	Twigs and foliage are an important browse for deer and elk, and a preferred food for the mountain beaver (<i>Aplodontia rufa</i>) (Native Plants PNW 2016i).
Oemleria cerasiformis	osoberry (also referred to as Indian plum)	Plums eaten by birds (e.g., cedar waxwings) and mammals, and flowers pollinated by native bees, hummingbirds, and butterflies (Native Plants PNW 2016k).
Mahonia nervosa (also known as Berberis nervosa)	low Oregon grape	Foliage browsed by deer and elk, and berries eaten by birds and mammals; nectar of the flowers is preferred by Anna's hummingbird (<i>Calypte anna</i>) (Native Plants PNW 2015g).
Physocarpus capitatus	Pacific ninebark	Provides structure for wildlife and mostly pollinated by native bees (Native Plants PNW 20161).
Rubus parviflorus	thimbleberry	A top summer food for wildlife, especially birds (e.g., grosbeak, grouse, waxwings) with leaves and stems eaten extensively by deer and rabbits, while fruit, bark, and twigs are consumed by bear, beaver, and marmots, and flowers are pollinated by insects (Native Plants PNW 2016m).

Scientific Name	Common Name	Benefit to Terrestrial Wildlife	
Herbs and Forbs ¹			
Asclepias spp.	milkweed	Provides habitat for a variety of insects and is the primary host for the monarch butterfly (<i>Danaus plexippus</i>) (Oregon Flora 2022e).	
Carex obnupta	slough sedge or coast carex	Provides cover for ducks and other wildlife and the seeds provide forage for a variety of birds (e.g., ducks, marsh birds, shorebirds, upland game birds, and songbirds) (EMSWCD 2013).	
Heracleum maximum	common cow parsnip	A valuable forage for elk and bear, host for at least 3 confirmed butterflies, and provides a pollen source (Calscape 2022c, Oregon Flora 2022f, Utah State University Extension 2002).	
Juncus effusus	common rush	Provides structure for amphibians, cover for wetland wading birds, and seeds are food for waterfowl, songbirds, and small mammals (muskrats feed on rootstalks and seeds) (NRCS 2000).	
Polystichum munitum	western sword fern	Many mammals eat the fronds and may use as cover in den sites; however, it has low protein content for deer and elk (Native Plants PNW 2017c).	
Oxalis oregana	redwood sorrel	Butterflies, moths, honeybees, and other pollinators are associated with this species (Washington Native Plant Society 2022).	

¹ In general grasses and forbs provide high-protein forage for elk and deer (Coe 2014).
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Appendix B

Native Plant Species and Association with Lepidoptera

This list includes native plant species and association with North American Lepidoptera (butterflies and moths) in Lane County, Oregon (Shropshire, K. J., and D. W. Tallamy. *In prep.* An annotated list of Lepidoptera of North America, including ranges and host plants.).

Family	Genus	Common Name	Native Oregon Lepidoptera
Herbaceous	•	-	
Fabaceae	Trifolium	clover	87
Rosaceae	Fragaria	strawberry	63
Asteraceae	Symphyotrichum	aster, oldfield aster	58
Fabaceae	Lupinus	lupine	56
Asteraceae	Solidago	goldenrod	51
Asteraceae	Helianthus	sunflower	43
Asteraceae	Artemisia	sagebrush, wormwood	42
Asteraceae	Lactuca	lettuce	41
Plantaginaceae	Plantago	plantain	36
Solanaceae	Solanum	horsenettle, nightshade, potato, tomato, eggplant, aubergine	36
Polygonaceae	Polygonum	knotweed, smartweed	35
Polygonaceae	Eriogonum	buckwheat	34
Polygonaceae	Rumex	dock, sheep sorrel, curly dock	33
Asteraceae	Senecio	butterweed, ragwort	31
Fabaceae	Lathyrus	pea	28
Fabaceae	Astragalus	milkvetch	27
Onagraceae	Epilobium	willowherb	25
Urticaceae	Urtica	nettle, stinging nettle	25
Fabaceae	Vicia	vetch	25
Violaceae	Viola	violet	25
Poaceae	Poa	blue grass	24
Orobanchaceae	Castilleja	Indian paintbrush	23
Asteraceae	Cirsium	thistle	21
Apiaceae	Daucus	carrot, Queen Anne's lace	20
Asteraceae	Ericameria	goldenbush	20
Geraniaceae	Geranium	geranium	19
Plantaginaceae	Penstemon	beardtongue, penstemon	19
Alliaceae	Allium	onion	18
Asteraceae	Ambrosia	ragweed	18
Asteraceae	Erigeron	fleabane	18
Onagraceae	Oenothera	evening primrose	18
Caryophyllaceae	Stellaria	chickweed, starwort	18
Poaceae	Elymus	rye, wheat, bottlebrush grass	17
Asteraceae	Achillea	yarrow, sneezeweed	16
Amaranthaceae	Amaranthus	pigweed, amaranth	16
Poaceae	Hordeum	barley	16
Hypericaceae	Hypericum	St. John's wort	15
Lamiaceae	Mentha	mint, spearmint, peppermint	15
Rosaceae	Potentilla	cinquefoil	15
Apocynaceae	Apocynum	dogbane	14
Apiaceae	Lomatium	biscuitroot	14
Poaceae	Phleum	timothy	14
Cyperaceae	Carex	sedge, burr reed	13
Asteraceae	Baccharis	baccharis	12

