# 5.0 TERRESTRIAL RESOURCES

Pursuant to requirements of 18 CFR (Sections 4.51 and 16.8), PacifiCorp has prepared a report on terrestrial resources for the Yale Hydroelectric Project. This report contains the following elements:

- A description of the existing terrestrial (wildlife and botanical) resources in the project vicinity, including measures currently implemented by PacifiCorp to maintain or protect terrestrial resources;
- Proposed measures to protect and enhance terrestrial resources during the term of the new FERC license;
- Enhancement measures recommended by the resource agencies that are not included in PacifiCorp's proposal;
- A discussion of agency/tribal involvement related to terrestrial resources;
- A description of continuing effects; and
- Implementation, schedule, and cost of proposed measures.

Terrestrial resources associated with the project include plant communities, mammals, birds, amphibians, and reptiles. These resources were surveyed in the 16,074-acre study area that encompasses Yale Lake, PacifiCorp-owned property in the project vicinity, and lands potentially affected by project operations (see Figure 2.1-1). The study area for the Lewis River watershed studies includes lands identified by the WDFW for potential acquisition as well as PacifiCorp ownership and lands within 0.5 mile of the reservoirs. A larger secondary study area is also proposed for the evaluation of cumulative effects.

## 5.1 EXISTING RESOURCES

As part of relicensing the Yale Hydroelectric Project, PacifiCorp conducted studies to describe existing terrestrial resources associated with the project. These studies included the following: (1) vegetation cover type mapping and characterization; (2) species/habitat association studies; (3) threatened, endangered, and sensitive (TES) wildlife and plant species surveys; and (4) surveys to determine wildlife use of the reservoir drawdown area. The objectives of these studies were to:

- Characterize botanical and wildlife resources associated with the existing project,
- Collect information necessary to assess continuing operational effects, and
- Identify measures to protect and enhance terrestrial resources.

These study objectives were consistent with FERC licensing requirements and with requests by the USFWS and WDFW during Stage I consultation. Results of the studies conducted between 1996 and 1998 were presented in the revised FTR for Terrestrial Resources (PacifiCorp 1998b). Revisions in response to agency comments on the draft

FTR and draft License Application have been incorporated into the final Yale License Application.

The information on existing resources presented in this section is based on the results of the 1995-1998 relicensing studies and describes the botanical and wildlife resources associated with the project. Scientific names and additional information on the studies conducted for these resources are provided in Appendix 5.1-1.

## 5.1.1 Botanical Resources

The Yale Project is located in the Southern Washington Cascades Province of the Pacific Northwest. The Lewis River drainage is typical of this province, which is characterized by steep mountain ridges that are generally east-west oriented and separated by broad, deep valleys (Franklin and Dyrness 1988). Soils are almost completely volcanic in origin and outcrops of basalt and andesite are common (Franklin and Dyrness 1988). Most of this province is within the western hemlock vegetation zone (Franklin and Dyrness 1988); vegetation throughout the Lewis River drainage, however, has been affected by timber harvest.

### 5.1.1.1 Vegetation Cover Types

Cover type mapping for the 16,074-acre study area resulted in a total of 28 cover types/seral stages, including 14 upland, 8 deep water/wetland, and 6 disturbed/modified types. Information on vegetation characteristics for each type was obtained from a forest inventory (Hildreth 1995), wetland inventory (Dueker and Paz 1995), and field sampling program conducted in 1997. Cover types are described in the following sections.

#### Upland Cover Types

Uplands, exclusive of the developed/disturbed transmission line right-of-way (ROW), represent 11,187 acres or 70 percent of the study area and are primarily forested (Table 5.1-1, Figure 5.1-1). Forests include both conifer and deciduous cover types. Non-forested upland cover types include shrublands, meadow/grasslands, rock talus, and rock outcroppings. The structure and composition of each of the upland cover types are briefly described in the following subsections.

Conifer Forest Cover Types - Conifer forests occupy 5,422 acres or 34 percent of the study area (Table 5.1-1, Figure 5.1-1). Approximately 5,242 acres or 97 percent of the conifer forest is dominated by Douglas-fir and was mapped into 1 of 5 cover types based on successional stage. These stages range in age and stand structure from recent clearcuts to even-aged/sized pole stands to mixed canopy old-growth forest. Most stands also have a small percentage of western hemlock and western red cedar. A sword-fern plant community is the dominant understory within most of the conifer types. Understory vegetation also includes a variety of shrubs and forbs, such as vine maple, Oregon grape, salal, trailing blackberry, and redwood sorrel. The remaining 180 acres, or 3 percent of

**Table 5.1-1. Cover type acres for the Yale Project study area.**

| Cover Types | Acreage in Study Area | Percent of Study Area | Acreage Owned by PacifiCorp[1] | Percent PacifiCorp Total |
|---|---|---|---|---|
| UPLANDS | | | | |
| Conifer Forest | | | | |
| Lodgepole Pine | 180.1 | 1.1 | 100.4 | 1.3 |
| Old-Growth | 103.0 | 0.6 | 28.0 | 0.4 |
| Mature | 726.4 | 4.5 | 209.1 | 2.8 |
| Mid-Successional | 1,966.6 | 12.2 | 680.1 | 9.1 |
| Pole | 1,204.6 | 7.5 | 98.8 | 1.3 |
| Seedling/Sapling | 1,240.9 | 7.7 | 305.7 | 4.1 |
| Conifer Forest Subtotal | 5,421.6 | 33.7 | 1,422.1 | 19.0 |
| Mixed Conifer/Deciduous Forest | | | | |
| Upland Mixed Conifer/Deciduous | 1,291.5 | 8.0 | 472.0 | 6.3 |
| Riparian Mixed Conifer/Deciduous | 120.0 | 0.7 | 44.4 | 0.6 |
| Mixed Conifer/Deciduous Forest Subtotal | 1,411.5 | 8.8 | 516.4 | 6.9 |
| Deciduous Forest | | | | |
| Upland Deciduous | 3,880.2 | 24.1 | 1,747.0 | 23.3 |
| Riparian Deciduous | 120.8 | 0.8 | 62.1 | 0.8 |
| Deciduous Forest Subtotal | 4,001.0 | 24.9 | 1,809.1 | 24.1 |
| Non-forested Areas | | | | |
| Shrubland | 131.2 | 0.8 | 67.6 | 0.9 |
| Meadow/Grassland | 204.8 | 1.3 | 40.4 | 0.5 |
| Rock Talus | 5.2 | 0.0 | 3.0 | 0.0 |
| Rock Outcropping | 11.8 | 0.1 | 0.0 | 0.0 |
| Non-forested Areas Subtotal | 353.0 | 2.2 | 111.0 | 1.4 |
| UPLANDS TOTAL | 11,187.1 | 69.6 | 3,858.6 | 51.4 |
| | | | | |
| DEEP WATER AND WETLAND TYPES | | | | |
| Deep Water Types | | | | |
| Riverine Unconsolidated Bottom | 27.1 | 0.2 | 9.8 | 0.1 |
| Riverine Unconsolidated Shore | 9.2 | 0.1 | 0.9 | 0.0 |
| Lacustrine Unconsolidated Bottom | 3,842.2 | 23.9 | 3,198.7 | 42.7 |
| Lacustrine Unconsolidated Shore | 1.0 | 0.0 | 1.0 | 0.0 |
| Deep Water Subtotal | 3,879.5 | 24.1 | 3,210.4 | 42.8 |
| Wetlands | | | | |
| Palustrine Emergent | 20.2 | 0.1 | 17.6 | 0.2 |
| Palustrine Scrub-Shrub | 70.1 | 0.4 | 36.0 | 0.5 |
| Palustrine Forested | 32.7 | 0.2 | 28.2 | 0.4 |
| Palustrine Unconsolidated Bottom | 34.0 | 0.2 | 18.6 | 0.2 |
| Wetlands Subtotal | 157.0 | 1.0 | 100.4 | 1.3 |
| DEEP WATER AND WETLANDS TOTAL | 4,036.5 | 25.1 | 3,310.8 | 44.1 |
| | | | | |
| DEVELOPED/DISTURBED AREAS | | | | |
| Transmission Line Right-of-Way | 229.5 | 1.4 | 107.8 | 1.3 |
| Recreation | 68.9 | 0.4 | 68.8 | 0.9 |
| Agriculture | 66.5 | 0.4 | 31.3 | 0.4 |
| Developed | 218.2 | 1.4 | 76.4 | 1.0 |
| Residential | 210.4 | 1.3 | 30.3 | 0.4 |
| Disturbed | 56.8 | 0.4 | 1.5 | 0.0 |
| DEVELOPED/DISTURBED AREAS TOTAL | 850.3 | 5.3 | 316.1 | 4.0 |
| STUDY AREA TOTAL | 16,073.9 | 100.0 | 7,485.5 | 100.0 |

[1] Includes 1,023.4 acres that are within the Merwin Wildlife Habitat Management Area and 635.5 acres that are associated with Swift Reservoir in Skamania County.

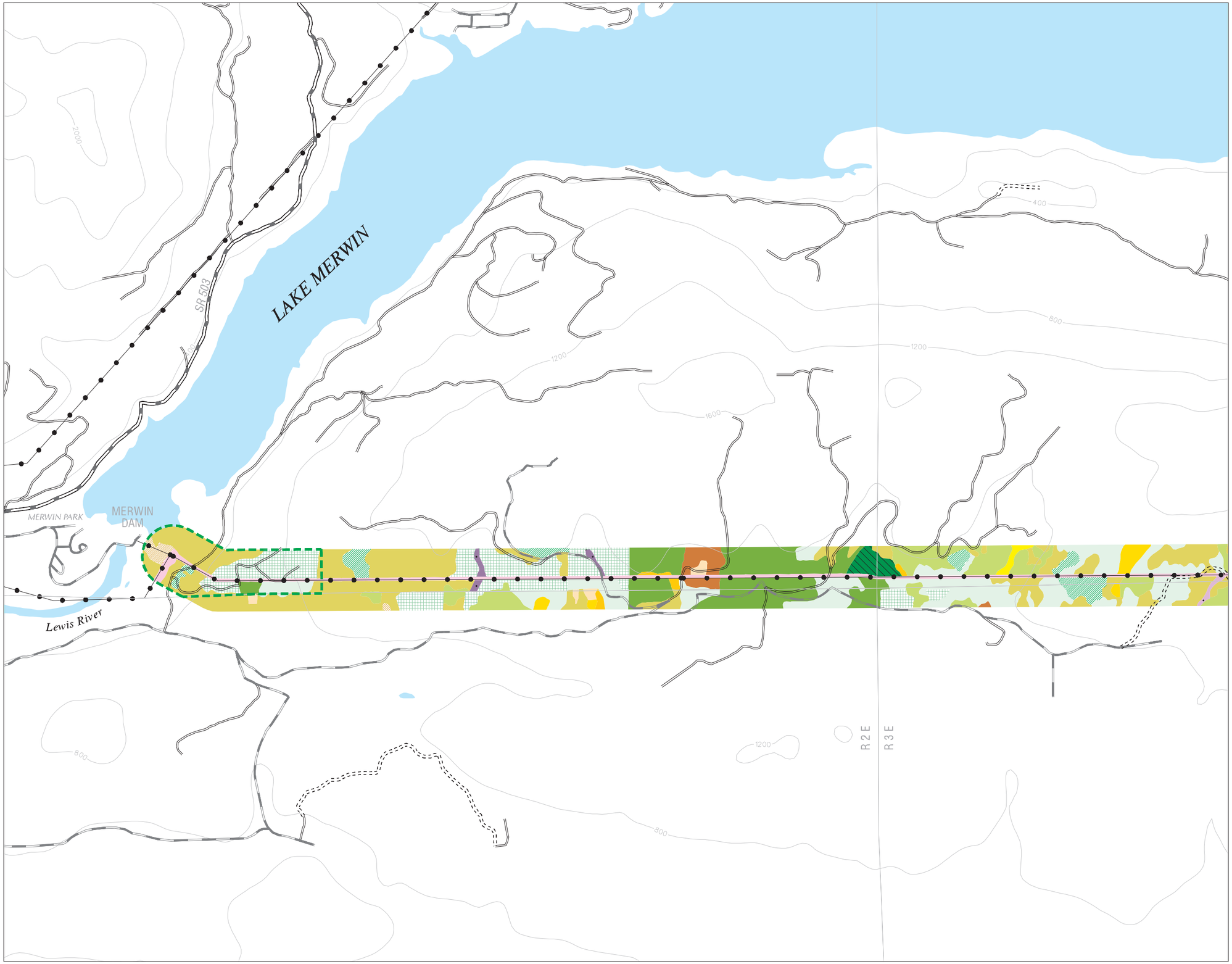
conifer forest, is composed of a lodgepole pine community that is unique to a lava flow in the study area (Figure 5.1-1). The following sections briefly describe each of the 6 conifer cover types.

*Lodgepole Pine* - Lodgepole pine is more typical of drier climates east of the Cascade crest; it is therefore the most unusual forest type in the study area. This type covers 180 acres or 1 percent of the study area and is restricted to the lava flow north of the upper end of the reservoir (Table 5.1-1, Figure 5.1-1). Overstory vegetation within this type consists of lodgepole pine and Douglas-fir, with an average canopy cover of 59 percent (Table 5.1-2). A thick layer of moss and lichen covers over 90 percent of the lava surface; low herbaceous vegetation is sparse, covering only about 4 percent of the ground (Table 5.1-3). Shrub cover in the lodgepole pine type is lower than most other conifer types, averaging 40 percent for tall and low species layers combined, and dominated by bristly manzanita, kinnikinnik, and prostrate ceanothus (Table 5.1-4).

*Old-Growth and Mature Conifer* - The WDFW Priority Habitats and Species (PHS) Program defines old-growth west of the Cascade crest as stands with the following characteristics:

- At least 2 tree species, forming a multi-layered canopy with occasional small openings;
- At least 8 trees/acre >32 inches diameter at breast height (dbh) or >200 years of age;
- >4 snags/acre over 20 inches dbh and 15 feet tall; and
- Numerous downed logs, including 4 logs/acre >24 inches in diameter (http://www.wa.gov/wdfw/hab/phshabs.htm, February 5, 1999).

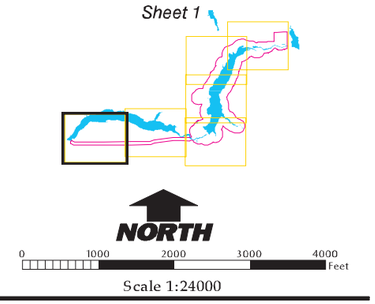
For the purpose of vegetation mapping in the Yale study area, stands were classified as old-growth if they had at least 2 tree species; a multi-layer canopy; and numerous large trees, snags greater than about 20 inches in diameter, and downed logs. Based on this definition, old-growth conifer covers 103 acres or less than 1 percent of the study area (Table 5.1-1, Figure 5.1-1). The only old-growth stand in the study area that may come close to having 8 trees/acre >32 inches dbh is a 36-acre parcel in PacifiCorp ownership located on Siouxon Ridge. All of the old-growth conifer in the study area occurs in 7 patches—1 just south of Siouxon Creek, 1 at the upstream end of Yale Lake, 1 east of the International Paper (IP) Road, 1 bordering the transmission line ROW east of Merwin Dam, and 3 north of the transmission line in the northeast portion of the study area (Figure 5.1-1). The only old-growth stand in the study area that may come close to having 8 trees/acre >32 inches dbh is a 36-acre parcel in PacifiCorp ownership located on Siouxon Ridge.




## Legend

- Agriculture
- Residential
- Developed
- Disturbed
- Recreation
- Transmission Line Right-Of-Way
- Rock Outcropping
- Rock Talus
- Old Growth Forest
- Mature Conifer Forest
- Mid-Successional Conifer Forest
- Pole Conifer Forest
- Seedling/Sapling Conifer Forest
- Lodgepole Pine Forest
- Upland Deciduous Forest
- Upland Mixed Conifer/Deciduous Forest
- Riparian Deciduous Forest
- Riparian Mixed Conifer/Deciduous Forest
- Dry Meadow/Grassland
- Shrubland
- Palustrine Scrub-Shrub Wetland
- Palustrine Emergent Wetland
- Palustrine Forest Wetland
- Palustrine Unconsolidated Bottom
- Lacustrine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom Above 474 ft. in Yale Lake
- Riverine Unconsolidated Bottom
- Riverine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom 474 ft. Elevation and Less
- PacifiCorp Ownership

Cave locations were mapped from the WDFW PHS but are not shown




Scale 1:24000

# *Yale Hydroelectric Project*

**Figure 5.1-1 (1 of 6)**
**Vegetation Cover Types in the Yale Project Study Area**



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*Created by VESTRA Resources for PacifiCorp*

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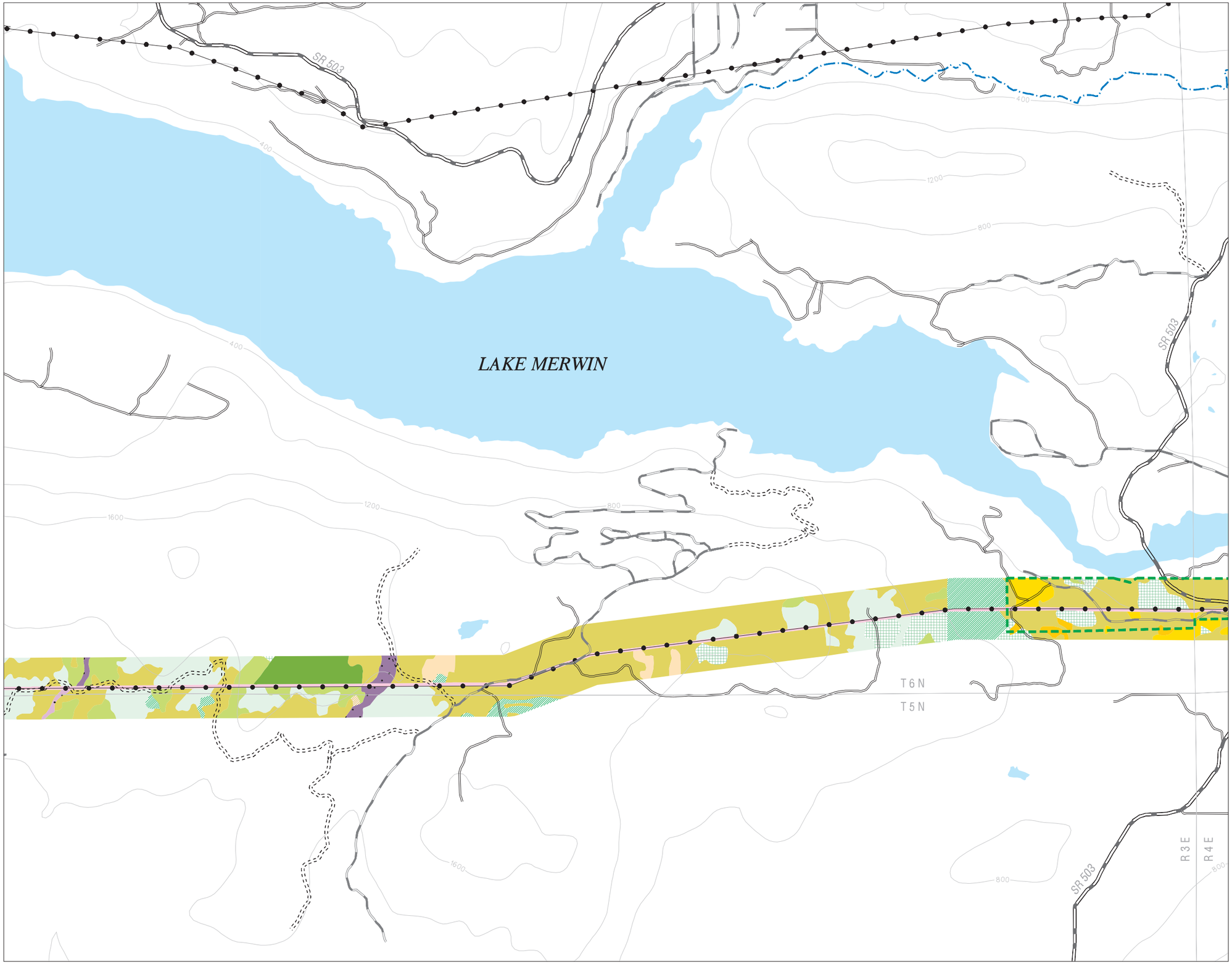
*February 24, 1999*




## Legend

- Agriculture
- Residential
- Developed
- Disturbed
- Recreation
- Transmission Line Right-Of-Way
- Rock Outcropping
- Rock Talus
- Old Growth Forest
- Mature Conifer Forest
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- Lodgepole Pine Forest
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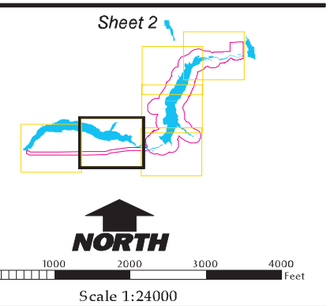
- Lacustrine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom Above 474 ft. in Yale Lake
- Riverine Unconsolidated Bottom
- Riverine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom 474 ft. Elevation and Less
- PacifiCorp Ownership

Cave locations were mapped from the WDFW PHS but are not shown

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# Yale Hydroelectric Project