Family	Genus	Common Name	Native Oregon Lepidoptera
Linaceae	Linum	flax	12
Lamiaceae	Stachys	hedge nettle, lamb's ear	12
Amaranthaceae	Atriplex	saltbush, orache	11
Poaceae	Festuca	fescue	11
Rubiaceae	Galium	bedstraw	11
Asteraceae	Gnaphalium	cudweed	11
Asteraceae	Grindelia	gumweed	11
Phrymaceae	Mimulus	monkey-flower	11
Polygonaceae	Persicaria	lady's-thumb, smartweed, tearthumb	11
Poaceae	Agrostis	bent grass	10
Ranunculaceae	Aquilegia	columbine	10
Brassicaceae	Arabis	rockcress	10
Asteraceae	Balsamorhiza	balsamroot	9
Ranunculaceae	Clematis	clematis, leather flower	9
Ranunculaceae	Delphinium	larkspur	9
Polemoniaceae	Phlox	phlox	9
Dennstaedtiaceae	Pteridium	bracken fern, bracken	9
Scrophulariaceae	Scrophularia	figwort, carpenter's square	9
Fabaceae	Thermopsis	golden banner	9
Poaceae	Bromus	brome	8
Brassicaceae	Descurainia	tansymustard, herb sophia	8
Iridaceae	Iris	iris	8
Juncaceae	Juncus	rush	8
Brassicaceae	Lepidium	peppergrass, pepperweed	8
Orobanchaceae	Orthocarpus	owl's clover	8
Hydrophyllaceae	Phacelia	phacelia	8
Ranunculaceae	Thalictrum	meadow rue	8
Verbenaceae	Verbena	verbena, vervain	8
Asteraceae	Anaphalis	pearly everlasting	7
Brassicaceae	Barbarea	yellow rocket, wintercress	7
Brassicaceae	Boechera	rockcress, sicklepod	7
Asteraceae	Eriophyllum	woolly sunflower	7
Poaceae	Glyceria	managrass, fowl managrass	7
Apiaceae	Heracleum	cow parsnip, giant hogweed, eltrot	7
Asteraceae	Heterotheca	false goldenaster	7
Rosaceae	Horkelia	horkelia	7
Apiaceae	Ligusticum	licorice-root	7
Crassulaceae	Sedum	orpine, stonecrop, green cockscomb	7
Brassicaceae	Streptanthus	twistflower, jewelflower	7
Typhaceae	Typha	cattail	7
Melanthiaceae	Veratrum	hellebore, bunchflower	7
Apiaceae	Angelica	angelica	6
Apocynaceae	Asclepias	milkweed, butterfly weed	6
Onagraceae	Chamaenerion	fireweed	6

Family	Genus	Common Name	Native Oregon Lepidoptera
Apiaceae	Cicuta	water hemlock	6
Onagraceae	Clarkia	clarkia	6
Asteraceae	Dieteria	false tansy-aster	6
Boraginaceae	Mertensia	bluebells	6
Orobanchaceae	Pedicularis	lousewort	6
Malvaceae	Sidalcea	checkerbloom	6
Brassicaceae	Turritis	tower mustard, towercress, rockcress	6
Nyctaginaceae	Abronia	sand verbena	5
Asteraceae	Bidens	beggers ticks	5
Asteraceae	Chaenactis	dustymaiden, pincushion	5
Asteraceae	Eurybia	aster	5
Poaceae	Leymus	wildrye, California bottlebrush grass	5
Liliaceae	Lilium	lily, tiger lily	5
Lamiaceae	Monardella	mountainbalm	5
Brassicaceae	Rorippa	yellowcress	5
Cyperaceae	Scirpus	woolgrass, bulrush	5
Caryophyllaceae	Silene	catchfly, moss champion	5
Plantaginaceae	Veronica	speedwell	5
Boraginaceae	Amsinckia	fiddleneck	4
Asteraceae	Antennaria	pussytoes	4
Araliaceae	Aralia	devil's walkingstick, spikenard, sarsaparilla	4
Poaceae	Calamagrostis	feather reed grass	4
Brassicaceae	Cardamine	bittercress, toothwort	4
Caryophyllaceae	Cerastium	chickweed, snow-in-summer	4
Asteraceae	Crepis	hawksbeard	4
Hydrophyllaceae	Eriodictyon	yerba santa	4
Saxifragaceae	Heuchera	alumroot	4
Asteraceae	Hieracium	hawkweed	4
Balsaminaceae	Impatiens	touch-me-not, impatiens	4
Saxifragaceae	Lithophragma	woodland-star	4
Poaceae	Panicum	bulb panic grass, guineagrass, maidencane, winged panicgrass, panicgrass, torpedograss, proso millet	4
Asteraceae	Rudbeckia	browneyed susan, blackeyed susan, coneflower	4
Saxifragaceaea	Saxifraga	saxifrage	4
Brassicaceae	Thelypodium	thelypody	4
Ranunculaceae	Aconitum	monkshood	3
Convolvulaceae	Calystegia	false bindweed	3
Montiaceae	Claytonia	springbeauty	3
Plantaginaceae	Collinsia	blue eyed Mary	3
Santalaceae	Comandra	bastard toadflax	3
Apiaceae	Conioselinum	hemlock-parsley	3

Family	Genus	Common Name	Native Oregon Lepidoptera
Boraginaceae	Cynoglossum	comfrey, hound's tongue	3
Cyperaceae	Cyperus	yellow nutgrass, nutgrass, chufa, flatsedge	3
Poaceae	Distichlis	saltgrass	3
Brassicaceae	Erysimum	wallflower	3
Rosaceae	Geum	avens	3
Polemoniaceae	Gilia	gilia	3
Boraginaceae	Lithospermum	stoneseed	3
Cucurbitaceae	Marah	manroot	3
Boraginaceae	Myosotis	forget-me-not	3
Apiaceae	Oenanthe	waterdropwort	3
Oxalidaceae	Oxalis	woodsorrel	3
Poaceae	Paspalum	paspalum, dallisgrass, vaseygrass, crowngrass	3
Dryopteridaceae	Polystichum	christmas fern, hollyfern	3
Ranunculaceae	Ranunculus	buttercup	3
Poaceae	Spartina	cordgrass	3
Asteraceae	Stephanomeria	wirelettuce	3
Apiaceae	Tauschia	umbrellawort	3
Lamiaceae	Trichostema	fluxweed, bluecurls	3
Asteraceae	Xanthium	spiny cocklebur	3
Polygonaceae	Aconogonon	Alaska wild rhubarb	2
Brassicaceae	Athysanus	sandweed	2
Asteraceae	Brickellia	false boneset, bricklebush	2
Onagraceae	Camissonia	suncup	2
Agavaceae	Chlorogalum	soapplant, amole	2
Euphorbiaceae	Croton	firebush, croton, prairie tea	2
Primulaceae	Dodecatheon	shootingstar	2
Brassicaceae	Draba	draba	2
Poaceae	Eragrostis	lovegrass	2
Apiaceae	Eryngium	sea holly, rattlesnakemaster, eryngo	2
Papaveraceae	Eschscholzia	California poppy, desert poppy	2
Asteraceae	Eucephalus	aster	2
Gentianaceae	Frasera	frasera, columbo	2
Onagraceae	Gayophytum	groundsmoke	2
Gentianaceae	Gentiana	gentian	2
Boraginaceae	Hackelia	stickseed	2
Asteraceae	Helenium	sneezeweed	2
Asteraceae	Madia	tarweed	2
Ruscaceae	Maianthemum	mayflower, false lily of the valley	2
Loasaceae	Mentzelia	blazingstar	2
Poaceae	Muhlenbergia	muhly	2
Hydrophyllaceae	Nemophila	baby blue eyes	2
Plantaginaceae	Nuttallanthus	toadflax	2
Orobanchaceae	Orobanche	broomrape	2
Apiaceae	Osmorhiza	sweetroot	2

Polygonaccae Oxyria mountain sorrel 2 Asteraccae Petasites butterbur, sweet coltsfoot, pestilence wort, 2 Poaceae Pholaris canary grass 2 Brassicaceac Phoenicaulis wallflower phoenicaulis 2 Valerianaceae Plectriits scablush 2 Asteraceae Pseudognaphalium rabbit-tobacco, sweet everlasting, cudweed 2 Fabaceae Ruperita rupertia 2 Asteraceae Sparganium butrush 2 Asteraceae Sparganium butrush 2 Asteraceae Tanacetum tansy 2 Asteraceae Wethia mule ears 2 Asteraceae Actaca bancberry, bugbane 1 Lamiaceae Agestria snakeroot 1 Asteraceae Agestria snakeroot 1 Asteraceae Agestria foxtail 1 Poaceae Antoxanthum vernaigrass 1 Poaceae	Family	Genus	Common Name	Native Oregon Lepidoptera
AsteraceacPetasitesbutterbur, sweet colsfoot, pestilence wort,2PoaceacPhalariscanary grass2BrassicaceaePhoenicauliswallflower phoenicaulis2ValerianaceacPlectritisscabush2AsteraceaePseudognaphaliumrabbit-tobacco, sweet everlasting, cudweed2CyperaceaeSchoenoplectusbultush2CyperaceaeSchoenoplectusbultush2AsteraceaeTanacetumtansy2BrassicaceaeThysanocarpusfingepod2AsteraceaeAchlysdeersfoot1BarnoucaceaeAgeratinasnakcroot1LamiaceaeAgeratinasnakcroot1AsteraceaeAgeratinasnakcroot1AsteraceaeAgeratinasnakcroot1AsteraceaeAgeratinasnakcroot1AsteraceaeAgeratinafinitagpink1PoaceaeAlopecurusfoxtail1PoaceaeAntinoxanhumvernalgrass1PlumbaginaceaeArmicaarmica1AsteraceaeBerulawaterparsnip1AsteraceaeCacaliopsissilvercrown1AsteraceaeCacaliopsissilvercrown1IlliaceaeCaclochortusmariposa lily1CaceaeCacalopsissilvercrown1IlliaceaeCaclochortusmariposa lily1CaceaeDichnthilapipissewa, prince's pi	Polygonaceae	Oxyria	mountain sorrel	2
Poaceae Phalaris canary grass 2 Brasciaceae Phoenicaulis waltPionenicaulis 2 Asteraceae Pseudognaphalium rabbit-tobacco, sweet everlasting, cudweed 2 Fabaceae Rupertia rupertia 2 Cyperaceae Schoenoplectus bulrush 2 Typhaceae Sparganium bur-reed 2 Asteraceae Tanacetum tansy 2 Brassicaceae Thysanocarpus fringepod 2 Asteraceae Actae banberry, bugbane 1 Banuculaceae Actaea banberry, bugbane 1 Asteraceae Ageratina snakeroot 1 Asteraceae Ageratina snakeroot 1 Asteraceae Ageratina snakeroot 1 Asteraceae Annocus brid's feathers, goatsbeard 1 Poaceae Annecus brid's feathers, goatsbeard 1 Asteraceae Cacaliopsis silvercrown 1 Iblechna	Asteraceae	Petasites	butterbur, sweet coltsfoot, pestilence wort,	2
Brassicaceae Phoenicaulis wallflower phoenicaulis 2 Valerianaceae Pseudognaphalium rabbit-tobacco, weet everlasting, cudweed 2 Fabaceae Rupertia rupertia 2 Cyperaceae Schoeonplectus bultrush 2 Typhaceae Sparganium bur-reed 2 Asteraceae Tanacetum tansy 2 Brassicaceae Thysanocarpus fringepod 2 Asteraceae Weythia mule ears 2 Berberidaceae Actaea banesrot 1 Lamiaceae Ageratina snakeroot 1 Asteraceae Agoseris wolly goat chicory, 1 Poaceae Alopecurus foxtail 1 Poaceae Anhoxanhum vernalgrass 1 Placeae Armeria thrift seapink 1 Asteraceae Armeria thrift seapink 1 Asteraceae Armeria thrift seapink 1 Asteraceae Armica armica 1 Asteraceae Cacolopsis silvercrown 1 Asteraceae Carnicus brid's beak 1 Asteraceae Carolapisis silvercrown </td <td>Poaceae</td> <td>Phalaris</td> <td>canary grass</td> <td>2</td>	Poaceae	Phalaris	canary grass	2
Valerianaceae Plectritis seablush 2 Asteraceae Pseudognaphalium rabbit-tobacco, sweet everlasting, cudweed 2 Fabaceae Rupertia rupertia 2 Cyperaceae Schoenoplectus bulrush 2 Typhaceae Sparganium bur-reed 2 Asteraceae Tanacetum tansy 2 Brassicaceae Thysanocarpus fringepod 2 Asteraceae Wyethia mule ears 2 Berberidaceae Actaea baneberry, bugbane 1 Lamiaceae Agastache hysop 1 Asteraceae Agostarin snakcroot 1 Asteraceae Agostarin tornal stakcroot 1 Poaceae Antopcurus fottail 1 Poaceae Antraca arnica 1 Rosaceae Aruncus brid's feathers, goatsbeard 1 Aplaceae Bechnum deer fern 1 Asteraceae Cacalopsis <	Brassicaceae	Phoenicaulis	wallflower phoenicaulis	2
AsteraceaePseudognaphaliumrabbit-tobacco, sweet vertalsting, cudweed2FabaceaeRupertiarupertia2CyperaceaeSchoenoplectusbulrush2TyphaceaeSparganiumbur-reed2AsteraceaeTinacetiumtansy2BrassicaceaeThysanocarpusfringepod2AsteraceaeWyethiamule ears2BerberidaceaeAchlysdeersfoot1RanuculaceaeActaeabaneberry, bugbane1LamiaceaeAgastachehyssop1AsteraceaeAgeratinasnakcroot1PaceaeAgoseriswoolly goat chicory,1PoaceaeAlopecurusfoxtail1PoaceaeAnhoxanthumvernalgrass1PlumbaginaceaeArmeriathrift seapink1AsteraceaeArmicaarnica1RosaceaeAruncusbride's feathers, goatsbeard1ApiaceaeBerhudeer ferm1BlechnaceaeBerlawaterparsnip1LiliaceaeCalochortusmariposa lily1CareaeCalochortusmariposa lily1CareaeCordylanthusbird's beak1OrobanchaceaeCordylanthusbird's beak1OrobanchaceaeCordylatikusbird's beak1OrobanchaceaeDicentrableeding heart1OroceaeDichantheliumdeert-ong worderns1Oroch	Valerianaceae	Plectritis	seablush	2
FabaceaeRupertiarupertia2CyperaceaeSchoenoplectusbulrush2TyphaceaeSparganiumbur-reed2AsteraceaeTanacetumtansy2BrassicaceaeThysanocarpusfringepod2AsteraceaeWyethiamule cars2BerberidaceaeActaeabaneberry, bugbane1LamiaceaeAgeratinasnakeroot1AsteraceaeAgeratinasnakeroot1AsteraceaeAgeratinasnakeroot1AsteraceaeAgeratinasnakeroot1PoaceaeAlopecurusfoxtail1PoaceaeAnthoxanthumvernalgrass1PlumbaginaceaeArmeriathrift seapink1AsteraceaeBerlulawaterparsnip1BlechnaceaeBerlulawaterparsnip1AsteraceaeBerlulawaterparsnip1IlicaceaeBlechnumdeer fern1AsteraceaeCaalopsissilvercrown1CampanulaceaeCalochortusmariposa lily1CampanulaceaeCordylanthusbird's beak1OrobanchaceaeDicentrabeleding heart1PoaceaeDicentrabeleding heart1OrobanchaceaeDicentrabeleding heart1OrobanchaceaeCordylanthusbird's beak1OrobanchaceaeDicentrableding heart1PoaceaeDicentrableding hear	Asteraceae	Pseudognaphalium	rabbit-tobacco, sweet everlasting, cudweed	2
CyperaceaeSchoenoplectusbulrush2TyphaceaeSparganiumbur-reed2AsteraceaeTanacetumtansy2BrassicaceaeThysanocarpusfringepod2AsteraceaeWyethiamule cars2BerberidaceaeActaeabaneberry, bugbane1LamiaceaeAgastachehyssop1AsteraceaeAgestachehyssop1AsteraceaeAgestriasnakeroot1PoaceaeAlopecurusfoxtail1PoaceaeAlopecurusfoxtail1PoaceaeArmeriathrift seapink1AsteraceaeArmeriathrift seapink1AsteraceaeArmeriathrift seapink1AsteraceaeArmeriathrift seapink1AsteraceaeArmeriathrift seapink1AsteraceaeBerulawaterparsnip1BlechnaceaeBlechnumdeer fern1AsteraceaeCacaliopsissilvercrown1LiliaceaeCalcohortusmariposa lily1CampanulaceaeCardylantulusbird's beak1OrchanchaceaeCordylantulusbird's slipper1PoaceaeDaethanpilapipsissewa, prince's pine1OrchanchaceaeCordylantusbird's slipper1OrchanchaceaeCordylantusbird's slipper1PoaceaeDichantheliumdeer-tongue witchgrass, panicgrass, rosette grass1 </td <td>Fabaceae</td> <td>Rupertia</td> <td>rupertia</td> <td>2</td>	Fabaceae	Rupertia	rupertia	2
TyphaceaeSparganiumbur-reed2AsteraccaeTanacetumtansy2BrassicaceaeThysanocarpusfringepod2AsteraccaeWyethiamule ears2BerberidaceaeAchlysdeersfoot1RanunculaceaeActaeabaneberry, bugbane1LamiaceaeAgastachehyssop1AsteraceaeAgeratinasnakeroot1AsteraceaeAgoseriswoolly goat chicory,1PoaceaeAlopecurusfoxtail1PoaceaeAnthoxanthumvernalgrass1PlumbaginaceaeArmeriathrift seapink1AsteraceaeBerulawaterparsnip1BiechnaceaeBerulawaterparsnip1AsteraceaeCalochortusmariposa lily1CampanulaceaeCalcohortusmariposa lily1CampanulaceaeCalcohortusmariposa lily1CanpanulaceaeCordylanthusbird's beak1PoaceaeDarkhniadeer fern1LiliaceaeCordylanthusbird's baird, bird1PoaceaeDarkhniaoatgrass1PoaceaeCordylanthusbird's baird, bird1EricaceaeCordylanthusbird's baird, bird1CampanulaceaeCordylanthusbird's baird, bird1PoaceaeDoschampsiahairgrass1PoaceaeDoschampsiahairgrass1PoaceaeDos	Cyperaceae	Schoenoplectus	bulrush	2
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Brassicaceae Thysanocarpus fringepod 2 Asteraceae Wyethia mule ears 2 Berberidaceae Achlys deersfoot 1 Ranunculaceae Acteaa baneberry, bugbane 1 Lamiaceae Agastache hyssop 1 Asteraceae Ageratina snakeroot 1 Asteraceae Agoseris woolly goat chicory, 1 Poaceae Alopecurus foxtail 1 Poaceae Antoxanthum vernalgrass 1 Plumbaginaceae Armeria thrift seapink 1 Asteraceae Arnica arnica 1 Asteraceae Aruncus bride's feathers, goatsbeard 1 Asteraceae Bechnum deer fern 1 Asteraceae Cacaliopsis silvercrown 1 Liliaceae Calochortus mariposa lily 1 Campanulaceae Campanula bellflower 1 Drobanchaceae Cordylanthus <	Asteraceae	Tanacetum	tansy	2
AsteraceaeWyethiamule ears2BerberidaceaeAchlysdeersfoot1RanunculaceaeActaeabaneberry, bugbane1LamiaceaeAgastachehyssop1AsteraceaeAgeratinasnakcroot1AsteraceaeAgeratinasnakcroot1PoaceaeAlopecurusfoxtail1PoaceaeAnthoxanthumvernalgrass1PlumbaginaceaeArmeriathrift seapink1AsteraceaeArmeriathrift seapink1AsteraceaeArmicaarnica1RosaceaeAruncusbride's feathers, goatsbeard1ApiaceaeBerulawaterparsnip1BlechnaceaeBlechnumdeer fern1AsteraceaeCacaliopsissilvercrown1LiliaceaeCalochortusmariposa lily1CampanulaceaeCordylanthusbird's beak1OrohanchaceaeCordylanthusbird's beak1PoaceaeDanthoniaoatgrass1PoaceaeDeschampsiahairgrass1PoaceaeDeschampsiahairgrass1PoaceaeDeschampsiahairgrass1EricaceaeCordylanthusbird's beak1FumariaceaeCordylanthusbird's beak1PoaceaeDeschampsiahairgrass1PoaceaeDeschampsiahairgrass1PoaceaeDeschampsiahairgrass1 </td <td>Brassicaceae</td> <td>Thysanocarpus</td> <td>fringepod</td> <td>2</td>	Brassicaceae	Thysanocarpus	fringepod	2
BerberidaceaeAchlysdeersfoot1RanunculaceaeActaeabaneberry, bugbane1LamiaceaeAgastachehyssop1AsteraceaeAgeratinasnakeroot1AsteraceaeAgoseriswoolly goat chicory,1PoaceaeAlopecurusfoxtail1PoaceaeAnthoxanthumvernalgrass1PlumbaginaceaeArmeriathrift seapink1AsteraceaeArmeriathrift seapink1RosaceaeAruncusbride's feathers, goatsbeard1ApiaceaeBerulawaterparsnip1BlechnaceaeBerulawaterparsnip1LiliaceaeCacaliopsissilvercrown1LiliaceaeCalochortusmariposa lily1LiliaceaeCorydalisfumewort1OrchachaceaeCorydalisfumewort1PoaceaeDanthoniaoatgrass1PoaceaeDeschampsiahairgrass1PoaceaeDorhanchaceaeCorydalisfumewortIpipaiseswa, prince's pine1OrchidaceaeDeschampsiahairgrass1PoaceaeDicentrableeding heart1PoaceaeDichantheliumdeer-tongue witchgrass, panicgrass, rosette grass1PoaceaeDichantheliumcottongrass, panicgrass, spikerush1CyperaceaeEleocharisspikerush1CyperaceaeEleocharisspikerush1 </td <td>Asteraceae</td> <td>Wyethia</td> <td>mule ears</td> <td>2</td>	Asteraceae	Wyethia	mule ears	2
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AsteraceaeCacaliopsissilvercrown1LiliaceaeCalochortusmariposa lily1CampanulaceaeCampanulabellflower1EricaceaeChimaphilapipsissewa, prince's pine1OrobanchaceaeCorydalisfumewort1FumariaceaeCorydalisfumewort1OrchidaceaeCypripediumlady's slipper1PoaceaeDanthoniaoatgrass1PoaceaeDeschampsiahairgrass1PoaceaeDicentrableeding heart1PoaceaeDichantheliumdeer-tongue witchgrass, panicgrass, rosette grass1PoaceaeDichantheliumcottongrass1PoaceaeEleocharisspikerush1CyperaceaeEleocharisspikerush1CyperaceaeEleocharisspikerush1CyperaceaeEleocharisspikerush1EuphorbiaceaeEuphorbiapoinsettia, spurge, snow-on-the- mountain1AsteraceaeEuthamiagoldentop, flat-top goldentop1AsteraceaeGamochaetaeverlasting1HydrophyllaceaeHydrophyllumwaterleaf1	Blechnaceae	Blechnum	deer fern	1
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Hydrophyllaceae Hydrophyllum waterleaf 1	Gentianaceae	Gentianopsis	fringed gentian	1
	Hydrophyllaceae	Hydrophyllum	waterleaf	1