**Figure 5.1-1 (2 of 6)**
**Vegetation Cover Types in the Yale Project Study Area**


Created by VESTRA Resources for PacifiCorp
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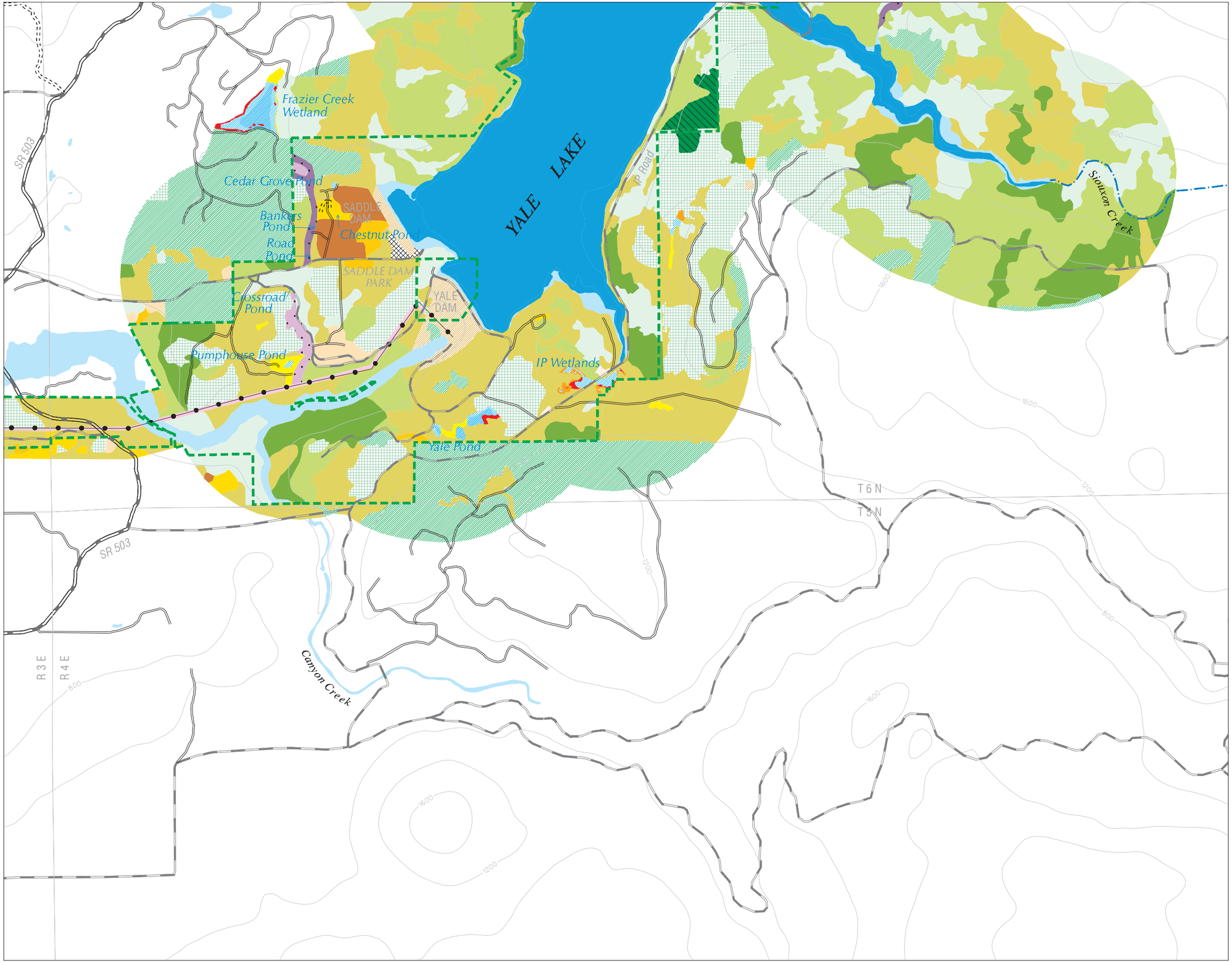
February 24, 1999




## Legend

- Agriculture
- Residential
- Developed
- Disturbed
- Recreation
- Transmission Line Right-Of-Way
- Rock Outcropping
- Rock Talus
- Old Growth Forest
- Mature Conifer Forest
- Mid-Successional Conifer Forest
- Pole Conifer Forest
- Seedling/Sapling Conifer Forest
- Lodgepole Pine Forest
- Upland Deciduous Forest
- Upland Mixed Conifer/Deciduous Forest
- Riparian Deciduous Forest
- Riparian Mixed Conifer/Deciduous Forest
- Dry Meadow/Grassland
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- Palustrine Emergent Wetland
- Palustrine Forest Wetland
- Palustrine Unconsolidated Bottom
- Lacustrine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom Above 474 ft. in Yale Lake
- Riverine Unconsolidated Bottom
- Riverine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom 474 ft. Elevation and Less
- PacifiCorp Ownership

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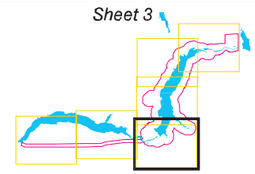


NORTH

0 1000 2000 3000 4000 Feet

Scale 1:24000

# Yale Hydroelectric Project

**Figure 5.1-1 (3 of 6)**
**Vegetation Cover Types in the Yale Project Study Area**


Created by VESTRA Resources for PacifiCorp
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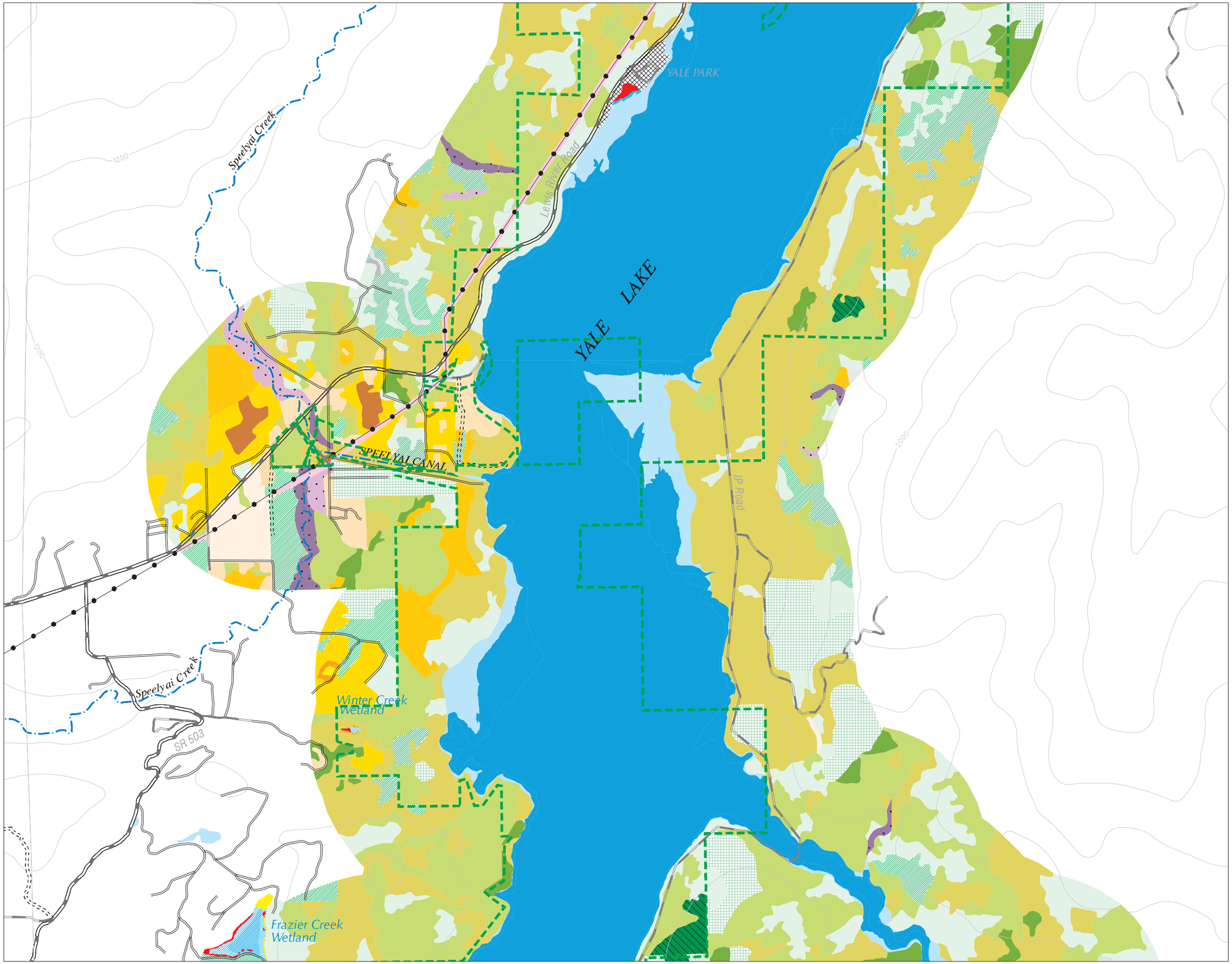
February 24, 1999




## Legend

- Agriculture
- Residential
- Developed
- Disturbed
- Recreation
- Transmission Line Right-Of-Way
- Rock Outcropping
- Rock Talus
- Old Growth Forest
- Mature Conifer Forest
- Mid-Successional Conifer Forest
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- Palustrine Emergent Wetland
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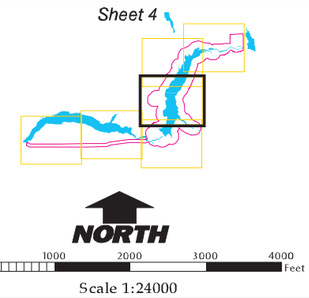
- Lacustrine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom Above 474 ft. in Yale Lake
- Riverine Unconsolidated Bottom
- Riverine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom 474 ft. Elevation and Less
- PacifiCorp Ownership

Cave locations were mapped from the WDFW PHS but are not shown

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# Yale Hydroelectric Project

**Figure 5.1-1 (4 of 6)**
**Vegetation Cover Types in the Yale Project Study Area**


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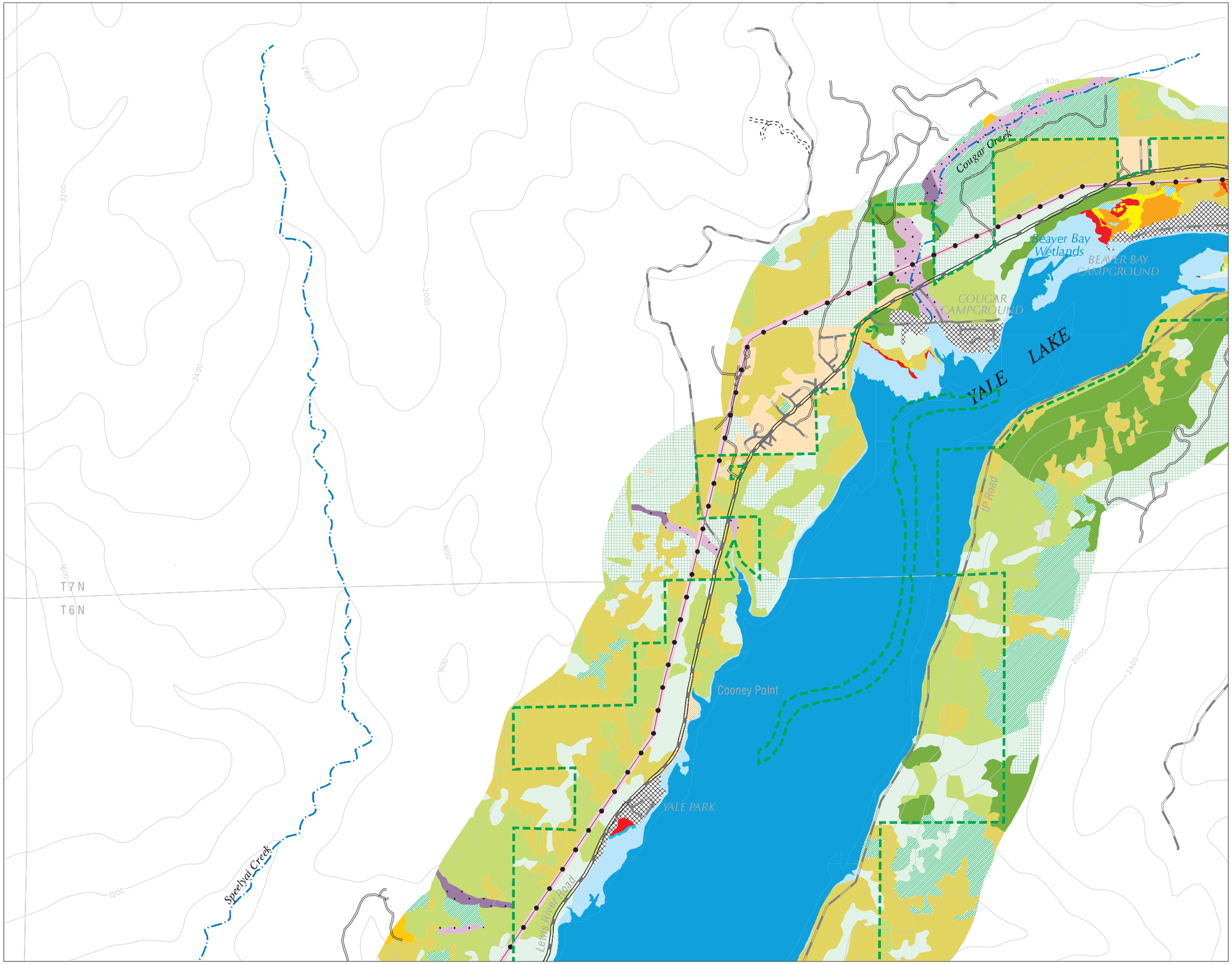
February 24, 1999




## Legend

- Agriculture
- Residential
- Developed
- Disturbed
- Recreation
- Transmission Line Right-Of-Way
- Rock Outcropping
- Rock Talus
- Old Growth Forest
- Mature Conifer Forest
- Mid-Successional Conifer Forest
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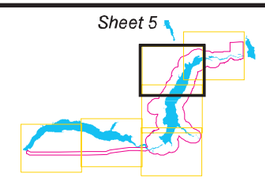
- Riverine Unconsolidated Bottom
- Riverine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom 474 ft. Elevation and Less
- PacifiCorp Ownership

Cave locations were mapped from the WDFW PHS but are not shown




NORTH

0 1000 2000 3000 4000 Feet

Scale 1:24000

# Yale Hydroelectric Project

**Figure 5.1-1 (5 of 6) Vegetation Cover Types in the Yale Project Study Area**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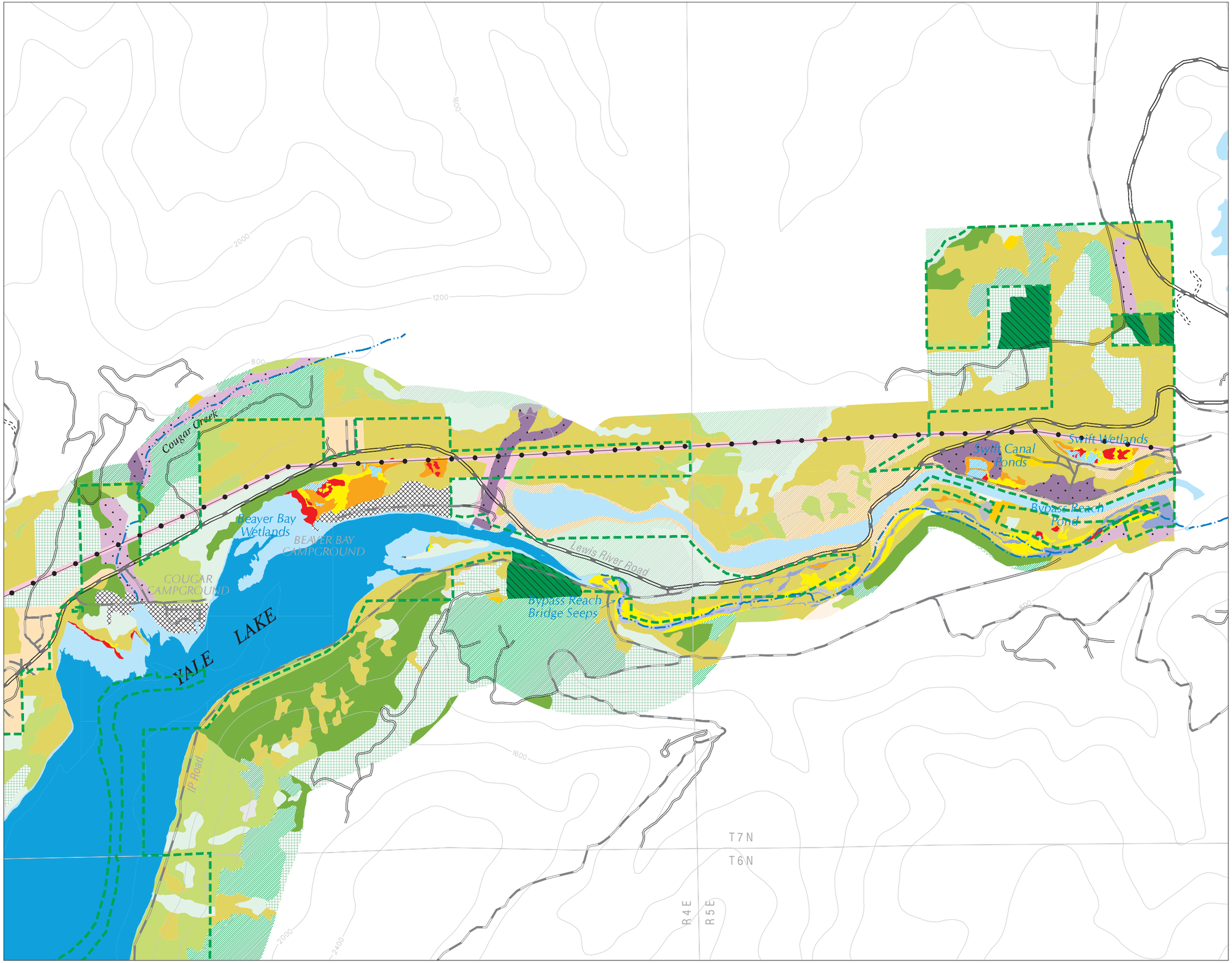
February 24, 1999




## Legend

- Agriculture
- Residential
- Developed
- Disturbed
- Recreation
- Transmission Line Right-Of-Way
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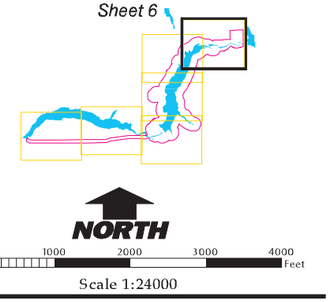
- Riverine Unconsolidated Bottom
- Riverine Unconsolidated Shore
- Lacustrine Unconsolidated Bottom 474 ft. Elevation and Less
- PacifiCorp Ownership

Cave locations were mapped from the WDFW PHS but are not shown

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# *Yale Hydroelectric Project*

**Figure 5.1-1 (6 of 6)**
**Vegetation Cover Types in the Yale Project Study Area**


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*February 24, 1999*

**Table 5.1-2. Tree layer attributes for forest cover types in the study area for the Yale Project[1].**

| Forest Cover Type | Tree Canopy Closure (%) | No. Trees/ Ac | Mean Tree Ht. (ft) | Overstory Tree Ht. (ft) | Mean Tree dbh (in) | No. Trees/ Ac>22 in dbh |
|---|---|---|---|---|---|---|
| Lodgepole Pine[2] | 59 | -- | -- | -- | -- | -- |
| Old-Growth Conifer | 85 | 101 | 109 | 158 | 21.4 | 33 |
| Mature Conifer | 69 | 107 | 71 | 127 | 17.4 | 21 |
| Mid-Successional Conifer | 76 | 121 | 90 | 102 | 16.9 | 20 |
| Pole Conifer | 79 | 195 | 69 | 77 | 12.3 | 7 |
| Seedling/Sapling Conifer[3] | -- | 357 | <20 | <20 | <6 | 0 |
| Mixed Conifer/Deciduous | 57 | 138 | 76 | 98 | 15.4 | 18 |
| Upland Deciduous[4] | >75 | 185 | 64 | 87 | 12.0 | 6 |

[1] Summarized from a forest inventory by Hildreth (1995); range and standard deviation were not reported for these attributes.

[2] Tree density and size measurements were not included in the forest inventory conducted by Hildreth (1995); tree canopy closure was measured during the field sampling program.

[3] Canopy closure and dbh in the seedling/sapling conifer type were not measured as part of the forest inventory because all trees are <20 feet; seedling/sapling density and dbh were estimated during the field sampling program.

[4] Deciduous canopy closure was not measured as part of the forest inventory (Hildreth 1995); however, canopy closure of deciduous trees during the summer is high and was estimated >75 percent in all sampled stands.

The old-growth conifer stands in the study area generally have 3 tree canopy layers—an overstory composed of large Douglas-fir and 2 understory layers that consist of smaller western hemlock and big-leaf maple. Most stands are also characterized by high densities (mean 35/acre) of large snags (20.1-inch mean diameter at breast height [dbh]). Cover of down woody material is relatively low (12 percent) (Table 5.1-3). Mean tree canopy closure (85 percent), height (109 feet), and dbh (21.4 inches) are greater in old-growth stands than in any other successional stage (Table 5.1-2). Mean shrub cover is 54 percent, with nearly two-thirds of the canopy composed of vine maple. Unlike the earlier successional forest types in the study area, old-growth does not support dense stands of sword-fern; mean canopy cover of this species is about 15 percent (Table 5.1-4).

Mature forest stands cover 726 acres and represent 5 percent of the study area. These stands are similar to old-growth stands in species composition but lack the uneven canopy structure and have lower mean canopy closure (69 percent), overstory height (127 feet), and tree dbh (17.4 inches) (Table 5.1-2). Stem (107/acre) and snag (37/acre) density and shrub cover (57 percent), however, were similar to that of old-growth stands (Tables 5.1-2, 5.1-3, and 5.1-4). Likewise, the shrub layer in mature conifer stands is also dominated by vine maple. At 24 percent, mean canopy cover of sword-fern is higher than in old-growth stands (15 percent) (Table 5.1-4); low forb/grass cover is substantially lower (Table 5.1-3).

**Table 5.1-3. Summary of data on snags, down woody material, and low forb/grass layer for cover types in the study area for the Yale Project[1].**

| Forest Cover Type | Mean No. Snags/ Ac | No. Snags/ Ac >20 in. dbh | Mean Snag dbh (in) | Mean Down Woody Material Cover (%) | Mean Low Forb/ Grass Canopy Cover[1] (%) | Mean Low Forb/ Grass Ht. (in) | Common Low Forb/ Grass Species |
|---|---|---|---|---|---|---|---|
| Lodgepole Pine Forest[2] | 8 (4-12) | 0.5 (0-1.2) | 9.1 (2.3-34.3) | <1 | 4 (1-8) | 5.1 (2.0-17.0) | Dogbane Tr. blackberry |
| Old-Growth Conifer Forest | 35 (24-52) | 13.3 (0-32) | 20.1 (4.3-57.5) | 12 (2-26) | 47 (8-73) | 8.7 (2.0-24.0) | Vanillaleaf Inside-out fl. |
| Mature Conifer Forest | 37 (6-68) | 1.6 (1.2-2) | 16.9 (3.1-43.3) | 15 (12-19) | 22 (7-37) | 6.1 (1.6-17.0) | Twin flower Tr. blackberry |
| Mid-Successional Conifer Forest | 9 (0-50) | 0.4 (0-1.2) | 13.4 (3.5-57.9) | 14 (7-23) | 19 (7-32) | 5.4 (1.2-39.4) | Bedstraw Twinflower |
| Pole Conifer Forest | 25 7-34 | 1.7 (0-4.4) | 10.5 (2.0-56.3) | 19 (14-26) | 23 (2-34) | 5.1 (0.8-31.5) | Star flower Inside-out fl. |
| Seedling/ Sapling Conifer Forest | 7 (4-8) | 0.3 (0-0.4) | 26.4 (16.1-44.1) | 10 (6-12) | 58 (33-77) | 8.7 (1.2-22.0) | Lettuce Tr. blackberry |
| Mixed Conifer/ Deciduous Forest | 19 (16-24) | 0 (0-0) | 8.8 (3.9-13.8) | 5 (3-9) | 31 (21-40) | 7.0 (2.0-24.8) | Tr. blackberry Bedstraw |
| Upland Deciduous Forest | 3 (1-15) | 0.3 (0-0.8) | 10.2 (2.0-53.5) | 4 (<1-8) | 53 (36-80) | 8.2 (2.0-26.8) | Montia spp. Vanillaleaf |
| Shrubland | 0 | | -- | 6 (5-8) | 15 (6-34) | 5.6 (0.8-24.8) | Tr. blackberry Bedstraw |
| Meadow[3] | 0 | | -- | 0 | 98.2 | -- | Canada thistle Sedge sp. |

[1] Range is shown in parentheses; see PacifiCorp (1998b) for other summary statistics.
[2] About 90 percent of the ground surface in lodgepole pine stands is covered by mosses and lichens.
[3] Only 1 meadow plot was measured; height of low forb/grass layer was not measured.

**Table 5.1-4. Shrub and tall forb layer attributes for cover types in the study area for the Yale Project[1].**

| Forest Cover Type | Mean Tall Shrub Canopy Cover (%) | Mean Low Shrub Canopy Cover (%) | Mean Tall Forb Canopy Cover (%) | Dominant Shrub & Tall Forb Species & Mean Canopy Cover (%) | Mean Shrub Ht. (ft) | Mean Low Shrub/ Tall Forb Ht. (ft) |
|---|---|---|---|---|---|---|
| Lodgepole Pine Forest | 31 (25-37) | 9 (6-12) | 1 (<1-1) | Bristly manzanita - 12<br>Salal – 6 | 5.2 (2.3-11.5) | 0.9 (0.2-2.0) |
| Old-Growth Conifer Forest | 41 (4-61) | 13 (6-20) | 15 (2-29) | Vine maple - 36<br>Sword-fern - 15 | 12.1 (1.3-26.2) | 1.5 (0.1-3.7) |
| Mature Conifer Forest | 49 (24-74) | 8 (4-12) | 29 (2-56) | Vine maple - 42<br>Sword-fern - 24 | 10.5 (3.3-29.5) | 2.1 (0.4-3.2) |
| Mid-Successional Conifer Forest | 77 (59-103) | 9 (<1-32) | 58 (41-76) | Vine maple - 39<br>Sword-fern - 40 | 11.1 (0.4-26.2) | 2.2 (0.4-4.4) |
| Pole Conifer Forest | 59 (50-70) | 1 (0-2) | 10 (4-18) | Vine maple - 51<br>Sword-fern - 6 | 11.0 (0.7-24.9) | 1.1 (0.2-2.6) |
| Seedling/Sapling Conifer Forest | 3 (1-6) | 6 (0-16) | 64 (56-69) | Oregon grape - 5<br>Bracken fern - 59 | 7.2 (0.5-17.4) | 3.2 (0.4-7.5) |
| Upland Mixed Conifer/ Deciduous Forest | 58 (40-78) | 18 (10-26) | 52 (47-60) | Vine maple - 38<br>Sword-fern - 48 | 11.0 (1.3-30.5) | 2.6 (0.4-4.2) |
| Upland Deciduous Forest | 50 (5-92) | 17 (<1-45) | 36 (10-66) | Salmonberry - 19<br>Sword-fern - 27 | 9.5 (1.3-24.9) | 2.7 (0.7--7.1) |
| Shrubland | 105 (94-114) | 17 (7-24) | 41 (35-47) | Hazelnut - 46<br>Bracken fern - 22 | 13.7 (0.3-29.5) | 1.9 (0.1-4.5) |
| Meadow[2] | 6 | 1 | 5 | Apple - 6<br>Bracken fern - 5 | 1.2 (1.1-1.5) | 1.3 (0.6-1.9) |

[1] Range is shown in parentheses; see PacifiCorp (1998b) for other summary statistics.
[2] Only 1 meadow plot was sampled.

*Mid-successional and Pole Conifer Types* - Mid-successional conifer forest covers 1,967 acres or 12 percent of the study area and is the dominant conifer type within the study area. Pole conifer stands represent 1,205 acres or about 8 percent of the study area (Table 5.1-1, Figure 5.1-1). Both mid-successional and pole conifer forest stands have high tree canopy closure, 76 and 79 percent, respectively (Table 5.1-2). Mean tree height (90 feet), overstory height (102 feet), and dbh (16.9 inches) are all about 25 percent greater in mid-successional forests than in pole stands (Table 5.1-2). However, stem densities in pole stands are considerably higher—195/acre vs. 121/acre—than in mid-successional forests. The pole stands are apparently undergoing natural thinning, as evidenced by moderately high numbers of small snags (10.5-inch mean dbh) and a substantial cover of woody material (19 percent) compared to other forest types (Table 5.1-3). High stem densities in pole stands probably also limit the development of the shrub and tall forb layers; cover of these layers is 60 and 10 percent, respectively. Shrub and tall forb cover is greater in mid-successional stands, about 86 and 58 percent, respectively. Vine maple is dominant

in both types; sword fern cover is 40 percent in mid-successional stands and only 6 percent in pole stands.

*Seedling/Sapling Conifer Type* - Seedling/sapling stands consist primarily of recent timber harvest areas and cover 1,241 acres or 8 percent of the study area. These areas are characterized by very high stem densities (357/acre) and were dominated by Douglas-fir that are generally less than 20 feet tall and 6 inches in diameter (Table 5.1-2). Snag density is low (7/acre) but the few remaining snags were large, with a mean diameter of 26.4 inches dbh (Table 5.1-3). Shrub canopy cover is lower than any other forest type—only 9 percent—but tall forb and low/grass cover is high, 64 and 58 percent, respectively. Mean height of the low shrub/tall forb layer (3.2 feet) is higher in seedling/sapling stands than in any other forest type, most likely the result of the dominance of bracken fern, which represents over 90 percent of the tall forb layer (Table 5.1-4).

Mixed Conifer/Deciduous Forest - There are 2 types of mixed conifer/deciduous forest stands present within the study area–an upland type (>200 feet from a stream or wetland) and a riparian type (<200 feet from a stream or wetland). Upland mixed forest stands cover 1,292 acres or 8 percent of the study area (Table 5.1-1, Figure 5.1-1). Riparian mixed forest stands cover 120 acres or 1 percent of the study area.

Mixed forest stands are characterized by an overstory of Douglas-fir and a second canopy layer of western hemlock, red alder, and/or big-leaf maple. Overstory tree height, stem density, and number of trees >22 inches dbh are similar to mid-successional stands, but mean tree height is lower (Table 5.1-2), likely reflecting the higher proportion of deciduous species. Snag density is moderate (19/acre) but consisted mostly of small (<14 inches dbh) alder and big-leaf maple (Table 5.1-3). Mean canopy closure of mixed forest stands is about 57 percent, lower than any other forest type (Table 5.1-2). The relatively open canopy is apparently conducive to dense shrub and forb layers. Mean shrub and tall forb cover in mixed stands is high—76 and 52 percent, respectively. Sword-fern represents over 90 percent of the tall forb layer and vine maple contributes over 60 percent of the shrub cover (Table 5.1-4).

The riparian mixed conifer/deciduous stands were not sampled because they represent a very small portion of the study area and because they typically occur in narrow strips that are difficult to sample effectively. These stands appear to be similar to upland mixed conifer/deciduous forest but typically have a higher percentage of salmonberry in the understory than upland stands.

Deciduous Forest - There are 2 types of deciduous forest within the study area—an upland type (>200 feet from a stream or wetland) and a riparian type (<200 feet from a stream or wetland). Upland deciduous forest stands represent 3,880 acres or 24 percent of the study area; riparian deciduous forest stands represent 121 acres or 1 percent of the study area (Table 5.1-1, Figure 5.1-1).

The overstory of upland deciduous forest stands is generally dominated by red alder, but big-leaf maple also occurs. Black cottonwood is present but in small amounts and

generally in stands along the reservoir or in riparian areas. Tree canopy closure and density are high (Table 5.1-2). In general, the understory in deciduous forest stands is very dense; mean cover of the tall shrub, low shrub, and tall forb layers combined is over 100 percent (Table 5.1-4). Species composition of these layers, however, is extremely variable depending on the location, slope, and aspect of the stand. North-facing stands south of the reservoir are characterized by a dense tall shrub layer (>80 percent cover) dominated by salmonberry; tall forb cover is moderate (32 to 34 percent) and consists primarily of sword-fern (PacifiCorp 1998b). Deciduous forest stands along the north side of the reservoir occur in areas that are relatively flatter and drier. Shrub cover is more moderate (42-46 percent), with Oregon grape and hazelnut dominating; sword-fern cover was 41 percent (PacifiCorp 1998b). In contrast, deciduous forests in the northeast portion of the study area are characterized by a high cover of vine maple (91 percent) but also support moderate cover of Oregon grape (PacifiCorp 1998b). Overall, low forb/grass cover in deciduous forest stands ranges from 36 to 80 percent, higher than in any other forest type, likely the result of greater light availability in early spring (Table 5.1-3).

Riparian deciduous stands were not sampled because they represent a very small portion of the study area and generally occur in very small parcels or strips that are difficult to sample effectively. These stands appear to be most similar to the deciduous forest located on the north side of the reservoir and typically have a high percentage of salmonberry and stinging nettle in the understory.

Non-forested Cover Types

Non-forested cover types in the study area include shrubland, meadow/grassland, rock talus, and rock outcrops. Collectively, these cover types occupy 353 acres or 2 percent of the study area. Nearly 60 percent of the non-forested land consists of meadows and open grasslands (Table 5.1-1, Figure 5.1-1). Shrublands, occurring as small openings within or adjacent to forested areas, represent an additional 38 percent of non-forested lands (Table 5.1-1, Figure 5.1-1). Exposed rock outcrops and talus cover 12 acres and 5 acres, respectively, and are primarily located on slopes east of Yale Lake (Table 5.1-1, Figure 5.1-1). In addition, several caves occur in the project vicinity; these features were mapped, but because of their sensitivity to human disturbance they are not included on Figure 5.1-1.

Meadow - Most meadows and grasslands in the study area are associated with agriculture or rural home sites. The one mapped natural meadow is dominated by low forbs and sedges with a cover of 98 percent; bracken fern contributes an additional 5 percent cover (Table 5.1-3, Figure 5.1-1). The only tree in the meadow is an old apple tree; shrub cover is represented by a few snowberry.

Shrubland - Shrublands in the study area are dominated by 3 species of tall shrub—hazelnut, cascara, and vine maple. Other species such as Indian plum, salal, and Oregon grape also occur. Canopies of the various species overlap, resulting in a mean total shrub cover exceeding 100 percent (Table 5.1-4). Mean height of the tall shrub layer is nearly 14 feet, and several individual shrubs are over 29 feet tall. Bracken fern and

sword-fern dominate the tall forb layer. Cover by grasses and low forbs is sparse (15 percent; Table 5.1-3).

Deep Water and Wetlands

Deep water and wetland cover types include wetlands, lakes, rivers, and ponds in the study area. These cover types occupy a total of 4,037 acres or 25 percent of the study area and are described the following sections.

Deep Water Types - Four deep water cover types, including riverine unconsolidated bottom and shore, and lacustrine unconsolidated bottom and shore, collectively cover 3,880 acres or 24 percent of the study area. Over 98 percent of the deep water acreage consists of the lacustrine unconsolidated bottom type which includes Yale Lake, a portion of Lake Merwin near the transmission line ROW, and the Swift No. 2 canal. The 36 acres of riverine habitat occurs in the Lewis River upstream of Yale Lake (the Swift bypass reach).

Each year, PacifiCorp lowers Yale Lake beginning in September to provide flood storage. The lake level then fluctuates in response to generation demands and runoff events (precipitation and/or snowmelt). In recent years there has not been a clear pattern in the timing of the minimum pool level, or the length of drawdowns below the typical levels (Table 5.1-5). Over the past 5 years, the winter elevation of Yale Lake has typically fluctuated between near the full pool level of 490 feet and 465 feet (Figure 5.1-2).

**Table 5.1-5. Summary of 1992-1997 Yale Lake drawdowns, October through May (243-244 days).**

| Year | Minimum Pool Level (ft) | Date of Minimum Pool | # of Days below 480 ft. (%) | # of Days below 474 ft. (%) | # of Days below 465 ft. (%) |
|---|---|---|---|---|---|
| 1992-93 | 451.6 | 2/22/93 | 178 (73) | 127 (52) | 29 (12) |
| 1993-94 | 464.3 | 10/31/93 | 196 (81) | 148 (61) | 1 (0) |
| 1994-95 | 466.7 | 10/26/94 | 97 (40) | 48 (20) | 0 (0) |
| 1995-96 | 469.1 | 3/23/96 | 85 (35) | 35 (14) | 0 (0) |
| 1996-97 | 462.8 | 11/12/96 | 224 (92) | 189 (78) | 23 (9) |
| Average | 462.9 | -- | 156 (64) | 109 (45) | 10 (4) |

However, in February 1993, the water level in Yale Lake was lowered to 452 feet; this extreme low pool lasted for only a few days, although the reservoir level was below 465 feet for over 1 month. Overall, Yale Lake was most frequently between 470 and 475 feet during the 1992-1997 winter drawdown periods (Table 5.1-6). Water levels were above 475 feet and 465 feet approximately 52 and 96 percent of the October to May days, respectively.

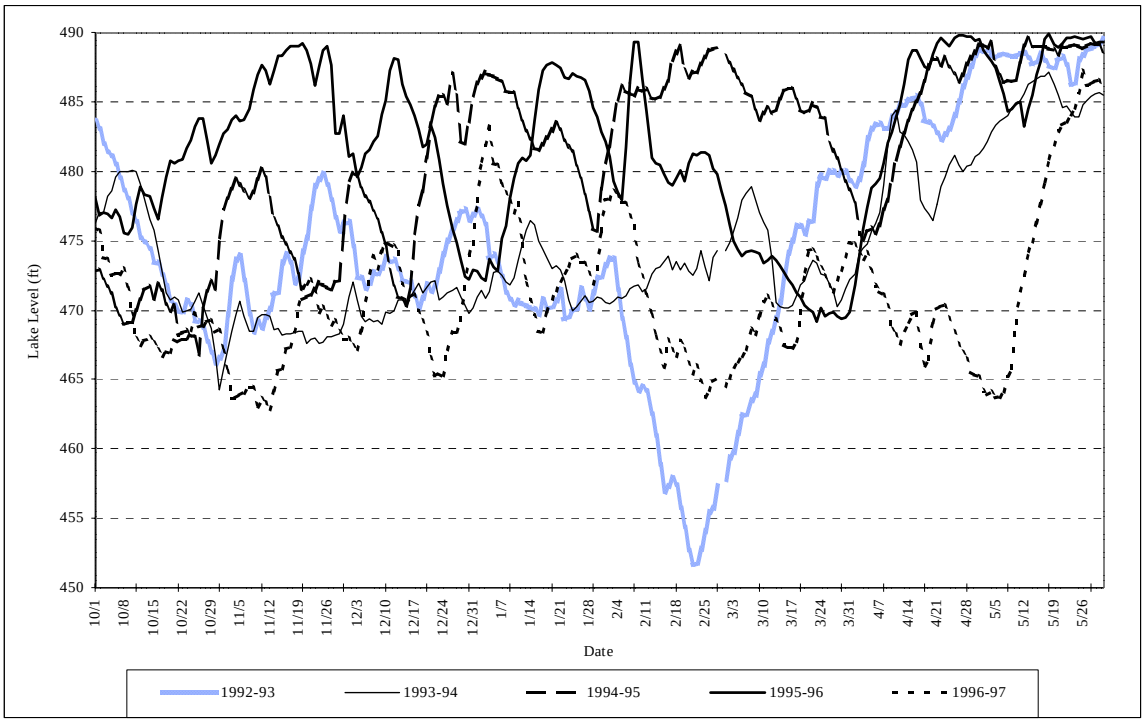



Figure 5.1-2. Yale Lake water level fluctuations during the fall, winter, and spring, 1992-1997.

**Table 5.1-6. Frequency of daily pool levels at Yale Lake during the October to May drawdown period, 1992-997.**

| Lake Level (ft) | Frequency (days) | Percentage |
|---|---|---|
| <450 | 0 | 0 |
| 450-455 | 6 | 0 |
| 455-460 | 12 | 1 |
| 460-465 | 35 | 3 |
| 465-470 | 197 | 16 |
| 470-475 | 341 | 28 |
| 475-480 | 190 | 16 |
| 480-485 | 190 | 16 |
| 485-490 | 245 | 20 |
| Total | 1,216 | 100 |

The bathymetry map indicates that the vast majority of the drawdown zone is narrow and relatively steep. The only areas where the exposed lake bed is flat and wide include the following:

- 0.8 mile of the western shore south of Speelyai Canal;
- 1.1 miles of the northwestern shore area immediately south and north of Yale Park;
- 2.1 miles of the northern shore, from Beaver Bay to west of Cougar Creek;
- 0.4 mile of shoreline along the small island at the upstream end of the reservoir; and

- 1.2 miles of the eastern shoreline directly across from the confluence of Speelyai Canal with Yale Lake (see Figure 5.1-1).

Analysis of the bathymetry data from 490 feet to 474 feet indicates a nearly straight-line relationship between reservoir level and area of exposed drawdown (Figure 5.1-3). Assuming a similar relationship between lake level and area of drawdown, approximately 1,004 acres would be exposed at a pool level of 452 feet, the lowest level that has occurred since 1992.

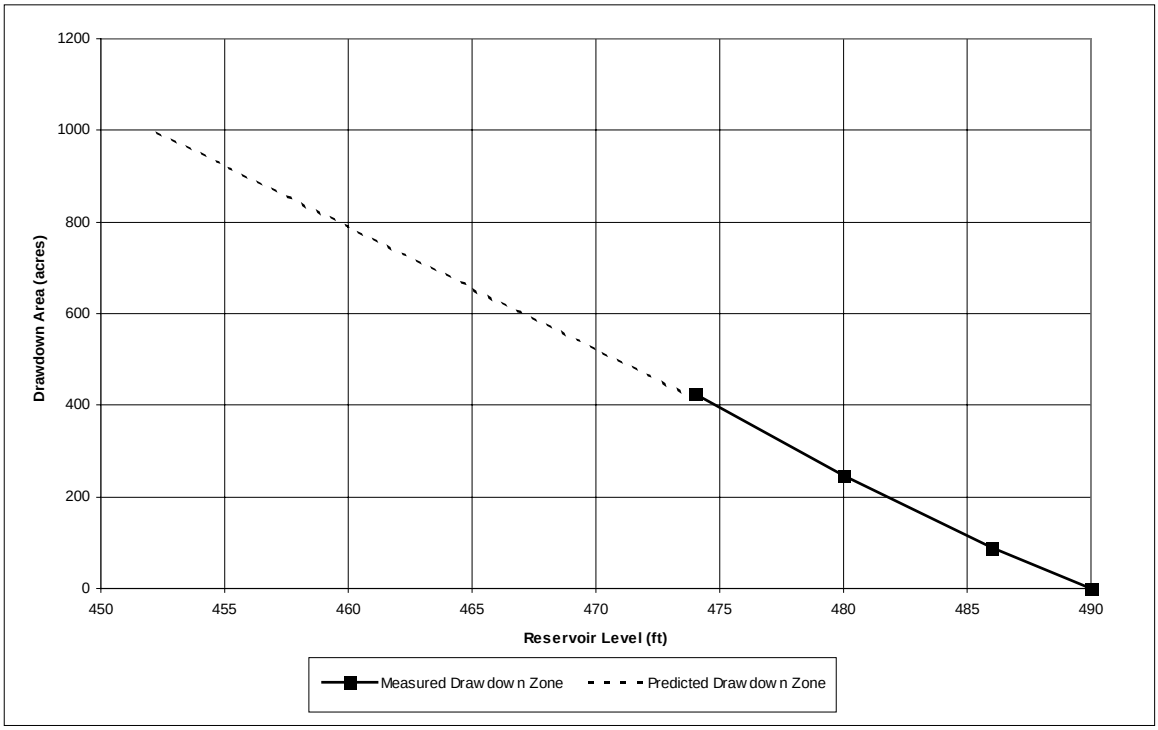



Figure 5.1-3. Area of drawdown zone exposed at different Yale Lake levels.

Wetlands - Wetlands represent 157 acres, or 1 percent of the study area. This acreage includes several small wetlands in the vicinity of Saddle Dam as well as Yale Pond (south of Yale Dam) which are managed as part of the Merwin Project.

Regulatory buffers are not depicted on Figure 5.1-1 or included in the 157 acres. PacifiCorp maintains a 100-foot buffer around the Frazier Creek wetland and 150-foot buffers around the other wetlands in the project vicinity (see Section 5.1.4.3). At Beaver Bay, the wetland buffer is reduced in places due to the presence of the Beaver Bay Campground. Wetland types in the study area include the following:

- Palustrine scrub-shrub - 70 acres
- Palustrine forested - 33 acres
- Palustrine emergent - 20 acres
- Palustrine unconsolidated bottom - 34 acres

Nearly all of the wetland acreage in the study area occurs either along the Swift bypass reach or as part of 4 large wetland complexes, all of which are associated with the Yale Project. These areas are briefly described below.

*Beaver Bay Wetland* - The Beaver Bay wetland is adjacent to Beaver Bay Campground and covers about 36 acres. It includes all 4 wetland types, with palustrine forest representing about half the acreage. Red alder is the dominant over-story species in the palustrine forest, but western red cedar, western hemlock, and big-leaf maple also occur. Skunk cabbage, slough sedge, and buttercup occur in the understory; snag density and the amount of down woody material are relatively high (Dueker and Paz 1995). The scrub-shrub wetland is characterized by willow and reed canarygrass, and sedges dominate the emergent wetland portions.

Although connected to the reservoir, Beaver Bay wetland also receives water from several small streams (Dueker and Paz 1995). Monitoring conducted between April 1 and June 1997 did not indicate a strong relationship between water levels in the wetland and Yale Lake. During this time, the water level in Beaver Bay wetland fluctuated an average of 0.9 inch on a daily basis. The only multi-day pattern was a brief 2.5-inch drop in May that lagged behind a 6-foot drop in lake level (Figure 5.1-4). This was followed by a rapid 3-inch rise that may have been in response to a 23-foot rise in lake level. Overall, the wetland water level remained within ± 3 inches of the average (30.3 inches) during the entire spring and early summer. During October and November 1997, the water level in Beaver Bay wetland increased by nearly 6 inches even though Yale Lake had been drawn down.