Malvaceae Hiamna wild hollyhock 1 Polemoniaceae Ipomopsis standing-cypress, skyrocket, ipomopsis, scarte glia 1 Poaceae Kabeleria junegrass 1 Asteraceae Lagophylla hareleaf 1 Asteraceae Lawingia goldfields 1 Poaceae Lawingia false losestrife, primrose-willow 1 Primulaceae Lysimachia yellow losestrife, fringed 1 Asteraceae Matricaria mayweed 1 Asteraceae Melica melicgrass 1 Montiaceae Melica melicgrass 1 Asteraceae Morita miner's lettuce 1 Haloragaceae Myriophyllum watermilfoil 1 Calastraceae Paristima paixistima 1 Poaceae Phragmiltes common reed 1 Apiaceae Phragmiltes common reed 1 Polygonaceae Polygolum polygoly 1 Lililacc	Family	Genus	Common Name	Native Oregon Lepidoptera
PolemoniaceaeIpomopsisstanding-cypress, skyrocket, ipomopsis, scarlet gilia1PoaceaeKoeleriajunegrass1AsteraceaeLagophyllahareleaf1AsteraceaeLastheniagoldfields1PoaceaeLeersiasouthern cutgrass, cutgrass1OnagraceaeLeersiasouthern cutgrass, cutgrass1OnagraceaeLysimachiayellow loosestrife, fringed loosestrife1PrimulaceaeMatricariamayweed1PoaceaeMelicamelicgrass1MenyanthaceaeMenyanthaceamotiograss1MontiaceaeMontiaminer's lettuce1HaloragaceaeMyriophyllimwatermilfoil1CelastraceaeParistimapaxistima1PoaceaePhilescommon recd1VerbenaceaePhylaturkey tangle fogfruit1PolygonaceaePolypodiumpolypody1LiliaceaePosartesfairy bells, mandarin1AstaraceaeSatitraiaarrowhead1ApiaceaeSpergulariasandclep1ApiaceaeSpergulariasandspurry1LilaceaeSpergulariasandspurry1ApiaceaeSpergulariasandspurry1ApiaceaeSpergulariasandspurry1ApiaceaeSpergulariasandspurry1ApiaceaeSpergulariasandspurry1ApiaceaeTorrilacia <td>Malvaceae</td> <td>Iliamna</td> <td>wild hollyhock</td> <td>1</td>	Malvaceae	Iliamna	wild hollyhock	1
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Onagraceae Ludwigia false loosestrife, primose-willow 1 Primulaceae Lysimachia yellow loosestrife, fringed loosestrife 1 Asteraceae Matricaria mayweed 1 Poaceae Melica melicgrass 1 Menyanthaceae Menyanthes buckbean 1 Asteraceae Microseris silverpuffs 1 Montiaceae Montia miner's lettuce 1 Haloragaceae Paxistima paxistima 1 Celastraceae Periderilia yampah 1 Poaceae Phragmites common reed 1 Poaceae Phyla turkey tangle fogfruit 1 Poaceae Polypodium polypody 1 Liliaceae Posartes fairy bells, mandarin 1 Ranuculaceae Sagittaria arrowhead 1 Apiaceae Saugittaria sanclula santeroot 1 Lamiaceae Sugattaria sandspurry 1 1	Poaceae	Leersia	southern cutgrass, cutgrass	1
PrimulaceaeLysimachiayellow loosestrife, fringed loosestrife1AsteraceaeMatricariamayweed1PoaceaeMelicamelicgrass1MenyanthaceaeMenyanthesbuckbean1AsteraceaeMicroserissilverpuffs1MontiaceaeMontiaminer's lettuce1HaloragaceaeMyriophyllumwatermilfoil1CelastraceaePaxistimapaxistima1PoaceaePerideridiayampah1PoaceaePhragmitescommon reed1VerbenaceaePhylaturkey tangle fogfruit1Polypodiumpolypody11LiliaceaeProsartesfairy bells, mandarin1RanunculaceaePalsatillapasqueflower1ApiaceaeSagittariasanicle, blacksnakeroot1LamiaceaeSagittariasanicle, blacksnakeroot1LamiaceaeSpirenosciadiumwoollyhead parsnip1ApiaceaeSpirenosciadiumwoollyhead parsnip1OrchidaceaeTiellinabigflower tellina1SaxifragaceaeTiellinafalse carrot1SaxifragaceaeTiellinatoadsde, trillium, wakerobin1PoaceaeApiaceaeAchnatherunnecedlegrass0ApiaceaeAchnatherunnecedlegrass0SaxifragaceaeTiellinatoadsde, trillium1SaxifragaceaeTiellinafalse carrot1 <td>Onagraceae</td> <td>Ludwigia</td> <td>false loosestrife, primrose-willow</td> <td>1</td>	Onagraceae	Ludwigia	false loosestrife, primrose-willow	1
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PoaceaeMelicamelicgrass1MenyanthaceaeMeryanthesbuckbean1AsteraceaeMicroserissilverpuffs1MontiaceaeMontiaminer's lettuce1HaloragaceaeMyriophyllumwatermilfoil1CelastraceaePaxistimapaxistima1ApiaceaePerideridiayampah1PoaceaePhragmitescommon reed1VerbenaceaePhylaturkey tangle fogfruit1PolygonaceaePolypodiumpolypody1LiliaceaeProsartesfairy bells, mandarin1RanunculaceaePulsatillapasqueflower1AlismataceaeSagittariaarrowhead1ApiaceaeSpergulariasanicle, blacksnakeroot1LamiaceaeSpergulariasandspurry1ApiaceaeSpergulariasandspurry1OrchidaceaeSpirantheslady's tresses1OrchidaceaeTiarellafoamflower1SaxifragaceaeTiarellafoamflower1SaxifragaceaeTiarellafoastlower1PoaceaeAchyrachaenablow wives0FabaceaeAchisafescue1OrchiaceaeYabeafalse carrot1DaceaeAchyrachaenablow wives0FabaceaeAchyrachaenablow wives0FabaceaeAchyrachaenablow wives0FabaceaeAdianther	Asteraceae	Matricaria	mayweed	1
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Lythraceae Ammannia redstem 0	Monotropaceae	Allotrona	sugarstick	0
	Lythraceae	Ammannia	redstem	0

Family	Genus	Common Name	Native Oregon Lepidoptera
Ranunculaceae	Anemone	anemone, thimbleweed	0
Asteraceae	Anisocarpus	leafy raillardiopsis	0
Liliaceae	Anticlea	western featherbells	0
Poaceae	Aristida	threeawn	0
Aristolochiaceae	Asarum	wildginger	0
Pteridaceae	Aspidotis	lacefern, Indian's dream	0
Aspleniaceae	Asplenium	spleenwort	0
Campanulaceae	Asyneuma	harebell	0
Athyriaceae	Athyrium	ladyfern	0
Salviniaceae	Azolla	mosquito fern	0
Poaceae	Beckmannia	sloughgrass	0
Saxifragaceae	Bensoniella	Oregon bensoniella	0
Polygonaceae	Bistorta	meadow bistort	0
Asteraceae	Blepharipappus	rough eyelashweed	0
Amaranthaceae	Blitum	urn orchid	0
Ophioglossaceae	Botrychium	grapefern	0
Ophioglossaceae	Botrypus	rattlesnake fern	0
Saxifragaceae	Boykinia	brookfoam	0
Cabombaceae	Brasenia	brasenia, watershield	0
Liliaceae	Brodiaea	brodiaea	0
Montiaceae	Calandrinia	redmaids	0
Plantaginaceae	Callitriche	water-starwort	0
Ranunculaceae	Caltha	marsh marigold	0
Asteraceae	Calycadenia	western rosinweed	0
Orchidaceae	Calypso	fairy slipper	0
Montiaceae	Calyptridium	pussypaws	0
Liliaceae	Camassia	camas	0
Asteraceae	Canadanthus	mountain aster	0
Papaveraceae	Canbya	pygmypoppy	0
Caryophyllaceae	Cardionema	sandcarpet	0
Saxifragaceae	Cascadia	Cascade-saxifrage	0
Orchidaceae	Cephalanthera	phantom orchid	0
Ceratophyllaceae	Ceratophyllum	hornwort	0
Saxifragaceae	Chrysosplenium	golden saxifrage	0
Gentianaceae	Cicendia	Oregon timwort	0
Poaceae	Cinna	woodreed	0
Onagraceae	Circaea	enchanter's nightshade	0
Lamiaceae	Clinopodium	clinopodium	0
Liliaceae	Clintonia	bluebead	0
Polemoniaceae	Collomia	trumpet	0
Asteraceae	Columbiadoria	Hall's columbiadoria	0
Rosaceae	Comarum	comarum, purple marshlocks	0
Ranunculaceae	Coptis	goldthread	0
Orchidaceae	Corallorhiza	coralroot	0
Asteraceae	Crocidium	common spring-gold	0
Boraginaceae	Cryptantha	cryptantha	0