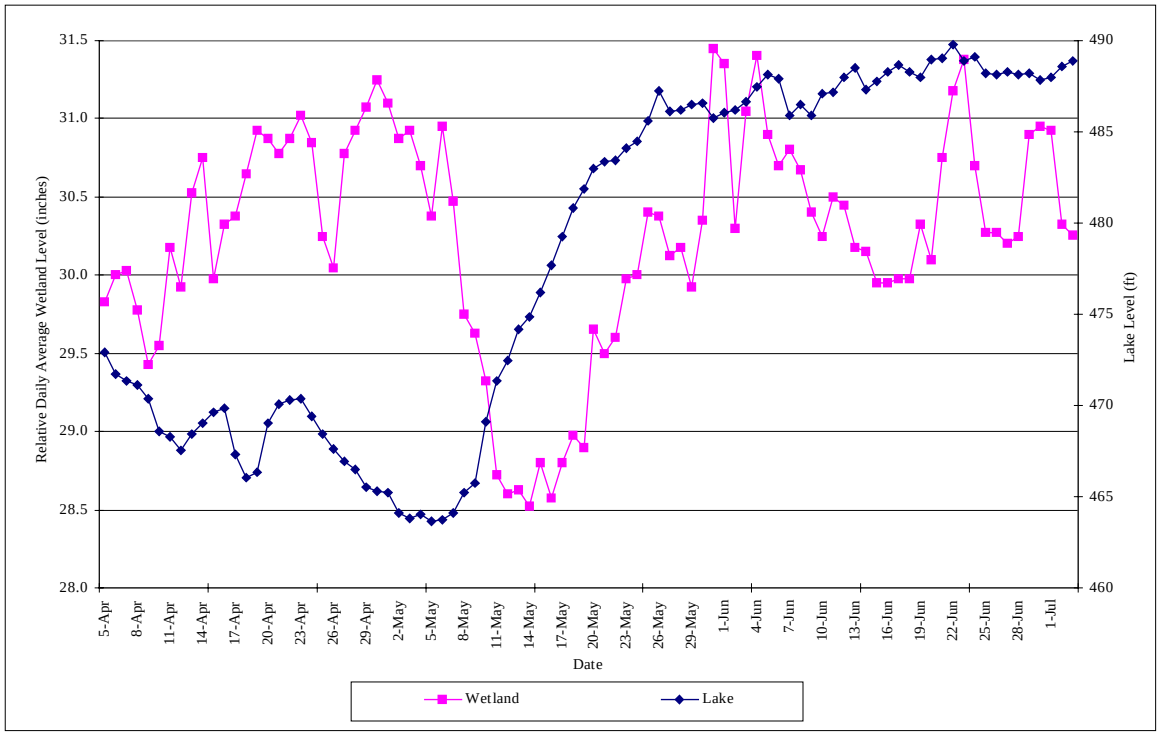



Figure 5.1-4. Beaver Bay wetland water level in relation to Yale Lake water level, April-July 1997.

Water levels in Beaver Bay wetland appear to be maintained by a series of large beaver dams, water from the tributary that flows through the wetland, and precipitation. It is possible that wetland water levels may be more sensitive to reservoir fluctuations during drought conditions, which would be rare in the Lewis River drainage during the fall-winter-spring period when low pool occurs.

*Swift Wetland* - The Swift wetland is at the northeastern end of the study area and is bordered on the south side by an access road and a maintenance area. Nearly half of this 10.5-acre wetland consists of palustrine unconsolidated bottom that is bordered by a thin band of cattail and bulrush; most of the remainder is scrub-shrub wetland with small amounts of emergent and forested wetland. The scrub-shrub wetland consists primarily of willow and sapling alder. Alder is also the dominant overstory species in the forested wetland; blackberry, sword-fern, and buttercup occur in the understory (Dueker and Paz 1995). The emergent wetland is characterized by bulrush, skunk cabbage, and reed canarygrass. The wetland receives water from 2 streams, with outflow through a standpipe and culvert.

*International Paper (IP) Wetland* - This 7.3-acre wetland complex is located east of the reservoir and is bisected by the IP Road. Over half of this wetland consists of palustrine unconsolidated bottom and over 25 percent is palustrine forest; small amounts of scrub-shrub and emergent vegetation also occur. Red alder is the dominant tree species; cattails, sedges, and salmonberry are present as well.

The IP wetland is fed by at least 2 streams and is connected to Yale Lake by a culvert. Monitoring conducting between April and May 1997 indicated that the IP wetland water fluctuated an average of 0.9 inch on a daily basis; the maximum daily fluctuation recorded was 3.4 inches. During April and May, the wetland remained fairly stable, fluctuating no more than ± 2 inches from the average level during the entire period (Figure 5.1-5). Even though the culvert that drains the IP wetland into Yale Lake was exposed and dry on the lake side, a beaver dam and debris maintain the water level. It appears that the wetland water level may have increased by a few inches beginning around May 11, as the lake level increased to near its full-pool level (Figure 5.1-5). The IP wetland seems potentially susceptible to a rapid de-watering if the culvert were to become unplugged during a drawdown period.

*Swift Bypass Reach Wetlands* - Approximately 84 acres of wetland occur along the Swift bypass reach and are bordered by upland deciduous forest and the river channel. Over 85 percent of the wetlands along the bypass reach are scrub-shrub dominated by willow, sapling red alder, and cottonwood (Dueker and Paz 1995).

*Frazier Creek Wetland* - Over 70 percent of the 19-acre Frazier Creek wetland consists of palustrine unconsolidated bottom and is characterized by numerous snags and floating logs. In the summer, this area also supports a dense cover of pondweed. A thin band of emergent vegetation and scrub-shrub borders the open water portion. Originally created by a beaver dam, this wetland is currently maintained by a rock gabion dam constructed by PacifiCorp through a cooperative agreement with the landowner, Longview Fiber.


Figure 5.1-5. IP wetland water level relative to Yale Lake water levels, April-May 1997.

Developed/Disturbed Areas

Developed and disturbed areas cover 850 acres and represent 5 percent of the study area. The dominant disturbed type within the study area is the transmission line ROW, followed by developed areas and residential housing. Approximately 147 acres of the ROW acreage occurs along the 100- to 125-foot-wide transmission line corridor that begins at the Swift No. 1 powerhouse and parallels the northern shore of Yale Lake; an additional 83 acres occur along the Yale to Merwin line. The majority of the transmission line ROW consists of dense shrub and bracken fern. Approximately 1,434 acres of land occur within 0.25 mile of the Yale to Merwin transmission line ROW, including 613 acres of upland deciduous forest, 238 acres of mixed deciduous/conifer forest, 150 acres of seedling sapling, and 10 acres of old-growth conifer. Outside of the Merwin Wildlife Habitat Management Area, PacifiCorp owns less than 2 acres of land on or along this ROW.

### 5.1.1.2 Plant Species with Federal and State Status

As part of the relicensing process, FERC requires identification and assessment of threatened, endangered, and/or sensitive (TES) plant species potentially affected by hydroelectric facilities and/or operations (18 CFR 4.51). TES plant species are defined as those species that are declining in population and/or in danger of extinction. Such species are protected at the federal level by the Endangered Species Act (ESA) of 1973, as amended. Under the ESA, the USFWS is responsible for identifying species that are threatened or endangered throughout all or a portion of their range. The USFWS

maintains of list of federally protected and candidate species and develops policies to promote their recovery. The Washington Department of Natural Resources (DNR) Natural Heritage Program (WNHP) has a similar responsibility at the state level. Although the State of Washington does not have a formal endangered species statute for plants, the WNHP maintains a database on species that are vulnerable to decline or extinction in Washington. Many of the species in the state database are federally listed as threatened or endangered; some are not.

A search of WNHP and the USFWS databases, review of literature (USFS 1990, USFS 1995, WNHP 1994), and consultation with botanists familiar with Clark, Cowlitz, and Skamania counties identified 21 TES species potentially occurring in the study area (pers. comm., O. Terry, USFS, Botanist, Gifford Pinchot National Forest, Vancouver, Washington, November 26, 1996; J. Gamon, Botanist, WNHP, Olympia, Washington, November 26, 1996; and Dr. Scott Sundberg, Botanist, Oregon State University [OSU], Corvallis, Oregon, May 1996; letter from Sandy Swope Moody, Environmental Coordinator, WNHP, January 25, 1999; http://www.wa.gov/dnr/htdocs/fr/wanhp.html, February 12, 1999) (Table 5.1-7).

Between May 12 and 16 and July 21 and 25, 1997, over 160 person-hours were spent conducting surveys for TES plants. Only 1 TES species—the green-fruited sedge—was identified during the field survey. The green-fruited sedge is on the State Monitor List in Group 3. The monitor list consists of taxa of potential concern to the state, but for which no status is currently assigned. Species in Group 3 are more abundant and/or less threatened in Washington than previously assumed. Green-fruited sedge typically occurs along streambanks and in low wet places. It was believed to be somewhat restricted to the lower reaches of the Columbia River (Hitchcock and Cronquist 1988), but has been found to be widespread in western Washington and along the eastern slope of the Cascades. In the Yale study area, green-fruited sedge occurs in several locations between Swift Dam and the upstream end of Yale Lake. It was found in emergent wetlands, on the edge of a small pond, and in the riparian zone along 2 segments of the Lewis River. Green-fruited sedge was most often found growing in open or semi-open areas with other sedge species. Other similar habitats in the study area were searched extensively for the species, but no additional populations were found.

#### 5.1.1.3 Sensitive Habitats

Eight habitats listed by the WDFW as priority habitats—caves, cliff, talus, wetlands, old-growth/mature forest, riparian areas, snag habitat, and deepwater habitat—occur in the Yale study area (WDFW 1993). Of these, deepwater, riparian, wetland, caves, and snag habitat are found in areas that are or could be affected by Yale Lake or PacifiCorp management activities. Deepwater, old-growth, wetland, and riparian habitat are identified in Figure 5.1-1 and are described in Section 5.1.1.1.

**Table 5.1-7. TES plant species potentially occurring in the vicinity of the Yale Project.**

| Species[1] | Species Status[2] | | Habitat[3] |
|---|---|---|---|
| | Federal | State | |
| Adder's-tongue* (*Ophioglossum pusillum*) | - | T | Meadows and woods, usually in broad valleys |
| Branching montia*# (*Montia diffusa*) | - | S | Moist open areas in second-growth Douglas-fir forests |
| Brewer's cinquefoil* (*Potentilla breweri*) | - | S | Currently known only from areas east of White Pass |
| Clackamas corydalis*# (*Corydalis aquae-gelidae*) | - | T | Wet places above 2,500 feet elevation |
| False pimpernel# (*Lindernia dubia var. anagallidea*) | - | R2 | Moist river banks, widespread |
| Flat-leaved bladderwort*# (*Utricularia intermedia*) | - | S | Open, slow moving water, bogs |
| Fringed grass-of-Parnassus*# (*Parnassia fimbriata* var. *hoodiana*) | - | S | Wet meadows and streambanks |
| Giant helleborine*# (*Epipactis gigantea*) | - | S | Springs, seeps, and channel margins on both sides of the Cascades |
| Great polemonium*# (*Polemonium carneum*) | - | T | Thickets, woodlands, and forest openings west of the Cascades |
| Green-fruited sedge* (*Carex interrupta*) | - | M3 | Rocky streams and low wet places |
| Hairy-stemmed checker-mallow# (*Sidalcea hirtipes*) | - | E | Prairie openings with little shrub and tree cover |
| Large-awn sedge# (*Carex macrochaeta*) | - | S | Moist, open places, and seeps throughout region |
| Lesser bladderwort# (*Utricularia minor*) | - | R1 | Standing or slow moving water |
| Nuttall's quillwort# (*Isoetes nuttallii*) | - | S | Seepy areas with low (or no) canopy cover |
| Pale blue-eyed grass*# (*Sisyrinchium sarmentosum*) | - | T | Marshes, vernally moist places |
| Shining flatsedge* (*Cyperus bipartitus*) | - | S | Low, wet places |
| Small-flowered trillium# (*Trillium parviflorum*) | - | S | Moist woods, generally with Oregon ash or alder, sometimes in oak woodlands |
| Tall agoseris# *(Agoseris elata)* | - | S | Meadows and open woods from low to mid elevation |
| Tall bugbane*# (*Cimicifuga elata*) | - | T | Moist woods at low elevation |
| Tree clubmoss (*Lycopodium dendroideum*) | | S | Moist to dry forests, thickets, and bog edges |
| Wheeler's bluegrass# *(Poa nervosa)* | - | S | Moist deciduous woodland slopes and mossy ledges on cliff faces |

[1] Species followed by (*) are on the USFS Region 6 Forester's list; species followed by (#) have been recorded in Clark, Cowlitz, and or Skamania counties (WNHP 1994; letter from Sandy Swope Moody, Environmental Coordinator, WNHP, January 25, 1999).

[2] Federal Status (USFWS): T—listed as threatened under the federal Endangered Species Act (ESA). State Status (DNR): E—listed as endangered, T—listed as threatened; S—listed as sensitive; M1—listed as a Group 1 Monitor species; M3—listed as Group 3 Monitor species; R1—Review 1: more field work needed; R2—Review 2: unresolved toxonomic problems.

[3] Habitat information from Hitchock and Cronquist (1988) and from WNHP (letter from John Gamon, Botanist, WNHP, November 26, 1996).

A number of caves occur in the study area; several more are found in the general vicinity of the project. One such cave, Moss Cave, is located near the Swift No. 1 - Swift No. 2 transmission line on private land. Cliff habitat occurs just south of the Yale powerhouse, as well as at scattered locations throughout the study area, particularly along Siouxon Ridge. Only small patches of talus occur in the study area, primarily along the IP stream drainages. High-quality snag habitat in the study area is limited to those few locations that support old-growth and mature conifer forests.

### 5.1.2 Wildlife Resources

Surveys conducted in 1996, 1997, and 1998 documented a total of 145 wildlife species, including 15 amphibians, 4 reptiles, 113 birds, and 13 mammals in 15 major cover types in the study area. Wetlands by far supported the greatest number of species; 95 species, or 66 percent of all taxa observed in the study area were recorded in wetlands (Table 5.1-8). Although wetlands typically support more wildlife species than upland habitats, the amount of survey time spent in wetlands was also greater. The combination of open water and adjacent vegetation that characterizes riverine and reservoir habitats also resulted in high species richness; 68 and 61 species were observed in these 2 habitats, respectively. The continued annual and daily Yale Lake water level fluctuations likely limit habitat quality for selected amphibian species as well as aquatic furbeares that den along shorelines and forage in shallow water zones. These potential impacts are discussed below by species group. Upland habitats in the study area generally supported between 32 and 57 species; fewer species were recorded in disturbed areas and rock/talus (Table 5.1-8).

Twenty taxa designated by the WDFW as priority species were identified in study area habitats, including the following:

- Cascade torrent salamander*
- Van Dyke's salamander*
- Bufflehead
- Wild turkey*
- Wood duck*
- Great blue heron
- Northern spotted owl
- Vaux's swift
- Pacific western big-eared bat*
- Elk*
- Larch Mountain salamander*
- Common loon
- Band-tailed pigeon
- Blue grouse
- Hooded merganser*
- Bald eagle*
- Pileated woodpecker
- Mink*
- Black-tailed deer*
- Osprey*

Observations of juveniles during the 1996-1998 surveys or other data collection efforts suggested that at least 12 WDFW priority species—3 amphibians, 5 birds, and 4 mammals—reproduce in or near the study area (indicated by asterisk above). Although not observed, it is likely that 4 other priority species—the band-tailed pigeon, great blue heron, pileated woodpecker, and northern spotted owl—also breed in the study area.

Since many priority species are also TES species, locational information for both groups is shown on the map presented in Section 5.1.2.5.

**Table 5.1-8. Number of species observed in Yale Project study area cover types.**

| | Number of Species Observed | | | | |
|---|---|---|---|---|---|
| **Habitat Types** | **Amphibians[1]** | **Reptiles** | **Birds** | **Mammals** | **Totals[2]** |
| Lodgepole pine forest | 2 | -- | 35 | 3 | 40 |
| Old-growth conifer forest | 5 | -- | 37 | 5 | 47 |
| Mature conifer forest | 1 | -- | 31 | 3 | 35 |
| Mid-successional conifer forest | 1 | -- | 34 | 4 | 39 |
| Pole conifer forest | -- | -- | 33 | 3 | 36 |
| Seedling/sapling conifer forest | 1 | -- | 43 | 5 | 49 |
| Mixed conifer/deciduous forest | 1 | 1 | 36 | 4 | 42 |
| Deciduous forest | 4 | -- | 49 | 5 | 58 |
| Shrubland | -- | 1 | 30 | 4 | 35 |
| Meadow/grassland | 2 | -- | 28 | 2 | 32 |
| Rock talus | 5 | 3 | -- | 1 | 9 |
| Wetland | 6 | 2 | 81 | 6 | 95 |
| Riparian Deciduous Forest/Riverine | 14 | -- | 52 | 2 | 68 |
| Reservoir/shoreline | -- | -- | 58 | 3 | 61 |
| Disturbed | 3 | 1 | 14 | 4 | 22 |
| Study Area Totals[1] | 15 | 4 | 113 | 13 | 145 |

[1] Includes the long-toed salamander which was tentatively identified but not confirmed.
[2] Wildlife not identified to species (e.g. frog sp.) are not included in totals.

The following sections present information on the species observed in the 16,074-acre study area in 1996-1998, either during surveys or incidentally. For purposes of presentation, species are discussed in the following groups:

- Amphibians
- Reptiles
- Birds
- Mammals
- Wildlife Species with Federal or State Status

Scientific names are listed in Appendix 5.1-1.

### 5.1.2.1 Amphibians

Surveys conducted in 1996 and 1997 confirmed the presence of 14 amphibian species in the vicinity of the Yale Project; 1 additional species, the long-toed salamander, was tentatively identified but not confirmed (Table 5.1-9). Survey methods included electroshocking, searches for egg masses, trapping in wetlands, instream surveys,

**Table 5.1-9. Amphibian and reptile species habitat associations in the Yale Project study area.**

| Species | Habitat Types[1] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **LPP** | **M** | **MD** | **MS** | **MX** | **OG** | **P** | **RI** | **RE** | **SH** | **SS** | **UD** | **WL** | **DST** | **ROCK** |
| **Amphibians** | | | | | | | | | | | | | | | |
| western red-backed salamander | X | | | X | X | X | | X | | | | | | X | X |
| rough-skinned newt | | X | X | | | X | | X | | | X | X | X | | |
| ensatina | X | | | | X | X | | X | | | | | | X | X |
| Pacific giant salamander | | | | | | | | X | | | | | | | |
| Cope's giant salamander | | | | | | | | X | | | | | | | |
| Cascade torrent salamander* | | | | | | | | X | | | | X | | | X |
| Larch Mountain salamander* | | | | | | | | X | | | | | | X | X |
| Van Dyke's salamander* | | | | | | | | X | | | | | | | X |
| long-toed salamander[2] | | | | | | | | | | | | | X | | |
| northwestern salamander | | | | | | | | X | | | | | X | | |
| frog (sp.) | | | | | | | | X | | | | | | | |
| tailed frog | | | | | | | | X | | | | | | | |
| Pacific chorus frog | | | X | X | X | X | | X | | | | X | X | | |
| northern red-legged frog | | | | | | X | | X | | | | | X | | |
| bullfrog | | | | | | | | X | | | | X | X | | |
| western toad | | | | | | | | X | | | | | | | |
| **Reptiles** | | | | | | | | | | | | | | | |
| garter snake (sp.) | | | | | | | | | | | | | X | | X |
| northwestern garter snake | | | | | | | | | | | | | X | | X |
| rubber boa | | | | | | | | | | | | | | | X |
| northern alligator lizard | | | | | X | | | | | X | | | | X | X |
| painted turtle | | | | | | | | | | | | | X | | |
| **Total No. of Species[3]** | 2 | 1 | 2 | 2 | 4 | 5 | 0 | 14 | 0 | 1 | 1 | 4 | 8 | 4 | 8 |

* WDFW priority species.
[1] Habitat types: LPP-lodgepole pine, M-mature conifer, MD-meadow, MS-mid-successional conifer, MX-mixed conifer/deciduous, OG-old-growth conifer, P-pole conifer, RI-riparian deciduous/riverine, RE-reservoir/shoreline, SH-shrubland, SS-seedling/sapling, UD-upland deciduous, WL-wetland, DST-disturbed, ROCK-rock/talus/cave.
[2] Identification not confirmed
[3] Wildlife not recorded to species (e.g., frog sp.) are not included in totals.

streamside surveys, searches along transects in the Yale Lake drawdown zone, and USFS protocol surveys for Van Dyke's and Larch Mountain salamanders. Additional information on survey methods can be found in PacifiCorp (1998b).

Of the 15 amphibian species occurring in the vicinity of the Yale Project, 4 are fully terrestrial, 4 are stream-dwelling, and 7 typically breed in stillwater habitats, such as ponds and wetlands, but may be found far from water as adults. Although the annual and daily water level fluctuations of Yale Lake limit amphibian use of the reservoir shoreline habitats, abundant and diverse amphibian populations were noted in virtually all of the surveyed wetlands, tributary streams/riparian habitat, rock talus areas, and mature and old-growth forests within the study area. Several terrestrial salamander species were also noted in younger successional forests and disturbed sites, including the face of Yale Dam. The following sections summarize observations for each of the habitats in the study area where amphibians were observed—reservoir drawdown zone, wetlands/ponds, streams/riparian areas, and upland sites.

Reservoir Drawdown Zone

In general, most reservoirs do not provide suitable habitat for stillwater-breeding amphibian species for 1 or more of the following reasons: (1) lack of suitable substrate for attaching eggs; (2) water level fluctuations during the breeding season (Richter and Azous 1995); (3) lack of shallow water (2.5 to 39 inches) for oviposition (Richter nd.); or (4) predation from resident fish. The annual and daily water level fluctuation of Yale Lake, generally steep shorelines, and lack of shallow water virtually eliminate suitable aquatic amphibian breeding habitat in the lake itself. Other than the Beaver Bay wetland, which extends into the drawdown zone, only two small areas in the drawdown zone support wetland vegetation—a site near Yale Park and an area near Cougar Creek Campground (Figure 5.1-1). Amphibians were not observed at either of these sites during transect surveys of the drawdown zone. The only amphibians recorded during these surveys were of breeding rough-skinned newts, which were observed in a small puddle on the south shore. It is possible that red-legged frogs and northwestern salamanders may also deposit eggs in puddles in the drawdown zone, but successful reproduction in this area is unlikely.

Wetland/Pond Habitats

Wetlands and ponds in the Yale study area provide breeding habitat for at least 5 amphibian species—the northern red-legged frog, northwestern salamander, rough-skinned newt, Pacific chorus frog, and bullfrog; and possibly 6, if the unconfirmed observation of the long-toed salamander is included (Table 5.1-10). Amphibians were found in 14 wetlands and ponds. Two of these wetlands—Beaver Bay and IP—are directly connected to Yale Lake but have beaver dams that maintain relatively constant water levels; the other wetlands/ponds are isolated from the reservoir and have hydrologic regimes independent of project operations.