Family	Genus	Common Name	Native Oregon Lepidoptera
Pteridaceae	Cryptogramma	rockbrake	0
Asteraceae	Cyclachaena	carelessweed	0
Dryopteridaceae	Cystopteris	bladderfern	0
Fabaceae	Dalea	prairie clover	0
Sarraceniaceae	Darlingtonia	California pitcherplant	0
Saxifragaceae	Darmera	Indian rhubarb	0
Liliaceae	Dichelostemma	snakelily	0
Primulaceae	Douglasia	dwarf-primrose	0
Campanulaceae	Downingia	calicoflower	0
Droseraceae	Drosera	sundew	0
Rosaceae	Drymocallis	woodbeauty	0
Cyperaceae	Dulichium	dulichium, three-way sedge	0
Saxifragaceae	Elmera	coralbells	0
Hydrocharitaceae	Elodea	waterweed	0
Ranunculaceae	Enemion	false rue anemone	0
Orchidaceae	Epipactis	helleborine, marsh orchid	0
Equisetaceae	Equisetum	horsetail	0
Caryophyllaceae	Eremogone	Clifton's eremogone	0
Liliaceae	Erythronium	fawnlily, dogtooth violet	0
Poaceae	×Elyhordeum	barley	0
Liliaceae	Fritillaria	fritillary	0
Campanulaceae	Githopsis	bluecup	0
Apiaceae	Glehnia	American silvertop	0
Orchidaceae	Goodyera	rattlesnake	0
Poaceae	Graphephorum	purple false oat, wolf's trisetum	0
Plantaginaceae	Gratiola	hedgehyssop	0
Dryopteridaceae	Gymnocarpium	oakfern	0
Asteraceae	Hazardia	bristleweed	0
Asteraceae	Helianthella	helianthella	0
Monotropaceae	Hemitomes	coneplant	0
Asteraceae	Hemizonella	opposite-leaved tarweed	0
Asteraceae	Hesperevax	dwarf-cudweed	0
Linaceae	Hesperolinon	dwarf-flax	0
Campanulaceae	Heterocodon	rareflower heterocodon	0
Plantaginaceae	Hippuris	mare's tail	0
Caryophyllaceae	Honckenya	honckenya	0
Fabaceae	Hosackia	deer-vetch	0
Campanulaceae	Howellia	water howellia	0
Asteraceae	Hulsea	alpinegold	0
Lycopodiaceae	Huperzia	clubmoss	0
Araliaceae	Hydrocotyle	marshpennywort	0
Ericaceae	Hypopitys	false beech-drops, yellow bird's- nest	0
Brassicaceae	Idahoa	oldstem idahoa	0
Isoetaceae	Isoetes	quillwort	0
Cyperaceae	Isolepis	bulrush	0