**Table 5.1-10. Amphibians and reptiles observed in wetlands and pond habitats in the Yale Hydroelectric Project study area.**

| Site | Species Observed | Life Stage(s) |
|---|---|---|
| Frazier Creek Wetland | Bullfrog<br>Garter snake (sp.)<br>Northwestern salamander<br>Rough-skinned newt<br>Painted turtle | Tadpole/Adult<br>Adult<br>Eggs/Neotenic Larvae<br>Adult (aquatic phase)<br>Adult |
| Beaver Bay Wetlands | Rough-skinned newt<br>Pacific chorus frog<br>Red-legged frog | Adult<br>Adult<br>Eggs/Tadpole/Adult |
| IP Wetlands | Northwestern salamander<br>Rough-skinned newt<br>Bullfrog<br>Pacific chorus frog<br>Red-legged frog | Eggs/Neotenic Larvae<br>Adult (aquatic phase)<br>Juvenile<br>Adult<br>Eggs/Tadpoles |
| Swift Wetlands | Northwestern salamander<br>Long-toed salamander[1]<br>Rough-skinned newt<br>Pacific chorus frog<br>Red-legged frog | Eggs/Neotenic Larvae<br>Eggs<br>Adult (aquatic phase)<br>Adult/tadpoles<br>Eggs/Tadpoles |
| Bypass Reach Pond | Red-legged frog<br>Northwestern salamander | Eggs<br>Eggs/Larvae |
| Swift Canal Ponds | Red-legged frog | Eggs |
| Yale Pond | Red-legged frog<br>Northwestern salamander | Eggs<br>Eggs |
| Crossroad Pond | Northwestern salamander | Eggs |
| Chestnut Pond | Red-legged frog<br>Northwestern salamander<br>Rough-skinned newt | Eggs<br>Eggs<br>Adults |
| Cedar Grove Pond | Northwestern salamander<br>Rough-skinned newt<br>Red-legged frog | Eggs<br>Adults<br>Eggs |
| Road Pond | Red-legged frog<br>Northwestern salamander | Eggs<br>Eggs |
| Bankers Pond | Red-legged frog | Eggs |
| Winter Creek Wetland | Red-legged frog | Adult |
| IP Road jeep trail ephemeral pond[2] | Red-legged frog<br>Northwestern salamander<br>Rough-skinned newt | Eggs<br>Eggs<br>Adult |

[1] Identification not confirmed.

[2] Location not mapped.

Three of the 5 major wetland complexes in the study area–Frazier Creek, IP, and Swift–supported large numbers of individual amphibians and egg masses (Table 5.1-10). Notably, bullfrogs were observed only at the Frazier Creek and IP wetland complexes. Bullfrogs were numerous in Frazier Creek wetland and the only other amphibian species observed—the northwestern salamander and rough-skinned newt—are toxic and often

coexist with bullfrogs. Fewer bullfrogs were observed in the IP wetland complex, and this species currently appears to be restricted to the 2 portions bordering the IP Road. In addition to bullfrogs, rough-skinned newts, and northwestern salamanders, the IP wetland complex also supports red-legged frogs. Most red-legged frog egg masses were observed in the upstream portion of the wetland that had greater tree and shrub cover and less open water, and was somewhat separated from the areas with bullfrogs.

The Swift and Beaver Bay wetland complexes and the smaller isolated wetlands and ponds in the study area seem free of bullfrogs. Numerous fish, including stickleback, sculpin, dace, sucker, lamprey (*Lampetra* sp.), and brook trout, were found in Beaver Bay wetland, which nonetheless also supported red-legged and Pacific chorus frogs, as well as rough-skinned newts. The dense vegetation and complex of ponds and flowing water apparently provide cover sufficient to protect amphibians from predation (Richter and Azous 1995). The Swift wetland complex appears free of fish and provided habitat for red-legged frogs, northwestern salamanders, newts, and possibly long-toed salamanders. Several eggs found in this wetland were tentatively identified as those of the long-toed salamander but not confirmed. A number of the other smaller permanently flooded wetlands, including the complex of ponds southwest of Yale Dam, and ephemeral ponds (i.e., 1 along a jeep trail between the IP Road and Yale Lake) in the study area also appear to be used for breeding by red-legged frogs and northwestern salamanders.

Instream, Streamside/Riparian, and Lotic Habitats

In all, 14 amphibian species were observed in or near streams and riparian habitat in the study area (Table 5.1-11). The most common species in and along the smaller creeks included Cascade torrent salamanders, western red-backed salamanders, tailed frogs, and Cope's and/or Pacific giant salamanders. Red-legged frogs, rough-skinned newts, ensatina, and Pacific chorus frogs were occasionally observed in or near the streams as well. Adult Cascade torrent salamanders were found in 15 of the 20 stream segments surveyed; larvae were seen in only 6, likely due to their habit of burrowing deep into the stream substrate. Cope's giant salamander larvae/neotenes were documented in 7 high-gradient tributary streams that drain Siouxon Ridge and cross the IP Road (Table 5.1-11). Tailed frogs and larval/neotenic Pacific giant salamanders were found in only 3 and 2 study area creeks, respectively. Both species were documented in IP-7 and Ole Creek; the tailed frog was also observed in the Swift bypass reach. One adult Pacific giant salamander was noted along IP-7.

The 13 small tributaries to Yale Lake that drain Siouxon Ridge (collectively referred to as the IP streams or tributaries) support large amphibian populations, in particular Cascade torrent, Cope's giant, and western red-backed salamanders (Table 5.1-11). The numerous small pools, segments with bedrock substrate, seeps, and waterfalls associated with most of the IP tributaries appeared to provide optimal habitat for salamanders. Several of the smaller IP streams actually supported larger numbers of individuals than the larger streams (e.g., Rain and Speelyai creeks) in the study area. IP-5 and IP-7, which drain the largest areas and have the highest instream flows, had the greatest observed species richness.

**Table 5.1-11. Amphibians and reptiles observed in instream, streamside/riparian, and lotic habitats in the Yale Project study area.**

| Site | Species Observed | Life Stage |
|---|---|---|
| Lower Cougar Creek | Red-legged frog<br>Cascade torrent salamander<br>Western red-backed salamander<br>Ensatina<br>Rough-skinned newt | Adult/Tadpole<br>Adult<br>Adult/Juvenile<br>Adult/Juvenile<br>Adult |
| Cougar Creek Headwaters (includes springs) | Red-legged frog<br>Cascade torrent salamander<br>Western red-backed salamander<br>Ensatina<br>Rough-skinned newt<br>Giant salamander (sp.) | Adult<br>Adult<br>Adult/Juvenile<br>Adult<br>Adult<br>Larvae |
| Panamaker Creek | Cascade torrent salamander<br>Western red-backed salamander<br>Rough-skinned newt<br>Ensatina<br>Northern alligator lizard | Adult<br>Adult<br>Adult<br>Adult<br>Adult |
| Dog Creek | No species observed | |
| Speelyai Creek | Ensatina<br>Pacific chorus frog<br>Garter snake (sp.) | Adult<br>Adult<br>Adult |
| Ole Creek | Red-legged frog<br>Tailed frog<br>Pacific giant salamander<br>Cascade torrent salamander<br>Northwestern garter snake | Larvae/Adult<br>Larvae<br>Larvae<br>Adult<br>Adult |
| Rain Creek | Western red-backed salamander | Adult |
| Bypass Reach Bridge Seeps | Western red-backed salamander<br>Cascade torrent salamander | Adults/Juvenile<br>Adults/Larvae |
| Swift Bypass Reach | Red-legged frog<br>Tailed frog | Adult<br>Tadpole |
| IP-1 | Cascade torrent salamander<br>Western red-backed salamander<br>Rough-skinned newt<br>Cope's giant salamander<br>Giant salamander (sp.) | Adults/Larvae<br>Adults/Juvenile<br>Adult<br>Larvae<br>Larvae |
| IP-2 | Cascade torrent salamander<br>Western red-backed salamander | Adult<br>Adult |
| IP-3 | Cascade torrent salamander<br>Western red-backed salamander<br>Rough-skinned newt<br>Cope's Giant salamander | Adult<br>Adult/Juvenile<br>Adult<br>Larvae |

**Table 5.1-11. Amphibian and reptile surveys in instream, streamside/riparian, and lotic habitats in the Yale Project study area (continued).**

| Site | Species Observed | Life Stage |
|---|---|---|
| IP-4 | Cascade torrent salamander<br>Western red-backed salamander<br>Rough-skinned newt<br>Ensatina | Adult<br>Adult/Juvenile<br>Adult<br>Adult |
| IP-5 | Cascade torrent salamander<br>Western red-backed salamander<br>Rough-skinned newt<br>Cope's giant salamander<br>Giant salamander (sp.) | Adult/Larvae<br>Adult/Juvenile<br>Adult<br>Larvae<br>Larvae |
| IP-6 | Cascade torrent salamander<br>Western red-backed salamander<br>Cope's giant salamander | Adult/Juvenile<br>Adult<br>Larvae |
| IP-7 | Red-legged frog<br>Cascade torrent salamander<br>Western red-backed salamander<br>Cope's giant salamander<br>Pacific giant salamander<br>Giant salamander (sp.)<br>Tailed Frog<br>Ensatina | Juvenile<br>Adult/Larvae<br>Adult<br>Larvae<br>Larvae/Adult<br>Larvae<br>Adult/Juvenile/Tadpole<br>Adult |
| IP-8 | Cascade torrent salamander<br>Western red-backed salamander<br>Cope's giant salamander<br>Pacific chorus frog | Adult/Larvae<br>Adult/Juvenile<br>Larvae<br>Juvenile |
| IP-9 | Cascade torrent salamander<br>Western red-backed salamander<br>Rough-skinned newt<br>Red-legged frog<br>Ensatina | Adult<br>Adult/Juvenile<br>Adult<br>Adult<br>Adult |
| IP-10 | Cascade torrent salamander<br>Western red-backed salamander<br>Rough-skinned newt<br>Cope's giant salamander<br>Ensatina | Adult<br>Adult/Juvenile<br>Adult<br>Larvae<br>Adult |
| IP-11 | Cascade torrent salamander<br>Western red-backed salamander | Adult/Larvae<br>Adult |
| IP-13 | Bullfrog<br>Pacific chorus frog<br>Rough-skinned newt | Adult<br>Adult<br>Adult |

The greatest amphibian density in the study area was associated with a large seep/talus/riparian site near the bridge over the Swift bypass reach. This site has a perennial stream that emerges from the base of a basalt cliff and flows through loose talus and boulders in the riparian zone before entering the bypass reach. Surveys at this site documented 92 adult western red-backed salamanders and 53 adult Cascade torrent salamanders.

The instream habitats in the lower portions of Cougar Creek, a major tributary to Yale Lake, did not appear to support large numbers of aquatic amphibians. However, the riparian habitat and associated beaver ponds do provide habitat for 5 amphibian species—red-legged frogs, rough-skinned newts, ensatinas, Cascade torrent salamanders, and western red-backed salamanders (Table 5.1-11). The Cougar Creek headwaters springs and surrounding riparian and old-growth forest support a large population of Cascade torrent salamanders and western red-backed salamanders (Table 5.1-11). The other creeks that drain into Yale Lake–Dog, Speelyai, Ole, and Rain–have been heavily impacted by land use activities and do not support particularly diverse or abundant amphibian populations (with the exception of the upper reaches of Ole Creek).

Upland Sites

Talus sites in the study area generally supported western red-backed salamanders, ensatina, and rough-skinned newts (Table 5.1-12). Cascade torrent salamanders were sometimes found at talus sites with seeps or water sources nearby. Two other fully terrestrial salamander species—the Van Dyke's and Larch Mountain—were found at 2 of the sampled talus sites. Adult and juvenile Van Dyke's salamanders were found at a south-facing talus slope near the edge of the old lava flow just north of the Swift No. 2 canal. Adult and juvenile Larch Mountain salamanders were found in the talus/rock that composes the face of Yale Dam and in the adjacent cliff/talus on the south side of the dam. It is likely that the Yale Dam site was colonized by salamanders that emigrated from the nearby cliff and talus habitat. The only other site in the study area known to support Larch Mountain salamanders is Moss Cave, which was documented by the WDFW and USFS (letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999). Van Dyke's and Larch Mountain salamanders are both TES species; additional information is provided in Section 5.1.2.5.

Old-growth and mature conifer forest habitats in the study area supported western red-backed salamanders, ensatina, rough-skinned newts, Pacific chorus frogs, and a few red-legged frogs. It is likely that red-legged frogs were more common but went undetected; this species tends to be cryptic when away from breeding sites. Adult northwestern salamanders probably also inhabit the forests in the study area but were undetected due to their subterranean habits. Western red-backed salamanders and Pacific chorus frogs were also noted in mid-successional forests and mixed deciduous/conifer forests, and Pacific chorus frogs and bullfrogs were documented in upland deciduous forests (Table 5.1-9).

### 5.1.2.2 Reptiles

Reptiles in the study area appear to be restricted to relatively dry, open habitats. A single rubber boa was found on Yale Dam, but this species likely occurs in other talus habitats. Of the 6 northern alligator lizards observed, 3 were in talus sites, 1 was along the transmission line ROW, 1 was along Panamaker Creek, and 1 was along the trail south of Speelyai Canal. Although not commonly observed, garter snakes were occasionally seen near wetlands and in rock/talus sites (Table 5.1-9). Painted turtles were noted at the Frazier Creek wetland during seasonal surveys.

**Table 5.1-12. Results of terrestrial amphibian and reptile surveys in the upland habitats in the Yale Hydroelectric Project study area.**

| Site | Species Observed | Life Stage |
|---|---|---|
| Face of Yale Dam & adjacent cliff | Western red-backed salamander<br>Larch Mountain salamander<br>Ensatina<br>Northern alligator lizard<br>Rubber boa | Adult<br>Adult/Juvenile<br>Adult<br>Adult<br>Adult |
| Swift Canal Rock/Talus | Western red-backed salamander<br>Cascade torrent salamander<br>Ensatina<br>Rough-skinned newt<br>Van Dyke's salamander | Adult/Juvenile<br>Adult<br>Adult/Juvenile<br>Adult<br>Adult/Juvenile |
| Lava Flow | Western red-backed salamander<br>Ensatina | Adult/Juvenile<br>Adult |
| Northern IP Old-Growth | Pacific chorus frog<br>Red-legged frog<br>Ensatina<br>Western red-backed salamander | Adult<br>Adult<br>Adult<br>Adult/Juvenile |
| Southern IP Old-Growth | Pacific chorus frog<br>Ensatina<br>Western red-backed salamander<br>Rough-skinned newt | Adult<br>Adult/Juvenile<br>Adult/Juvenile<br>Adult |
| Cougar Creek Talus | Western red-backed salamander<br>Garter snake (sp.) | Adult<br>Adult |
| IP-10 Talus | Western red-backed salamander | Adult/Juvenile |
| Cougar Creek Mature/Old-Growth | Western red-backed salamander<br>Ensatina<br>Rough-skinned newt | Adult<br>Adult<br>Adult |
| IP-4 Mature/Old-Growth | Western red-backed salamander<br>Ensatina | Adult<br>Adult |

### 5.1.2.3 Birds

Surveys to document seasonal use of study area habitats by birds were conducted 8 times over the course of 2 years—4 during the breeding season (May-June 1996 and 1997), 2 during the fall (October 1996 and 1997), and 2 during the winter (February 1997 and early March 1998). Surveys in upland habitats were conducted using the area search method (Altman 1995). In wetlands and riparian areas surveys were conducted along transects; stationary points were established for surveys of reservoir/shoreline areas. Incidental observations of birds were also recorded. In all, 113 bird species were observed in the study area during the 1996-1998 surveys; 97 taxa were recorded during breeding season surveys.

Pooling data across all habitat types and all seasons, the most commonly observed species in the study area was the winter wren, with 238 observations, followed by the Swainson's thrush (187), black-throated gray warbler (163), American robin (122), and Pacific slope flycatcher (119). All 5 of these species probably breed in the study area. Based on data

from the spring-summer surveys at least 13 additional taxa probably breed in the study area; nesting was confirmed for 12 species (Table 5.1-13). Breeding is considered possible for the other species observed during the spring or summer. Definitions of confirmed, probable, and possible breeding are included in Table 5.1-13.

**Table 5.1-13 Confirmed and probable breeding bird species in the Yale study area**

| Confirmed Breeding Species[1] | | Probable Breeding Species[1] | |
|---|---|---|---|
| Canada goose | Downy woodpecker | Mallard | Swainson's thrush |
| Common merganser | Northern flicker | Tree swallow | Cedar waxwing |
| Hooded merganser* | Common yellowthroat | Violet green swallow | Wilson's warbler |
| Wood duck* | Black-throated gray warbler[2] | Cliff swallow | Pacific slope flycatcher |
| Bald eagle* | Cowbird[2] | Barn swallow | Willow flycatcher |
| Osprey# | Red-breasted sapsucker[2] | Northern rough-winged swallow | Winter wren |
| Wild turkey[2] | | Red-winged blackbird | Dark-eyed junco |
| | | European starling | Song sparrow |
| | | American robin | |

[1] The definitions for possible, probable, and confirmed breeding were modified slightly from the Washington gap analysis (Smith et al. 1997) and are as follows: Possible breeding: Species in suitable habitat during breeding season; singing male present. Probable breeding: >7 singing males during 1 visit in a given habitat type; pair observed in suitable habitat; territory established; adults visiting probable nest site; agitated behavior from adults; or nest building or excavation. Confirmed breeding: Distraction display; used nest or eggshells of positive identity; recently fledged young incapable of sustained flight; occupied nest (adults entering, leaving, incubating); adults delivering food to nest; or nest with eggs or young seen or heard.
[2] Based on incidental observations.
* WDFW priority species.
# Currently being reviewed for removal from WDFW PHS list (pers. comm., N. Nordstrom, PHS Program, WDFW, Olympia, Washington, February 4, 1999).

Bird species richness in all habitat types was highest during the breeding season surveys (spring and summer) and lowest during the winter. Results of the seasonal surveys for birds in each habitat are summarized below. Specific data for each plot and survey are provided in PacifiCorp (1998b).

Conifer Forests

Five of the 6 conifer forest types in the study area—old-growth, mature, lodgepole pine, mid-successional, and pole—supported a similar number and mix of bird species despite differences in successional stage. Species richness ranged from 31 in the mature conifer type to 37 in old growth (Table 5.1-14). Manuwal (1991) found a similar lack of difference in species richness between different aged unmanaged conifer forest stands in the southern Washington Cascades. The greatest numbers of species overall (N=43) and during the breeding season (N=22) were observed in the seedling/sapling conifer type (Tables 5.1-14 and 5.1-15). The 5 other conifer forest types supported between 14 and 21 species during the breeding season. Mean species richness during the breeding season ranged from 3.3 to 5.8 species/2.5-acre survey plot in conifer types (Table 5.1-15). Unmanaged conifer stands in the southern Washington Cascades supported similar numbers of species but typically had higher mean species richness (Manuwal 1991).

**Table 5.1-14. Species/habitat associations and breeding season relative abundance for birds in the Yale Project study area.**

| Species | Habitat Types[2] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LPP | M | MD | MS | MX | OG | P | RI | RE | SH | SS | UD | WL | DST | ROCK |
| **Waterfowl and Waterbirds** | | | | | | | | | | | | | | | |
| waterfowl (sp.) | | | | X | | | | | X | | | | X | | |
| common loon* | | | | | | | | | 0.3 | | | | | | |
| western grebe | | | | | | | | | 0.6 | | | | X | | |
| pied-billed grebe | | | | | | | | | X | | | | | | |
| double-crested cormorant | | | | | | | | | 0.6 | | | | | | |
| Canada goose | | | | X | X | | X | | | | X | X | 5.1 | | |
| mallard | | | | | | | | 1.7 | 0.3 | | | | 2.8 | | |
| American wigeon | | | | | | | | | X | | | | X | | |
| blue-winged teal | | | | | | | | | | | | | X | | |
| wood duck* | | | | | | | | 0.3 | | | | | 4.9 | | |
| ring-necked duck | | | | | | | | | | | | | X | | |
| lesser scaup | | | | | | | | | | | | | X | | |
| bufflehead* | | | | | | | | | X | | | | X | | |
| common merganser | | | | | | | | X | 2.6 | | | | 0.5 | | |
| hooded merganser* | | | | | | | | | X | | | | 4.0 | | |
| **Gulls and Shorebirds** | | | | | | | | | | | | | | | |
| Caspian tern | | | | | | X | | | | | | | | | |
| gull (sp.) | X | | | | | | | X | X | | | | 0.2 | | |
| glaucous-winged gull | | | | | | | | | X | | | | | | |
| ring-bill gull | | | | | | | | | X | | | | | | |
| California gull | | | | | | | | X | X | | | | | | |
| great blue heron* | | | | | | | | X | 1.0 | | | | 1.1 | | |
| green-backed heron | | | | | | | | | | | | | 0.2 | | |
| killdeer | | | | | X | | | 1.4 | 0.3 | | | | 1.4 | | |
| spotted sandpiper | | | | | | | | 1.4 | 0.3 | | | | 0.2 | | |
| **Raptors, Vultures, and Owls** | | | | | | | | | | | | | | | |
| bald eagle* | X | | | | | 2.0 | X | 1.0 | X | | | | X | | |
| sharp-shinned hawk | X | | | | | | | | | | 0.9 | X | | | |
| red-tailed hawk | X | X | | X | | | | 0.3 | | | | X | X | | |
| osprey# | X | X | | X | | X | X | 0.3 | 3.9 | | | X | 0.5 | | |
| owl (sp.) | | | | | | | | | | | | X | | | |
| great horned owl | X | | | | | | | | | | | | | | |
| barred owl | | | | X | | | | | | | | | | | |
| northern spotted owl* | | X | | | | | | | | | | | | | |