Family	Genus	Common Name	Native Oregon Lepidoptera
Rosaceae	Ivesia	mousetail	0
Asteraceae	Jaumea	marsh jaumea	0
Rubiaceae	Kelloggia	kelloggia	0
Orobanchaceae	Kopsiopsis	kopsiopsis	0
Asteraceae	Kyhosia	Bolander's madia	0
Lemnaceae	Lemna	duckweed	0
Saxifragaceae	Leptarrhena	fireleaf leptarrhena	0
Polemoniaceae	Leptosiphon	linanthus, babystars	0
Solanaceae	Leucophysalis	leucophysalis, dwarf chamaesaracha, large false groundcherry	0
Montiaceae	Lewisia	lewisia	0
Apiaceae	Lilaeopsis	grasswort	0
Limnanthaceae	Limnanthes	meadowfoam	0
Plantaginaceae	Limosella	mudwort	0
Linderniaceae	Lindernia	false pimpernel	0
Caprifoliaceae	Linnaea	twinflower	0
Cyperaceae	Lipocarpha	halfchaff sedge	0
Asteraceae	Luina	silverback	0
Juncaceae	Luzula	woodrush	0
Lycopodiaceae	Lycopodiella	clubmoss	0
Lycopodiaceae	Lycopodium	clubmoss	0
Lamiaceae	Lycopus	bugleweed, waterhorehound	0
Araceae	Lysichiton	skunk cabbage	0
Marsileaceae	Marsilea	waterclover	0
Papaveraceae	Meconella	fairypoppy	0
Saxifragaceae	Micranthes	pseudosaxifrage	0
Asteraceae	Micropus	cottonseed, q-tips	0
Polemoniaceae	Microsteris	slender phlox	0
Caryophyllaceae	Minuartia	stitchwort	0
Saxifragaceae	Mitellastra	mock millerwort	0
Caryophyllaceae	Moehringia	sandwort	0
Pyrolaceae	Moneses	single delight	0
Ericaceae	Monotropa	Indian pipe, pinesap	0
Ranunculaceae	Myosurus	mousetail	0
Pteridaceae	Myriopteris	lip fern	0
Najadaceae	Najas	waternymph	0
Polemoniaceae	Navarretia	pincushion plant	0
Orchidaceae	Neottia	twayblade	0
Menyanthaceae	Nephrophyllidium	deercabbage	0
Brassicaceae	Noccaea	pennycress	0
Asteraceae	Nothocalais	false dandelion	0
Plantaginaceae	Nothochelone	woodland beardtongue	0
Nymphaeaceae	Nuphar	pond lily	0
Iridaceae	Olsynium	grasswidow	0
Ophioglossaceae	Ophioglossum	adderstongue	0

Family	Genus	Common Name	Native Oregon Lepidoptera
Asteraceae	Oreostemma	aster	0
Apiaceae	Orogenia	Indian potato	0
Ericaceae	Orthilia	orthilia, sidebells wintergreen	0
Apiaceae	Oxypolis	cowbane	0
Saxifragaceae	Ozomelis	mitrewort	0
Asteraceae	Packera	ragwort	0
Thelypteridaceae	Parathelypteris	bog fern, New York fern	0
Parnassiaceae	Parnassia	grass of Parnassus	0
Saxifragaceae	Pectiantia	miterwort	0
Boraginaceae	Pectocarya	combseed	0
Pteridaceae	Pellaea	cliffbrake	0
Pteridaceae	Pentagramma	goldback fern	0
Zosteraceae	Phyllospadix	surfgrass	0
Orchidaceae	Piperia	rein orchid	0
Monotropaceae	Pityopus	California pinefoot	0
Boraginaceae	Plagiobothrys	popcornflower	0
Orchidaceae	Platanthera	fringed orchid	0
Monotropaceae	Pleuricospora	fringed pinesap	0
Poaceae	Pleuropogon	semaphoregrass	0
Poaceae	Podagrostis	false bent	0
Polemoniaceae	Polemonium	Jacob's-ladder, Greek valerian	0
Poaceae	Polypogon	rabbitsfoot grass	0
Potamogetonaceae	Potamogeton	pondweed	0
Rosaceae	Poteridium	prairie burnet	0
Lamiaceae	Prunella	selfheal	0
Poaceae	Pseudoroegneria	bluebunch wheatgrass	0
Trilliaceae	Pseudotrillium	brook wakerobin	0
Asteraceae	Psilocarphus	woollyheads	0
Monotropaceae	Pterospora	woodland pinedrops, pinedrops	0
Poaceae	Puccinellia	alkaligrass	0
Ericaceae	Pyrola	wintergreen	0
Asteraceae	Pyrrocoma	goldenweed	0
Asteraceae	Raillardella	raillardella	0
Asteraceae	Rainiera	false silverback	0
Polygalaceae	Rhinotropis	desert-milkwort	0
Cyperaceae	Rhynchospora	beaksedge	0
Asteraceae	Rigiopappus	wireweed	0
Hydrophyllaceae	Romanzoffia	mistmaiden	0
Lythraceae	Rotala	rotala	0
Ruppiaceae	Ruppia	widgeonweed	0
Caryophyllaceae	Sagina	pearlwort	0
Plantaginaceae	Sairocarpus	snapdragon	0
Amaranthaceae	Salicornia	pickleweed	0
Primulaceae	Samolus	brookweed	0
Rosaceae	Sanguisorba	burnet	0
Monotropaceae	Sarcodes	snowplant	0