**Table 5.1-14. Species/habitat associations and breeding season relative abundance for birds in the Yale Project study area (continued).**

| Species | Habitat Types[2] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LPP | M | MD | MS | MX | OG | P | RI | RE | SH | SS | UD | WL | DST | ROCK |
| pygmy owl | | | | | | X | | | | | | | X | | |
| turkey vulture | X | | X | | | | | X | X | | | | X | | |
| **Gamebirds** | | | | | | | | | | | | | | | |
| band-tailed pigeon* | | X | | | X | | X | | | | 0.9 | X | | | |
| mourning dove | | | | | | | | X | X | | X | | X | | |
| blue grouse* | | | | | | X | | | | | X | | | | |
| ruffed grouse | | | | X | | | | | X | | 0.9 | | X | | |
| common snipe | | | | | | | | | | | | | 0.2 | | |
| wild turkey* | | | | | | | X | | | | | | | | |
| **Nightjars, Swifts, and Hummingbirds** | | | | | | | | | | | | | | | |
| belted kingfisher | | | | | X | | | 1.4 | 0.6 | | | | 2.5 | | |
| Vaux's swift* | | | | | | | | | | | | | X | X | |
| common nighthawk | X | | | | | | | | | | | | | | |
| hummingbird (sp.) | 2.8 | | | | | | | 0.7 | | | | | 0.4 | | |
| rufous hummingbird | 7.4 | | 2.0 | 0.9 | | 4.0 | | 0.3 | 0.3 | 1.3 | 0.9 | X | 1.2 | | |
| black-chinned hummingbird | 1.5 | | | | | | | | | | | 1.0 | | | |
| **Woodpeckers** | | | | | | | | | | | | | | | |
| woodpecker (sp.) | X | | X | X | X | X | | 0.3 | | | | X | 0.2 | | |
| red-breasted sapsucker | | X | X | X | | | | 0.3 | | | 0.9 | X | 0.4 | | |
| pileated woodpecker* | X | X | X | | | 2.0 | X | 0.3 | 0.3 | | X | 1.5 | 0.2 | | |
| common flicker | 2.8 | X | | X | 1.0 | X | X | 1.0 | | X | 3.5 | X | 0.9 | | |
| downy woodpecker | X | | | | X | X | | 0.7 | 0.3 | | X | 0.5 | 1.6 | X | |
| hairy woodpecker | | X | | 0.9 | | 2.0 | | | | X | 2.8 | 0.5 | 0.4 | | |
| **Flycatchers and Swallows** | | | | | | | | | | | | | | | |
| flycatcher (sp.) | | | | | 1.9 | | | | | | | | | | |
| Hammond's flycatcher | 4.2 | 2.4 | | 0.9 | 2.9 | 2.0 | | 0.3 | 0.3 | 1.3 | | 2.5 | X | | |
| alder flycatcher | | | | | | | | | | | X | | | | |
| western flycatcher | | | | | | | | | | | | X | | | |
| Pacific slope flycatcher | | 14.6 | 2.0 | 11.1 | 20.0 | 4.0 | 21.5 | 3.4 | 1.6 | 3.9 | 0.9 | 15.8 | 0.7 | | |
| willow flycatcher | | | 30.0 | | 3.8 | X | 1.3 | 1.7 | 1.0 | | 13.9 | 1.0 | 4.2 | | |
| olive-sided flycatcher | | | 2.0 | | | | | | | | | | | | |
| western wood-pewee | | X | | X | X | | | | | | | 0.5 | 0.9 | | |

**Table 5.1-14. Species/habitat associations and breeding season relative abundance for birds in the Yale Project study area (continued).**

| Species | Habitat Types[2] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LPP | M | MD | MS | MX | OG | P | RI | RE | SH | SS | UD | WL | DST | ROCK |
| swallow (sp.) | X | X | | | X | | | | 17.9 | | X | X | 0.2 | | |
| tree swallow | | | | | | | | 2.4 | 0.6 | | | | 4.0 | | |
| violet green swallow | | | | | | | | 15.9 | 3.2 | | | | 2.8 | | |
| cliff swallow | | | | | | | | 13.4 | 17.9 | | | | | | |
| barn swallow | | | 4.0 | | | | | 5.9 | 7.1 | | | X | X | | |
| northern rough-winged swallow | | | | | | | | 7.9 | 15.6 | | | | 2.8 | | |
| **Jays and Crows** | | | | | | | | | | | | | | | |
| scrub jay | 1.5 | | | | | | | | | | | X | | | |
| Steller's jay | 11.3 | 2.4 | 4.0 | 3.7 | 1.9 | 10.0 | 3.8 | 2.4 | 1.6 | 2.6 | 3.5 | 1.0 | 1.1 | | |
| American crow | 1.5 | X | | X | 1.9 | X | X | 2.1 | 0.3 | X | X | 1.5 | 0.7 | | |
| common raven | X | X | X | X | | X | X | 0.7 | 1.6 | X | X | X | 0.5 | X | |
| brown-headed cowbird | X | | | | X | | | 1.0 | | | | 1.0 | 0.9 | X | |
| **Chickadees, Wrens, and Thrushes, and Creepers** | | | | | | | | | | | | | | | |
| chickadee (sp.) | X | X | X | | 1.0 | X | | | | | X | X | X | | |
| black-capped chickadee | 1.5 | 12.2 | 2.0 | 2.8 | 2.9 | 8.0 | 3.8 | X | 0.6 | X | 3.5 | 2 | 1.1 | | |
| mountain chickadee | X | | | | X | | | | | | | | | | |
| chestnut-backed chickadee | 4.2 | 22.0 | | 7.4 | X | 14.0 | 12.7 | 1.0 | X | 9.1 | 6.1 | 4.5 | 0.2 | X | |
| bushtit | | | | | | | | | | | | X | 0.7 | | |
| red-breasted nuthatch | 1.5 | 4.9 | | X | X | 6.0 | 1.3 | | X | 1.3 | X | X | 0.2 | | |
| white-breasted nuthatch | | | | | | | | | | | | 0.5 | | | |
| winter wren | 1.5 | 22.0 | X | 28.7 | 13.3 | 10.0 | 17.7 | 3.4 | 1 | 18.2 | X | 11.4 | 0.5 | X | |
| marsh wren | | | | | | | | | | | | | 0.4 | | |
| kinglet (sp.) | | | | | X | | | | | | | | X | X | |
| ruby-crowned kinglet | X | | | | X | | | | X | | X | | X | X | |
| golden-crowned kinglet | 4.2 | 2.4 | 2.0 | 1.9 | 3.8 | 8.0 | 7.6 | 1.0 | X | 1.3 | X | 2.0 | 0.2 | X | |
| hermit thrush | | | | | 1.0 | | X | | | | | | | | |
| Swainson's thrush | 1.5 | 2.4 | X | 6.5 | 6.7 | X | 5.1 | 0.3 | 1.9 | 6.5 | 3.5 | 7.4 | 1.9 | | |
| varied thrush | X | X | | X | X | X | X | | 0.3 | X | X | X | X | X | |
| American robin | 9.9 | X | X | 0.9 | 4.8 | 4.0 | 2.5 | 3.8 | 2.6 | X | 14.8 | 5.4 | 5.3 | X | |
| American dipper | | | | | | | | 1.0 | 0.3 | | | | X | | |
| cedar waxwing | | | 4.0 | 0.9 | 1.9 | | | 0.7 | 1.6 | | 4.3 | X | 5.4 | | |
| European starling | | | | | | | | 0.3 | X | | | X | 2.3 | X | |

**Table 5.1-14. Species/habitat associations and breeding season relative abundance for birds in the Yale Project study area (continued).**

| Species | Habitat Types[2] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **LPP** | **M** | **MD** | **MS** | **MX** | **OG** | **P** | **RI** | **RE** | **SH** | **SS** | **UD** | **WL** | **DST** | **ROCK** |
| brown creeper | | 4.9 | | | | 8.0 | | | | | | | | | |
| **Vireos and Warblers** | | | | | | | | | | | | | | | |
| Hutton's vireo | | | | | 1.0 | X | | | | X | X | | 0.2 | X | |
| solitary vireo | | | | X | | | | | 0.3 | X | | X | 0.4 | | |
| warbling vireo | 2.8 | | | | 6.7 | | 1.3 | 1.7 | 1.9 | 1.3 | X | 4.5 | 0.5 | | |
| warbler (sp.) | | | | | | | | | | | | 0.5 | | | |
| orange-crowned warbler | | | | | | | | 0.3 | | | | X | | | |
| black-throated gray warbler | 4.2 | 2.4 | 2.0 | 16.7 | 11.4 | 2.0 | 6.3 | 1.7 | 0.3 | 27.3 | X | 7.9 | 0.9 | X | |
| yellow warbler | | | | | 1.0 | | | 1.4 | | 1.3 | X | | 2.1 | | |
| yellow-rumped warbler | | | | | | | | | | | | X | X | | |
| Nashville warbler | | | | | | | | | | 1.3 | X | | | | |
| MacGillivray's warbler | | X | 8.0 | | 1.9 | 2.0 | X | | | 2.6 | 8.7 | | 0.7 | | |
| Heto warbler[3] | | 2.4 | | | | 2.0 | | | | | | | | | |
| hermit warbler | | 2.4 | | | | | | | | | | | | | |
| Wilson's warbler | | | 10.0 | 3.7 | 1.0 | X | 1.3 | 0.3 | 0.6 | 7.8 | | 2.5 | 0.4 | | |
| common yellowthroat | | X | 22.0 | | | | | 1.7 | 0.6 | X | | 1.0 | 4.4 | | |
| **Grosbeaks, Buntings, and Sparrows** | | | | | | | | | | | | | | | |
| black-headed grosbeak | | X | X | 0.9 | | | 2.5 | | | 3.9 | | 1.0 | 0.9 | | |
| lazuli bunting | | | X | | | | | | | | | | | | |
| evening grosbeak | | | | | | X | | X | | 1.3 | X | X | X | | |
| spotted towhee | X | | X | 3.7 | X | X | 3.8 | | | 3.9 | 2.6 | 4.5 | X | X | |
| song sparrow | | | X | 1.9 | 1.0 | X | X | 2.1 | 2.3 | | 1.7 | 12.9 | 10.5 | | |
| chipping sparrow | | | | | | | | | | | X | | | | |
| dark-eyed junco | 35.2 | X | 2.0 | 0.9 | 3.8 | 2.0 | 1.3 | 1.0 | 0.6 | 1.3 | 11.3 | 1.0 | 0.4 | | |
| white-crowned sparrow | 1.5 | | 2.0 | 0.9 | 1 | X | X | 3.8 | 3.2 | | 12.2 | | 0.7 | | |
| golden-crowned sparrow | | | X | | | | | | | | | | | | |
| pine siskin | | | | | | | | | | | | | X | | |
| **Blackbirds, Orioles, and Finches** | | | | | | | | | | | | | | | |
| red-winged blackbird | | | | | | | | | X | | | | 8.8 | | |
| Brewer's blackbird | | | | | | | | X | | | | | 0.2 | | |
| northern oriole | | | | | | | | | | | | | 0.4 | | |
| Bullock's oriole | | | | | | | | | | | | | 0.4 | | |

**Table 5.1-14. Species/habitat associations and breeding season relative abundance for birds in the Yale Project study area (continued).**

| Species | Habitat Types[2] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **LPP** | **M** | **MD** | **MS** | **MX** | **OG** | **P** | **RI** | **RE** | **SH** | **SS** | **UD** | **WL** | **DST** | **ROCK** |
| western tanager | X | 2.4 | 2.0 | 3.7 | 2.9 | 8.0 | 6.3 | 1.7 | 0.3 | 2.6 | 3.5 | 3.0 | 1.2 | | |
| finch (sp.) | | | | | | | | | | | X | | | | |
| American goldfinch | | | | | | X | | 2.4 | 0.6 | | X | X | 1.8 | | |
| red crossbill | | | | | | | X | | | | | | | | |
| purple finch | X | | | 0.9 | | | X | | | | 0.9 | | 0.2 | | |
| **Total No. of Species[4]** | 35 | 31 | 28 | 34 | 36 | 37 | 32 | 52 | 58 | 30 | 43 | 50 | 80 | 14 | 0 |

* WDFW priority species.
[#] Currently being reviewed for removal from WDFW PHS list (pers. comm., N. Nordstrom, PHS Program, WDFW, Olympia, Washington, February 4, 1999).
[1] Numbers represent relative abundance during the breeding season; "X" indicates species was observed either incidentally or during fall or winter surveys. Relative abundance was calculated by dividing the number of individuals observed per species by the total number of individuals recorded over all 4 breeding season surveys.
[2] Habitat types: LPP-lodgepole pine, M-mature conifer, MD-meadow, MS-mid-successional conifer, MX-mixed conifer/deciduous, OG-old-growth conifer, P-pole conifer, RI-riparian deciduous/riverine, RE-reservoir/shoreline, SH-shrubland, SS-seedling/sapling, UD-upland deciduous, WL-wetland, DST-disturbed, ROCK-rock/talus/cave.
[3] Heto = hermit-Townsend's warbler hybrids
[4] Wildlife not recorded to species are not included in totals.

Manuwal's study (1991), however, included many more survey sites over a much wider elevational gradient.

Most of the species observed in conifer stands during the breeding season are widely distributed in the forests of western Washington (Brown 1985; Manuwal 1991). Eight species—the Pacific slope flycatcher, Steller's jay, chestnut-backed chickadee, black-capped chickadee, winter wren, golden-crowned kinglet, American robin, and western tanager—were observed in at least 5 of the 6 conifer types (Table 5.1-14). The winter wren was 1 of the most commonly observed species in all types except seedling/sapling and lodgepole pine stands. The winter wren was also reported by Manuwal (1991) as the most abundant species in unmanaged conifer stands in the southwestern Cascades. The ubiquitous American robin was the most common species in seedling/sapling stands during the breeding season; white-crowned sparrows and willow flycatchers, both species which are typically associated with open, brushy areas (Brown 1985), were nearly equally as abundant (Table 5.1-14). The dark-eyed junco was the most frequently observed species in lodgepole pine stands.

Relatively uncommon species observed in conifer forests included the sharp-shinned hawk, pileated woodpecker, and ruffed grouse. Two WDFW priority species—the pileated woodpecker and bald eagle—were observed during breeding season surveys in old-growth stands; the band-tailed pigeon, also a WDFW priority species, was recorded in seedling/sapling conifer habitat. This species was frequently heard in mature, pole, and seedling/sapling types over the course of field activities in 1996-1998. The spotted owl, another WDFW priority species, was seen once in a mature conifer stand.

**Table 5.1-15. Summary results of seasonal bird surveys, by habitat type, for the Yale Hydroelectric Project.**

| | All Seasons | | Breeding Season | | | | | |
|---|---|---|---|---|---|---|---|---|
| Habitat Type | Total No. Individuals Observed | Total Spp. Richness (No.)[1] | Total No. Individuals Observed | Total Spp. Richness (No.)[1] | Mean # Species/ Plot Breeding Season | Confirmed Breeding Spp. | No. Probable Breeding Spp. | WDFW Priority Species Observed[2] |
| Lodgepole pine forest | 124 | 22 | 71 | 19 | 3.6 | | 1 | |
| Old-growth conifer forest | 82 | 25 | 50 | 19 | 3.3 | Bald Eagle | | Bald Eagle, Pileated Woodpecker |
| Mature conifer forest | 88 | 17 | 41 | 14 | 3.3 | | 1 | Spotted Owl, Band-tailed Pigeon* |
| Mid-successional conifer forest | 220 | 24 | 108 | 21 | 4. 3 | | 1 | |
| Pole conifer forest | 147 | 21 | 79 | 17 | 4.6 | | 1 | Band-tailed Pigeon |
| Seedling/ sapling conifer forest | 162 | 27 | 115 | 22 | 5.8 | Northern flicker | 2 | Band-tailed Pigeon |
| Mixed conifer/ deciduous forest | 71 | 30 | 105 | 25 | 6.3 | | 1 | Band-tailed Pigeon* |
| Upland deciduous forest | 323 | 31 | 199 | 28 | 5.5 | Black-throated gray warbler[3] Cowbird[3] Red-breasted sapsucker[3] | 3 | Pileated Woodpecker, Band-tailed Pigeon |
| Shrubland | 140 | 24 | 77 | 20 | 4.0 | | 2 | |
| Meadow/ grassland | 69 | 21 | 50 | 16 | 6.3 | Common yellowthroat | 2 | |
| Riparian deciduous forest/ riverine | 371 | 51 | 287 | 46 | 8.7 | | 5 | Wood Duck, Bald Eagle, Osprey, Pileated Woodpecker |
| Reservoir/ shoreline | 416 | 52 | 308 | 42 | 5.3 | Common merganser | | Common Loon, Pileated Woodpecker, Osprey, Great Blue Heron |

**Table 5.1-15. Summary results of seasonal bird surveys, by habitat type, for the Yale Hydroelectric Project (continued).**

| | All Seasons | | Breeding Season | | | | | |
|---|---|---|---|---|---|---|---|---|
| Habitat Type | Total No. Individuals Observed | Total Spp. Richness (No.)[1] | Total No. Individuals Observed | Total Spp. Richness (No.)[1] | Mean # Species/ Plot Breeding Season | Confirmed Breeding Spp. | No. Probable Breeding Spp. | WDFW Priority Species Observed[2] |
| Wetland | 1,007 | 76 | 571 | 62 | 11.0 | Downy woodpecker, Hooded merganser, Wood duck, Canada goose | 9 | Wood Duck, Great Blue Heron, Hooded Merganser, Pileated Woodpecker, Osprey, Bufflehead |

[1] Total includes all taxa observed during seasonal surveys, including those not identified to species. Totals do not include species observed incidentally and are therefore not comparable to totals in species/habitat association table (Table 5.1-14).
[2] Includes TES and WDFW Priority species observed incidentally as well as during seasonal surveys.
[3] Based on incidental observations.
* Species occurred outside the plot boundary.

Breeding in conifer forest types was confirmed for only 2 species—the bald eagle and northern flicker. Bald eagles nested in old-growth forest near 1 of the survey plots. The northern flicker was observed nesting in a snag in seedling/sapling habitat. In addition, the following 6 species probably breed in conifer forest types:

- Winter wren - mid-successional conifer
- Back-throated gray warbler - mid-successional conifer
- Pacific slope flycatcher - pole conifer
- Dark-eyed junco - lodgepole pine
- Willow flycatcher - seedling/sapling
- American robin - seedling/sapling

Species richness in all conifer forest types decreased precipitously between the breeding season, fall, and winter surveys. Fall species richness ranged from 7 to 12, and was highest in old-growth and seedling/sapling forests (PacifiCorp 1998b). During the fall, the winter wren and/or the golden-crowned kinglet were most commonly observed in all conifer types except lodgepole pine, where chickadees were most abundant. Winter species richness was uniformly low, ranging from 1 to 4, with the winter wren most abundant in all but lodgepole forest, where the dark-eyed junco was most common (PacifiCorp 1998b).

Mixed Conifer/Deciduous Forest

A total of 36 species were recorded in mixed conifer/deciduous forest stands overall (Table 5.1-14); 25 were observed during breeding season surveys (Table 5.1-14); 10 and 8 species were observed in the fall and winter, respectively. Species richness values in mixed conifer/deciduous stands, both overall and during breeding season surveys, are higher than any of the conifer forest types but lower than the upland deciduous forest type

(Tables 5.1-14 and 5.1-15). The Pacific slope flycatcher was the most common species during the breeding season, representing 20 percent of all observations (Table 5.1-14); this species probably breeds in the mixed conifer/deciduous forests in the study area. The next most common species were the winter wren and black-throated gray warbler. During the fall and winter, the winter wren was the most frequently recorded species. One WDFW priority species—the band-tailed pigeon—was noted incidentally in mixed conifer/deciduous forest.

Upland Deciduous Forest

A total of 28 bird species were documented using the upland deciduous forests during the breeding season surveys (Table 5.1-15); overall species richness in this habitat was 50, higher than any other upland type (Table 5.1.14). There was considerable variation in vegetation, slope, and aspect among the 6 upland deciduous survey plots (see Section 5.1.1.1). Similarly, the number of species detected during the 4 breeding season surveys ranged from 2 to 10 per plot, with a mean of 5.5 species/plot (Table 5.1-15). The Pacific slope flycatcher was the only species documented at least once in all 6 plots; this species composed approximately 16 percent of all observations during the breeding season (Table 5.1-14). Other common species during the breeding season were the song sparrow and winter wren. The Pacific slope flycatcher, winter wren, and song sparrow probably breed in the upland deciduous forests in the study area. The pileated woodpecker was the only WDFW priority species observed in upland deciduous forests during breeding surveys; the band-tailed pigeon was noted incidentally (Table 5.1-14).

As in other forest types, species richness in upland deciduous forests in the fall and winter was low; 11 and 10 species were documented, respectively. The winter wren and golden-crowned kinglet were the most frequently observed species in both seasons. During the fall, each upland deciduous forest plot supported between 1 and 7 species, with a mean of 2.8 species/plot (PacifiCorp 1998b).

Riparian Deciduous Forest

Over the 2 years of relicensing studies, 52 bird species were observed in riparian deciduous forests; of these, 46 species were recorded during the breeding season surveys (Tables 5.1-14 and 5.1-15). Mean breeding season species richness was 8.7 species/transect, the highest of any forest type in the study area. However, 10 species were seen only once during the 4 breeding surveys, suggesting transitory use of this habitat by about 22 percent of the species observed during surveys. No single species was observed in all 4 of the riparian forest stands included in the surveys. Overall, swallows dominated the species composition in this habitat; 5 swallow species represented more than 45 percent of all individuals observed and likely breed in or near riparian habitat. The violet green swallow, cliff swallow, American robin, and western tanager were common species during the breeding season surveys (Table 5.1-14). Four WDFW priority species were observed in riparian deciduous forests during the breeding season—the wood duck, bald eagle, osprey, and pileated woodpecker.

A total of 17 species were recorded in riparian deciduous habitats during the fall, more than in any other habitat type in the study area except wetlands and reservoir/shorelines (PacifiCorp 1998b). The American crow was most common, representing over 21 percent of the observations. An additional 41 percent of the observations consisted of just 3 species—the chestnut-backed chickadee, black-capped chickadee, and winter wren. The bald eagle, osprey, and great blue heron, all WDFW priority species, were also observed at least once during fall surveys. Winter species richness in riparian deciduous forests was as low as in other forest types in the study area. Only 8 individuals of 4 species were observed—winter wrens, mallards, golden-crowned kinglets, and common ravens (PacifiCorp 1998b).

Shrubland

Overall, 30 bird species were documented in shrubland habitats, including 20 taxa observed during the breeding season (Tables 5.1-14 and 5.1-15). Between 1 and 7 species were detected at a given shrubland plot during breeding season surveys; mean species richness was 4.0 species/plot. Nine species, nearly half of those documented during the breeding season, were detected only once and probably represent transitory use of this type (PacifiCorp 1998b). The black-throated gray warbler and winter wren probably breed in shrubland habitat. The black-throated gray warbler accounted for over 27 percent of all individuals detected in shrublands; the winter wren was also relatively abundant, representing about 18 percent of the observations (Table 5.1-14).

During the fall, 7 species were observed in shrubland habitats. Three of these species—the golden-crowned kinglet, winter wren, and chestnut-backed chickadee—accounted for nearly 90 percent of the observations. Six species were recorded during winter surveys, with the golden-crowned kinglet and winter wren most common (PacifiCorp 1998b).

Meadow

Twenty-eight bird species were observed in the 1 meadow habitat area that was surveyed, including 16 taxa during the breeding season (Tables 5.1-14 and 5.1-15). Nine species were observed only once, generally in the shrubs or trees on the edge of the meadow (PacifiCorp 1998b). Most of these species are more typically associated with forest or shrub habitats but may forage along the edges of open areas. The most abundant species were the willow flycatcher and common yellowthroat, which together represented over 50 percent of the individuals observed in this wet meadow during the breeding season (Table 5.1-14). Two other species typically associated with more open habitats—MacGillivray's warbler and Wilson's warbler—were also observed several times during breeding season surveys. Breeding was confirmed for the common yellowthroat in meadow habitat and considered probable for the willow flycatcher and Wilson's warbler.

Four species—the golden-crowned sparrow, winter wren, spotted towhee, and song sparrow—were observed during fall surveys in meadow habitat. All of these species were observed in the shrubs and small trees on the edge of the meadow. Interestingly, none of these species used meadow habitat during the breeding season. Steller's jay,

winter wren, and American robin were the only species observed in meadow habitat during the winter (PacifiCorp 1998b).

Reservoir/Shoreline

Fifty-eight bird species were observed using the reservoir and adjacent shoreline habitat, 42 during the breeding season surveys (Tables 5.1-14 and 5.1-15). Various species of swallows accounted for 63 percent of the observations (Table 5.1-14) and probably breed in or near reservoir/shoreline habitat. No other species comprised more than 4 percent and 14 taxa were observed only once, suggesting relatively high transitory use (Table 5.1-14). Up to 17 species were seen at a given reservoir/shoreline point; the mean breeding season species richness was 5.3 species/point. Breeding in reservoir/shoreline habitat was confirmed for 1 species—the common merganser. Four WDFW priority species were documented in reservoir/shoreline habitats during the breeding season—the osprey, common loon, pileated woodpecker, and great blue heron (Table 5.1-15). In addition, bald eagles were regularly seen perching along the shoreline of the lake near the Yale powerhouse/tailrace while foraging for fish.

During the fall, 22 species were observed at the reservoir/shoreline points; mean species richness was low—only 2.5 species/point (PacifiCorp 1998b). Fall observations were predominantly of waterfowl, waterbirds, gulls, and shorebirds; collectively this group of 13 species represented 78 percent of the individuals seen. Of these, the great blue heron and American wigeon were the most common, accounting for over 30 percent of the observations. Only 9 species, primarily waterfowl, were seen using reservoir/shoreline habitats during the winter (PacifiCorp 1998b).

Wetlands

Seasonal wildlife surveys were conducted in the 4 major study area wetlands—Swift, IP, Beaver Bay, and Frazier Creek. A total of 80 bird species were recorded in wetland habitats, more than in any other cover type in the study area; 62 were observed during the breeding season (Tables 5.1-14 and 5.1-15). However, species richness is not directly comparable between wetland and upland habitats. Ranging from 7 to 39 acres, the 4 wetlands surveyed are substantially larger than the 2.5-acre plots established in upland habitats. They also include several different habitat types (e.g., open water, emergent wetland, shrub-scrub wetland); upland plots encompassed single types. Although wetlands are generally known to be heavily used by wildlife (Brown 1985), the larger size and combination of habitats that characterize study area wetlands probably contribute to their high species richness.

Breeding Season - Between 4 and 16 species were recorded along wetland transects during the 4 breeding season surveys (PacifiCorp 1998b); mean species richness was 11 species/transect. Six species—the song sparrow, rufous hummingbird, belted kingfisher, American robin, northern rough-winged swallow, and common yellowthroat—were observed at all 4 wetlands during the breeding season (PacifiCorp 1998b). As with riparian deciduous habitats, there was no 1 taxon that dominated the breeding season

species composition in wetlands. The song sparrow was the most abundant species, representing slightly more than 10 percent of the individuals seen (Table 5.1-14). The red-winged blackbird, American robin, and Canada goose each represented nearly between 5 and 8 percent of the individuals during the breeding season. Observation of nests, flightless young, pairs, and/or multiple singing males suggested probable (P) or confirmed (C) breeding by at least 13 species in study area wetlands (PacifiCorp 1998b). These species are as follows:

- Downy woodpecker (C)
- Tree swallow (P)
- Violet green swallow (P)
- American robin (P)
- Cedar waxwing (P)
- European starling (P)
- Red-winged blackbird (P)
- Willow flycatcher (P)
- Song sparrow (P)
- Mallard (P)
- Hooded merganser (C)
- Wood duck (C)
- Canada goose (C)

Of the 4 wetlands surveyed, Beaver Bay had the greatest breeding season species richness—46—about twice the number observed in the other 3 wetlands, which each supported between 22 and 28 species (PacifiCorp 1998b). Beaver Bay also had the greatest number of individuals observed—224. At 36 acres, Beaver Bay is considerably larger than any of the other 3 wetlands and consists of all 4 palustrine wetland types, including several large stands of palustrine forest. The diversity of wetland types, canopy layers, and plant species found in Beaver Bay is probably at least partially responsible for the high bird species richness observed at this site. The song sparrow was the most common species observed during the breeding season at Beaver Bay, IP, and Swift wetlands. Overall, breeding waterfowl use of these 3 wetlands was relatively low, ranging from 4 percent of the individuals observed at the IP wetland to about 17 percent at Swift. Conversely, waterfowl use of Frazier Creek wetland was relatively high, accounting for over 30 percent of the observations. The wood duck, a WDFW priority species, was the most commonly observed waterfowl species at Frazier Creek and appeared to be nesting in several of the large snags in the northwest portion of this wetland. Another WDFW priority species—the hooded merganser—was also apparently nesting at the Frazier Creek and IP wetlands and was observed once at Swift. Other WDFW priority species observed in at least 1 of the 4 wetlands during the breeding season included the great blue heron, pileated woodpecker, and osprey.

Fall - The fall surveys indicated much lower species richness and overall abundance of birds in wetlands (PacifiCorp 1998b). Nonetheless, 28 species were observed in wetlands during the fall, considerably more than any other habitat type in the study area. In contrast to the breeding season, species richness was highest at the Swift wetland (28 species) and ranged from 5 to 15 at the other 3 wetlands. Swift wetland was the only site in the study area where more species were observed in the fall than in the summer. About 37 percent of the 121 individuals observed at Swift were represented by 7 waterfowl species, but a large number of passerine species was recorded as well. Waterfowl were also abundant at Frazier Creek, accounting for over 82 percent of the observations. American wigeon, blue-winged teal, and hooded merganser were the most common

waterfowl at both the Frazier Creek and Swift wetlands. Conversely, relatively few waterfowl were observed at either Beaver Bay or IP during the fall. Passerines were more common at these sites, with the song sparrow most abundant (PacifiCorp 1998b).

Winter - A total of 24 species were observed in wetlands during winter surveys—nearly equal to the number observed in the fall, and substantially greater than winter species richness in any other habitat type. Species richness at individual wetlands, however, was relatively low, ranging from 8 at IP to 15 at Beaver Bay (PacifiCorp 1998b). At Frazier Creek, over 80 percent of the individuals observed during the winter were waterfowl, with bufflehead, a WDFW priority species, the majority (>55 percent). Waterfowl were common at Swift as well; 2 species—the mallard and bufflehead—accounted for over 25 percent of the 42 individuals observed. Conversely, only a few mallards were observed at the IP and Beaver Bay wetlands. Song sparrows represented 33 percent of the 21 individuals observed at IP. At Beaver Bay, song sparrows and golden-crowned kinglets together represented slightly more than 30 percent of the 63 observations (PacifiCorp 1998b).

### 5.1.2.4 Mammals

There were 13 mammal species documented in the study area during 1996-1998 field studies, including 1 bat species, 3 big game species, 2 aquatic furbearers, 2 medium-sized mammal species, 3 small mammal species, bobcat, and coyote (Table 5.1-16).

Four of these taxa—the Pacific western big-eared bat, elk, black-tailed deer, and mink—are WDFW priority species (Table 5.1-16). Six of the 13 mammal species were documented in wetlands; old-growth conifer forests, shrublands, and upland deciduous forests had 5 species each. Elk and/or black-tailed deer were documented in virtually all habitats; the entire study area represents big game winter range (WDFW 1995; DNR 1996). Elk calves and deer fawns were observed on several occasions. Squirrels or chipmunks were noted in most forested habitats as well. Mink and beaver were documented primarily in wetlands. Mink, raccoon, coyote, black bear, beaver, and Douglas squirrel sign were commonly observed. Observations of most other mammal species were few (Table 5.1-16).

PacifiCorp assessed the winter use of the Yale Lake drawdown zone by mammals, particularly big game. The results of this assessment indicated highly variable use by deer and elk. In February 1997, the only drawdown areas that showed evidence of substantial use by deer and elk were the relatively flat zones near Beaver Bay and near the mouth of Speelyai Canal. In March 1998, elk and deer tracks were found at these sites as well as near Yale Park and at the upstream end of the reservoir. All other portions of the drawdown area are narrow and steep and do not provide easy opportunities for large mammals to reach water. Access to the drawdown zone and water appears to be limited by the shoreline characteristics. Mapping of the reservoir shoreline found that over 50 percent consists of cutbanks greater than 6 feet high during full pool. Most of the sections with banks less than 2 feet high occur adjacent to the areas within drawdown zones that are relatively flat. Other sign of mammals included raccoon and coyote tracks.

Mammal species affected most by the annual drawdown of Yale Lake include beaver and mink; some small mammals associated with riparian habitat are also likely affected to a lesser degree. Mink require sufficient vegetative cover interspersed with or immediately adjacent to water for cover, den sites, and prey (Allen 1986). Beaver generally prefer seasonally stable water levels that do not affect burrow or lodge entrances (Allen 1983). Winter drawdown of Yale Lake results in large exposed mud flats that provide little denning or forage cover for mink. Similarly, the drawdowns make virtually the entire shoreline unsuitable for beaver denning. Beaver and mink were observed in wetlands in the Yale study area, and both species may occur along some sections of the lake under more stable water levels.

**Table 5.1-16. Species/habitat associations for mammals in the Yale Project.**

| | **Habitat Types[1]** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **LPP** | **M** | **MD** | **MS** | **MX** | **OG** | **P** | **RI** | **RE** | **SH** | **SS** | **UD** | **WL** | **DST** | **ROCK** |
| Pacific western big-eared bat* | | | | | | | | | | | | | | | X |
| Townsend chipmunk | | | | | | X | | | | | | X | | | |
| Douglas squirrel | X | X | | X | X | X | X | | X | X | X | X | | X | |
| beaver | | | X | | | | | | | | | | X | | |
| mink* | | | | | | | | | X | | | | X | | |
| coyote | | | | | | | | | | | X | | X | X | |
| bobcat | | | | | | | | | | | | X | | | |
| black bear | | | | | X | | | | | | | | | | |
| elk* | X | X | | X | X | X | X | X | | X | X | X | X | X | |
| black-tailed deer* | X | X | X | X | X | X | X | X | X | X | X | X | X | X | |
| pocket gopher | | | | | | | | | | | X | | | | |
| striped skunk | | | | X | | X | | | | X | | | | | |
| raccoon | | | | | | | | | | | | | X | | |
| **Total No. of Species** | **3** | **3** | **2** | **4** | **4** | **5** | **3** | **2** | **3** | **4** | **5** | **5** | **6** | **4** | **1** |

* WDFW priority species.
[1] Habitat types: LPP-lodgepole pine, M-mature conifer, MD-meadow, MS-mid-successional conifer, MX-mixed conifer/deciduous, OG-old-growth conifer, P-pole conifer, RI-riparian deciduous/riverine, RE-reservoir/shoreline, SH-shrubland, SS-seedling/sapling, UD-upland deciduous, WL-wetland, DST-disturbed, ROCK-rock/talus/cave.

### 5.1.2.5 Wildlife Species with Federal or State Status

The WDFW and USFWS identified 26 TES wildlife species documented or potentially occurring in the Yale study area (Table 5.1-17) (letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999; letter from N. Gloman, Supervisor, USFWS, Lacey, Washington, February 4, 1999; and Rodrick and Milner 1991). A variety of methods were used to survey for these species, including USFS protocol surveys for Larch Mountain and Van Dyke's salamanders, cave exit surveys, helicopter surveys, and seasonal wildlife surveys (see PacifiCorp 1998b for details on survey methods).

**Table 5.1-17. TES wildlife species known or potentially occurring in the vicinity of the Yale Project.**

| Species | TES Status[1] | |
|---|---|---|
| | Federal | WDFW |
| **Amphibians and Reptiles** | | |
| Red-legged frog *(Rana aurora*) | SC | — |
| Cascades frog (*Rana cascadae)* | SC | — |
| Oregon spotted frog (*Rana pretiosa)* | C | C |
| Tailed frog (*Ascaphus truei*) | SC | M |
| Cascade torrent salamander* (*Rhyacotriton cascadae*) | — | C |
| Cope's giant salamander *(Dicamptodon copei)* | — | M |
| Larch Mountain salamander* (*Plethodon larselli*) | SC | S |
| Van Dyke's salamander* (*Plethodon vandykei*) | SC | C |
| Northwestern pond turtle* (*Clemmys marmorata marmorata)* | SC | E |
| **Birds** | | |
| Common loon* (*Gavia immer*) | — | C |
| Great blue heron* *(Ardea herodias)* | — | M |
| Harlequin duck* (*Histrionicus histrionicus*) | SC | — |
| Bald eagle* (*Haliaeetus leucocephalus*) | T | T |
| Northern goshawk* (*Accipter gentilis*) | SC | C |
| Osprey# (*Pandion haliaetus*) | — | M |
| Peregrine falcon* (*Falco peregrinus*) | E | E |
| Northern spotted owl* (*Strix occidentalis*) | T | E |
| Pileated woodpecker* (*Dryocopus pileatus*) | — | C |
| Vaux's swift* (*Chaetura vauxi*) | — | C |
| Olive-sided flycatcher (*Contopus borealis)* | SC | — |
| **Mammals** | | |
| Pacific western big-eared bat* (*Corynorhinus townsendii*, previously known as *Plecotus townsendii*) | SC | C |
| Long-eared myotis* (*Myotis evotis)* | SC | M |
| Long-legged myotis* (*M. volans)* | SC | M |
| Wolverine (*Gulo gulo lascus)* | SC | C |
| Fisher (*Martes pennanti)* | SC | E |
| Gray wolf* (*Canis lupus)* | E | E |

1 Federal Status (USFWS): E listed as endangered, those species likely to become extinct within the foreseeable future; T—listed threatened, those species likely to become endangered within the foreseeable future; SC—species of concern, formerly Category 2 candidate for listing, species needs additional information to support a proposal to list as threatened or endangered; not protected under the ESA; C—candidate for listing.

[1] WDFW Status: E-listed endangered; T-listed threatened; S-listed sensitive; C-candidate for listing as endangered, threatened, or sensitive; M-monitor species.

* Indicates that species is also a state priority species.

\# Currently being reviewed for removal from WDFW PHS list (pers. comm., N. Nordstrom, PHS Program, WDFW, Olympia, Washington, February 4, 1999).

Sources: Letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999; letter from N. Golman, Supervisor, USFWS, Lacey, Washington, February 4, 1999; and Rodrick and Milner 1991.

Of the 26 TES species documented or potentially occurring in or near the study area, 15 were observed during 1996-1998 field studies, including 6 amphibians, 8 birds, and 1 mammal (Table 5.1-18). Information on each of the TES species known to occur in the study area or potentially occurring is summarized below. It should be noted that the lack of observations does not necessarily indicate species absence from the study area. The locations of TES species and WDFW priority species observed in the study area are shown on Figure 5.1-6. This figure also includes records from the WDFW PHS database for the study area (letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999).

**Table 5.1-18. TES species observations by habitat.**

| Species | Habitat Types[1] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **LPP** | **M** | **MD** | **MS** | **MX** | **OG** | **P** | **RP/ RI** | **RE/ SL** | **SH** | **SS** | **UD** | **WL** | **DST** | **RO/ CA** |
| Red-legged frog | | | | | | X | | X | | | | | X | | |
| Tailed frog | | | | | | | | X | | | | | | | |
| Cascade torrent salamander | | | | | | | | X | | | | X | | | |
| Cope's giant salamander | | | | | | | | X | | | | | | | |
| Larch Mountain salamander | | | | | | | | | | | | | | | X |
| Van Dyke's salamander | | | | | | | | | | | | | | | X |
| Common loon | | | | | | | | | X | | | | | | |
| Great blue heron | | | | | | | | X | X | | | | X | | |
| Bald eagle[2] | X | | | | | 1/X | X | X | X | | | | X | | |
| Osprey[2] | X | X | | X | | X | X | X | 1/X | | | 1/X | X | | |
| Northern spotted owl | | X | | | | | | | | | | | | | |
| Pileated woodpecker | X | | X | | | X | X | X | X | | X | X | X | | |
| Vaux's swift | | | | | | | | | | | | | X | X | |
| Olive-sided flycatcher | | | X | | | | | | | | | | | | |
| Pacific western big-eared bat | | | | | | | | | | | | | | | X |

1 Habitat types: LPP-lodgepole pine, M-mature conifer, MD-meadow, MS-mid-successional conifer forest, MX-mixed conifer/deciduous forest, OG-old growth forest, P-pole conifer forest, RP/RI-riparian deciduous forest/riverine/stream, RE/SL-reservoir/shoreline, SH-shrub, SS-seedling/sapling, UD-upland deciduous, WL-wetland, DST-disturbed, RO/CA-rock/cave.
[2] Numbers indicate habitats with occupied nests in 1996 and 1997; X indicate species was observed flying over or perched in habitat.

## Federally Listed Species

Two federally listed species—the bald eagle and the spotted owl—were documented in the study area during the 1996-1998 field studies; the peregrine falcon was last observed in 1994. There were no observations of wolves during the 1996-1998 field studies and the WDFW PHS has no records for this species in or near the study area. Overall, it is

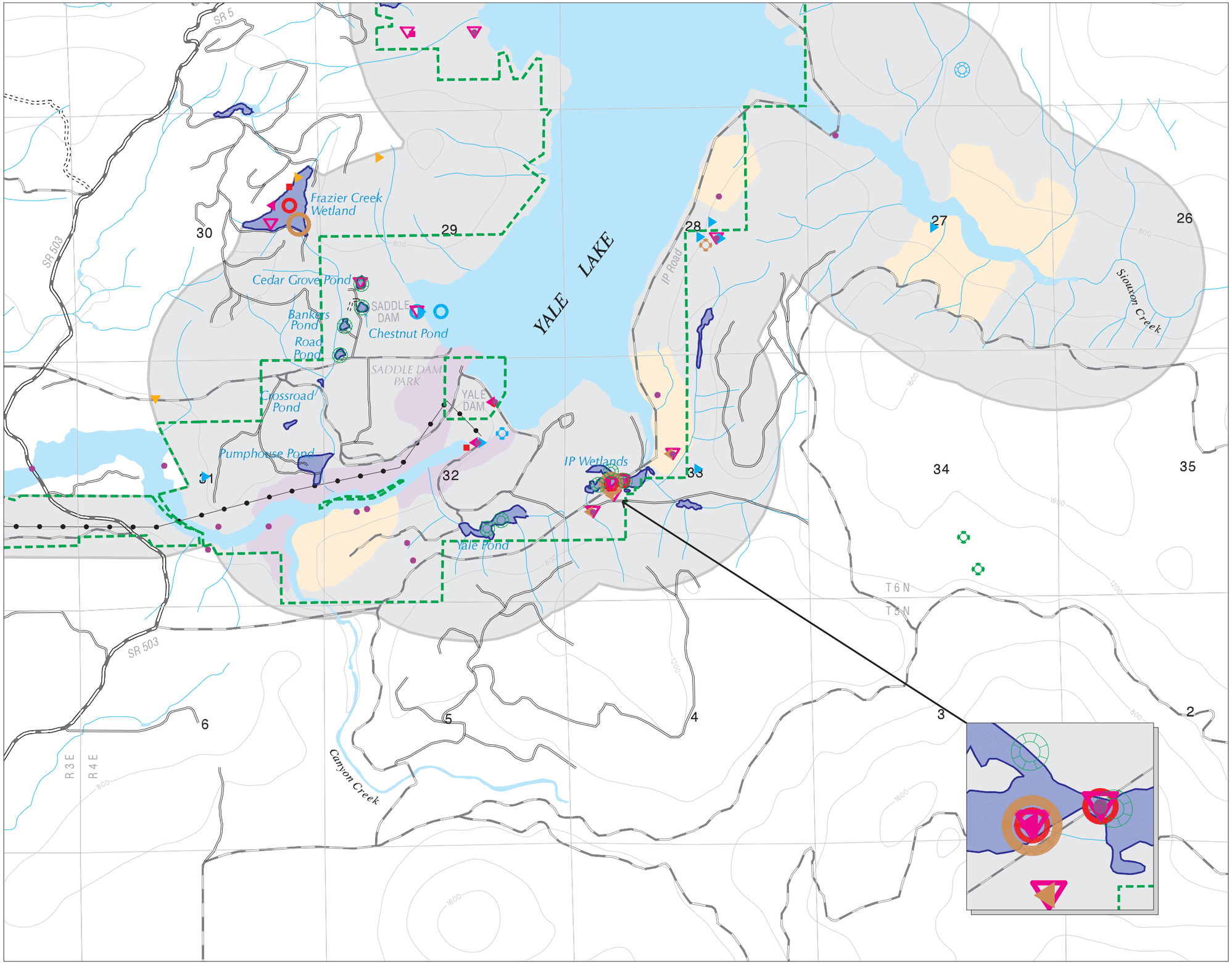
unlikely that the Lewis River valley provides the isolation from human activity that the wolf needs for long-term survival.

Bald Eagle - Results of the 1996-1998 studies and ongoing survey efforts by PacifiCorp indicate that bald eagles use portions of the study area year-round for breeding, foraging, perching, and roosting. Bald eagles were regularly observed flying over the reservoir or perched in trees along the shorelines below Yale Dam and at the upstream end of Yale Lake. In June 1996, an active bald eagle nest along the east side of Yale Lake was identified. This new nest was located just upslope from a nest site that had been used from 1993 through 1995. The Yale nest successfully fledged young in both 1996 and 1997—1 each year. Winter use of the study area by bald eagles was documented by helicopter surveys; 45 were observed in February 1996, 14 in March 1997, and 6 in March 1998 (Table 5.1-19). Eagles were also observed foraging for fish in Yale Lake during the winter when the reservoir level was low. Roost sites and known regular concentration areas are shown on Figure 5.1-6.