Family	Genus	Common Name	Native Oregon Lepidoptera
Ophioglossaceae	Sceptridium	island grapefern	0
Scheuchzeriaceae	Scheuchzeria	rannoch-rush	0
Linaceae	Sclerolinon	northwestern yellowflax	0
Liliaceae	Scoliopus	fetid adderstongue	0
Selaginellaceae	Selaginella	spikemoss	0
Asteraceae	Sericocarpus	whitetop aster	0
Rosaceae	Sibbaldia	creeping sibbaldia	0
Iridaceae	Sisyrinchium	blue-eyed grass	0
Apiaceae	Sium	water parsnip	0
Brassicaceae	Smelowskia	candytuft	0
Lycopodiaceae	Spinulum	club-moss	0
Lemnaceae	Spirodela	duckmeat	0
Liliaceae	Streptopus	twistedstalk	0
Potamogetonaceae	Stuckenia	pondweed	0
Plantaginaceae	Synthyris	kittentails	0
Onagraceae	Taraxia	golden eggs	0
Plantaginaceae	Tonella	tonella, lesser baby innocence	0
Poaceae	Torreyochloa	false mannagrass	0
Melanthiaceae	Toxicoscordion	deathcamas	0
Ranunculaceae	Trautvetteria	bugbane	0
Liliaceae	Triantha	sticky tofieldia, false asphodel	0
Cyperaceae	Trichophorum	bulrush	0
Juncaginaceae	Triglochin	arrowgrass	0
Campanulaceae	Triodanis	Venus' looking-glass	0
Orobanchaceae	Triphysaria	owl's-clover, johnny-tuck	0
Poaceae	Trisetum	oatgrass	0
Liliaceae	Triteleia	triteleia	0
Asteraceae	Uropappus	Lindley's silverpuffs	0
Lentibulariaceae	Utricularia	bladderwort	0
Poaceae	Vahlodea	mountain hairgrass	0
Valerianaceae	Valeriana	valerian	0
Hydrocharitaceae	Vallisneria	eelgrass	0
Berberidaceae	Vancouveria	insideout flower	0
Lemnaceae	Wolffia	watermeal	0
Dryopteridaceae	Woodsia	cliff fern	0
Blechnaceae	Woodwardia	chainfern	0
Liliaceae	Xerophyllum	turkeybeard	0
Potamogetonaceae	Zannichellia	horned pondweed	0
Gentianaceae	Zeltnera	mountain-pink	0
Zosteraceae	Zostera	eelgrass, seawrack	0

Family	Genus	Common Name	Native Oregon Lepidoptera
Woody			
Trees			
Salicaceae	Salix	willow	307
Salicaceae	Populus	aspen, cottonwood, poplar	226
Rosaceae	Prunus	beach plum, cherry, chokecherry, peach, plum, sweet cherry, wild plum, almond	225
Betulaceae	Alnus	alder	204
Fagaceae	Quercus	oak	191
Betulaceae	Betula	birch	178
Pinaceae	Pinus	pine	149
Pinaceae	Pseudotsuga	Douglas-fir	137
Rosaceae	Malus	crabapple, apple	135
Pinaceae	Abies	fir	121
Aceraceae	Acer	maple, boxelder	117
Pinaceae	Tsuga	hemlock	93
Pinaceae	Larix	larch, tamarack	77
Rosaceae	Crataegus	hawthorn	65
Betulaceae	Corylus	filbert, hazel, hazelnut	61
Cupressaceae	Thuja	western red cedar, arborvitae	52
Oleaceae	Fraxinus	ash	50
Ericaceae	Arbutus	madrone	42
Cupressaceae	Juniperus	juniper	40
Rosaceae	Sorbus	mountain ash	37
Anacardiaceae	Rhus	sumac	21
Rosaceae	Physocarpus	ninebark	14
Cupressaceae	Chamaecyparis	Atlantic white cedar, white cedar	12
Cupressaceae	Calocedrus	incense cedar	9
Fagaceae	Notholithocarpus	tanoak	6
Cupressaceae	Sequoia	redwood	5
Taxaceae	Taxus	yew	3
Lauraceae	Umbellularia	California laurel	3
Cupressaceae	Callitropsis	Nootka cypress, Alaska cedar	0
Tree/Shrub			
Cornaceae	Cornus	dogwood, bunchberry	57
Rosaceae	Cercocarpus	mountain mahogany	23
Rhamnaceae	Frangula	buckthorn	22
Shrub			
Ericaceae	Vaccinium	cranberry, blueberry	127
Grossulariaceae	Ribes	currant, gooseberry	116
Rosaceae	Rubus	blackberry, dewberry, Himalayan berry, raspberry, thimbleberry, loganberry	95
Rhamnaceae	Ceanothus	New Jersey tea	90
Rosaceae	Rosa	rose, sweetbriar	88
Rosaceae	Amelanchier	serviceberry, juneberry, shadbush	82
Rosaceae	Spiraea	meadowsweet, spirea	58

Family	Genus	Common Name	Native Oregon Lepidoptera
Ericaceae	Arctostaphylos	bearberry, kinnikinnick, manzanita	52
Rosaceae	Holodiscus	oceanspray, rockspiraea	40
Caprifoliaceae	Symphoricarpos	snowberry, buckbush	37
Ericaceae	Rhododendron	rhododendron, azalea, labrador tea	34
Adoxaceae	Sambucus	elderberry	34
Adoxaceae	Viburnum	arrowwood, viburnum, swamp elder, wild raisin	33
Rosaceae	Purshia	bitterbush, cliffrose	32
Ericaceae	Kalmia	mountainlaurel, sheep laurel, bog laurel, whitewicky	13
Myricaceae	Morella	red bayberry, wax myrtle, northern bayberry	11
Fagaceae	Chrysolepis	golden chinquapin	9
Rosaceae	Oemleria	Indian plum	9
Ericaceae	Menziesia	minniebush, rusty menziesia	4
Hydrangeaceae	Philadelphus	mock orange	4
Ericaceae	Gaultheria	snowberry	3
Celastraceae	Euonymus	wahoo, burningbush, euonymus, spindletree, burstingheart, wintercreeper, strawberrybush	2
Berberidaceae	Mahonia	Barberry	2
Empetraceae	Empetrum	crowberry	1
Araliaceae	Oplopanax	devilsclub	1
Ericaceae	Phyllodoce	mountainheath	1
Ericaceae	Cassiope	western moss heather	0
Lycopodiaceae	Diphasiastrum	creeping-cedar	0
Garryaceae	Garrya	silktassel	0
Ericaceae	Kalmiopsis	North Umpqua kalmiopsis	0
Rosaceae	Luetkea	partridgefoot	0
Hydrangeaceae	Whipplea	common whipplea	0
Parasite			
Santalaceae	Arceuthobium	dwarf mistletoe	5
Santalaceae	Phoradendron	mistletoe	2
Vine			
Caprifoliaceae	Lonicera	honeysuckle	29
Anacardiaceae	Toxicodendron	poison oak, poison sumac, poison ivy	7