**Table 5.1-19. Summary of bald eagle observations during 1996-1997 winter helicopter surveys.**

| Segment of Study Area | 1996 Survey | 1997 Survey | 1998 Survey |
|---|---|---|---|
| SR 503 Bridge to downstream face of Yale Dam | 10 total: 3 adults perched, 2 adults and 5 subadults flying | 1 total: 1 subadult flying | 2 total: 1 subadult and 1 adult perched |
| Yale Dam | 23 total: 15 adults and 8 subadults flying | 6 total: 4 adults and 2 subadults perched | --- |
| Yale Lake | 4 total: 4 adults perched | 1 total: 1 adult perched | 3 subadults perched |
| Swift Dam to Yale Lake | 8 total: 5 adults and 3 subadults perched | 6 total: 1 adult and 2 subadults perched, 1 adult and 2 subadults flying | 1 adult perched |
| Total | 45 total: 29 adults, 16 subadults | 14 total: 7 adults and 7 subadults | 6 total: 2 adults and 4 subadults |

Spotted Owl - According to records from the WDFW PHS, nearly all lands within the study area for the Yale Project are within 1.8 miles of known spotted owl activity centers (letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999). However, no activity centers have been identified within the study area, most likely due to the lack of old-growth and mature forest. Protocol surveys were not conducted for the following reasons: (1) resource agencies had indicated that PHS and DNR data would be sufficient to identify spotted owl nesting habitat, (2) DNR conducts spotted owl surveys on Siouxon Ridge, and (3) very little old-growth or mature conifer occurs on PacifiCorp land. During a seasonal wildlife survey conducted in June 1996 (see PacifiCorp 1997 and 1998b for methods), 1 spotted owl was observed in a stand of old-growth conifer in the northeastern portion of the study area, on USFS land just off USFS Road 90 (Figure 5.1-6). The owl was not resighted on a follow-up visit to the stand with mice or on subsequent seasonal surveys.




## Legend

- Wetlands

**TES Wildlife Observations** [1,2]

- Common Loon+
- Bald Eagle+
- Osprey
- Northern Spotted Owl+
- Pileated Woodpecker+
- Vaux`s Swift+
- Olive-sided Flycatcher
- Great Blue Heron+
- Cascade Torrent Salamander+
- Larch Mountain Salamander+
- Van Dyke`s Salamander+
- Red-legged Frog
- Tailed Frog
- Cope`s Giant Salamander
- Pacific Western Big-Eared Bat

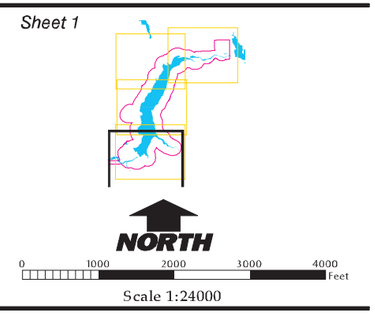
**Priority Species Observations** [1,3]

- Bufflehead
- Hooded Merganser
- Wood Duck
- Band-tailed Pigeon
- Turkey
- Blue Grouse
- Mink

**Bald Eagle Areas**

- Communal Roost Area
- Regular Concentration Area
- PacifiCorp Ownership

[1] Includes data from the WDFW PHS as well as 1996-1998 field observations
[2] Most TES species are also WDFW priority species, indicated by +
[3] WDFW priority species that are not also TES; observations of deer and elk were not mapped




Scale 1:24000

# Yale Hydroelectric Project

## Figure 5.1-6 (1 of 4) TES and Priority Species Observations


Created by VESTRA Resources for PacifiCorp
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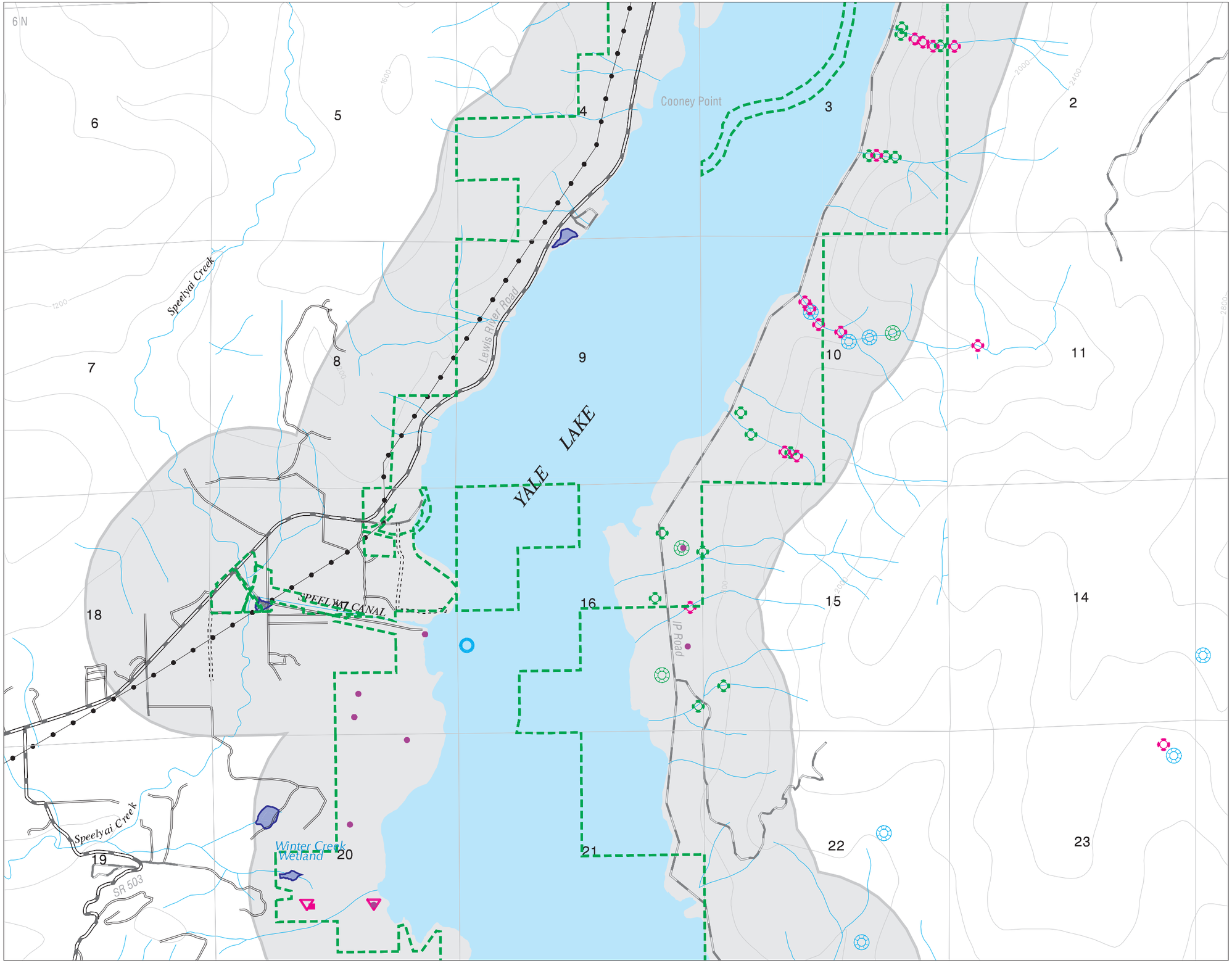
April 06, 1999




## Legend

Wetlands

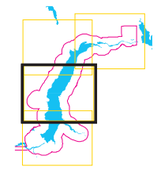
TES Wildlife Observations [1,2]
- Common Loon+
- Bald Eagle+
- Osprey
- Northern Spotted Owl+
- Pileated Woodpecker+
- Vaux`s Swift+
- Olive-sided Flycatcher
- Great Blue Heron+
- Cascade Torrent Salamander+
- Larch Mountain Salamander+
- Van Dyke`s Salamander+
- Red-legged Frog
- Tailed Frog
- Cope`s Giant Salamander
- Pacific Western Big-Eared Bat

Priority Species Observations [1,3]
- Bufflehead
- Hooded Merganser
- Wood Duck
- Band-tailed Pigeon
- Turkey
- Blue Grouse
- Mink

Bald Eagle Areas
- Communal Roost Area
- Regular Concentration Area
- PacifiCorp Ownership

[1] Includes data from the WDFW PHS as well as 1996-1998 field observations
[2] Most TES species are also WDFW priority species, indicated by +
[3] WDFW priority species that are not also TES; observations of deer and elk were not mapped

Sheet 2



NORTH

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# Yale Hydroelectric Project

## Figure 5.1-6 (2 of 4) TES and Priority Species Observations


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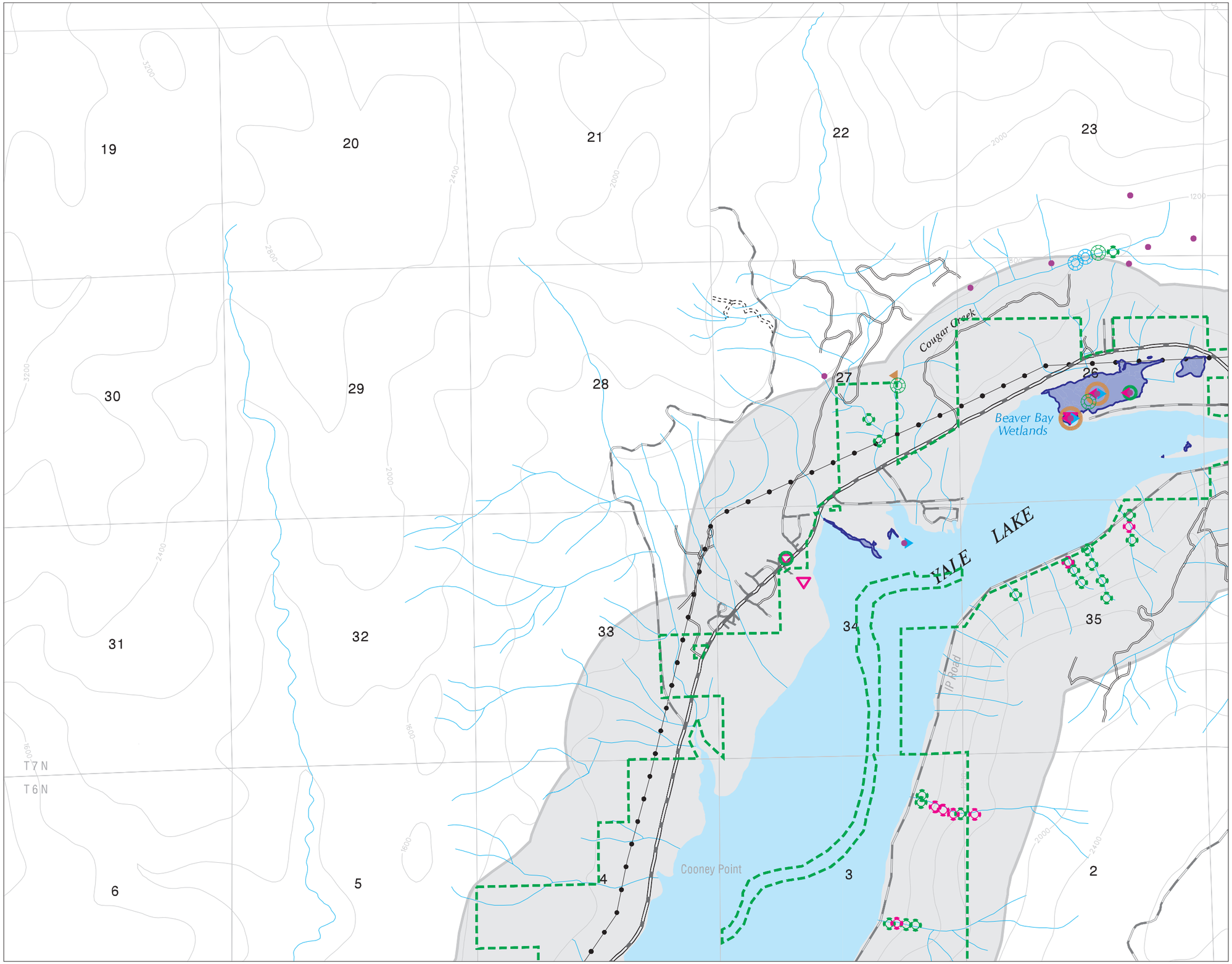
April 06, 1999




## Legend

- Wetlands

**TES Wildlife Observations** [1,2]

- Common Loon+
- Bald Eagle+
- Osprey
- Northern Spotted Owl+
- Pileated Woodpecker+
- Vaux`s Swift+
- Olive-sided Flycatcher
- Great Blue Heron+
- Cascade Torrent Salamander+
- Larch Mountain Salamander+
- Van Dyke`s Salamander+
- Red-legged Frog
- Tailed Frog
- Cope`s Giant Salamander
- Pacific Western Big-Eared Bat

**Priority Species Observations** [1,3]

- Bufflehead
- Hooded Merganser
- Wood Duck
- Band-tailed Pigeon
- Turkey
- Blue Grouse
- Mink

**Bald Eagle Areas**

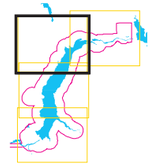
- Communal Roost Area
- Regular Concentration Area
- PacifiCorp Ownership

[1] Includes data from the WDFW PHS as well as 1996-1998 field observations

[2] Most TES species are also WDFW priority species, indicated by +

[3] WDFW priority species that are not also TES; observations of deer and elk were not mapped

Sheet 3



NORTH

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Scale 1:24000

# Yale Hydroelectric Project

## Figure 5.1-6 (3 of 4) TES and Priority Species Observations



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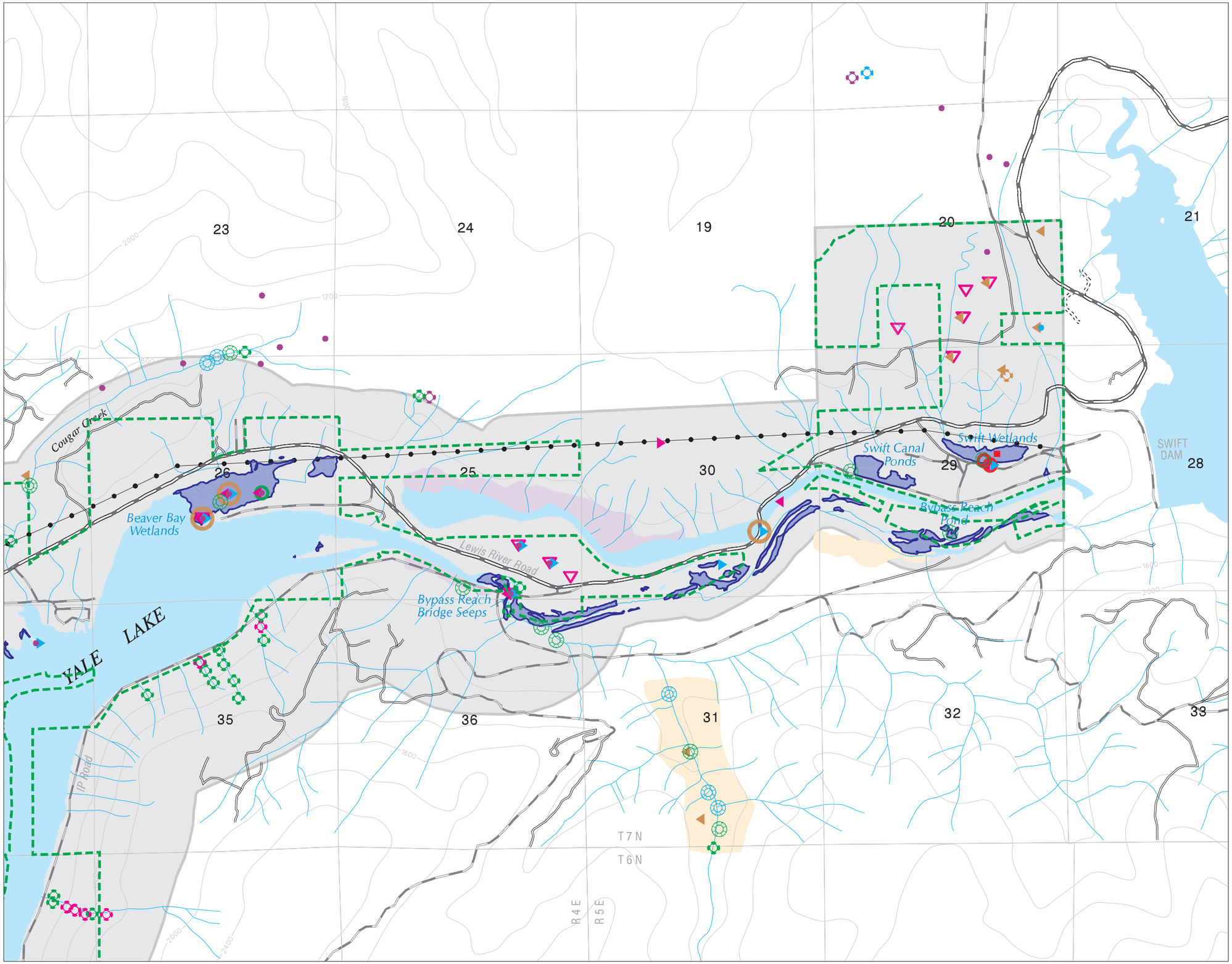



## Legend

Wetlands

**TES Wildlife Observations** [1,2]

- Common Loon+
- Bald Eagle+
- Osprey
- Northern Spotted Owl+
- Pileated Woodpecker+
- Vaux`s Swift+
- Olive-sided Flycatcher
- Great Blue Heron+
- Cascade Torrent Salamander+
- Larch Mountain Salamander+
- Van Dyke`s Salamander+
- Red-legged Frog
- Tailed Frog
- Cope`s Giant Salamander
- Pacific Western Big-Eared Bat

**Priority Species Observations** [1,3]

- Bufflehead
- Hooded Merganser
- Wood Duck
- Band-tailed Pigeon
- Turkey
- Blue Grouse
- Mink

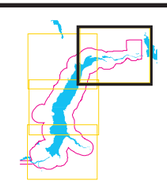
**Bald Eagle Areas**

- Communal Roost Area
- Regular Concentration Area
- PacifiCorp Ownership

[1] Includes data from the WDFW PHS as well as 1996-1998 field observations

[2] Most TES species are also WDFW priority species, indicated by +

[3] WDFW priority species that are not also TES; observations of deer and elk were not mapped

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# Yale Hydroelectric Project

## Figure 5.1-6 (4 of 4) TES and Priority Species Observations



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April 06, 1999

Peregrine Falcon - No peregrine falcons were observed during the 1996-1998 field surveys, nor are there any WDFW PHS records for this species in the study area or in the Lewis River drainage. However, biologists inventorying the study area wetlands in 1994 reported seeing a peregrine falcon flying over the bypass reach (Dueker and Paz 1995). Although the project vicinity lacks cliffs suitable for nesting use by peregrine falcons, study area wetlands represent potential foraging sites. This species can be fairly wide-ranging, particularly in the winter, and occasional observations in the study area would not be unusual. The breeding population of peregrine falcons also seems to be expanding in Pacific Northwest and it is possible that a new territory could be established in the Lewis River Valley if suitable habitat exists.

Federal Candidate Species

The Oregon spotted frog is the only candidate for federal listing as threatened or endangered. This species is thought to be nearly extirpated from western Washington (Leonard et al. 1993). It is unlikely that this species occurs in the study area due to the presence of bullfrogs in suitable wetlands and the lack of non-woody wetland communities.

Federal Species of Concern

Fourteen taxa designated as species of concern by the USFWS potentially occur in the study area for the Yale Project; of these, 10 also have state status. Of the 4 species with no state status, only 2—the red-legged frog and olive-sided flycatcher—were documented in the study area during 1996-1998 field surveys. There were no observations of the 2 other species of concern with no state status—the Cascades frog and harlequin duck—that potentially occur in the study area. The WDFW PHS has no records for either of these 2 species in the immediate project vicinity but has documented occurrences of both in the upper Lewis River watershed. The Cascades frog rarely occurs at elevations below 2,000 feet (Leonard et al. 1993) and it is unlikely that they are present in the study area. Siouxon and Cougar creeks may provide suitable habitat for the harlequin duck.

Red-legged Frog - The red-legged frog was observed to be a common breeding species in the study area. During the March 1997 egg mass surveys, large numbers of red-legged frog egg masses or tadpoles were observed in 11 separate locations: (1) Swift wetlands, (2) Beaver Bay wetland, (3) IP wetlands, (4) Swift canal ponds, (5) Swift bypass reach pond, (6) Yale ponds, (7) Chestnut pond, (8) Road pond, (9) Bankers pond, (10) an ephemeral pond on a jeep trail off the IP Road, and (11) lower Cougar Creek beaver pond (incidental observation) (Tables 5.1-10, 5.1-11, and 5.1-12; Figure 5.1-6). Adult and juvenile red-legged frogs were seen in the Swift bypass reach floodplain, along Ole Creek, near Winter Creek (south of Speelyai Canal), along lower Cougar Creek, along IP-7, near IP-9, and in an old-growth stand near the gate at the north end of the IP Road. It is likely that forested habitats in the vicinity of the 11 documented breeding sites in the study area are used by adult and juvenile frogs for foraging and cover outside of the breeding season.

Olive-sided Flycatcher - The olive-side flycatcher was recorded once during the 1996-1998 field surveys. The 1 individual observed was perched in an alder tree at the edge of a wet meadow on the west side of Yale Lake. The WDFW PHS has no records of this species because it is not state listed or a priority species. The Washington gap analysis has records of possible breeding evidence for the olive-sided flycatcher both the north and south of the study area, but not within the Lewis River drainage; core habitat for this species exists in forested areas throughout western Washington (Smith et al. 1997).

State Listed Species

The Larch Mountain salamander, northwestern pond turtle, and fisher are the only state-listed species potentially occurring in the study area that are not also federally listed.

Larch Mountain salamander - Of 25 sites specifically surveyed for TES salamanders, the Larch Mountain salamander was found at only 1—on the downstream face of Yale Dam, near the base of the adjacent north-facing cliff (Figure 5.1-6; Table 5.1-18). In total, 4 adults and 1 juvenile were found at this site on April 28, 1997; identification was confirmed by C. Crisafulli, USFS ecologist and salamander expert. Factors responsible for the occurrence of the Larch Mountain salamander on Yale Dam most likely include the following: (1) the age (44 years) and rock structure of the dam; (2) the presence of adjacent refugia habitat (the cliff/talus); and (3) nearly continual shade, which is provided by the adjacent canyon walls and keeps the site cool and moist.

The WDFW PHS database has records of Larch Mountain salamanders at 1 additional site in the study area—Moss Cave—which is along the ROW for the Swift No. 1- Swift No. 2 transmission line. No surveys were conducted at this site since it is also used by a colony of Pacific western big-eared bats.

Northwestern Pond Turtle - There were no observations of the northwestern pond turtle during 1996-1998 field surveys in apparently suitable habitat, and the WDFW PHS has no records for this species in or near the study area. The study area is below the 500-foot elevation reported to be the upper limit of the northwestern pond turtle in Washington (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, November 17, 1998), and the larger ponds associated with the Swift, IP, and Frazier Creek wetlands appear to have suitable habitat for this species. The ponds in the study area may be too cool for northwestern pond turtles; the presence of bullfrogs or other predators may also be a factor.

Fisher - There were no observations of fisher or their sign during 1996-1998 field surveys, and the WDFW PHS has no records for this species in or near the Yale Lake study area. The fisher is thought to be nearly extirpated from western Washington (Lewis and Stinson 1998). This species is not likely to occur in the study area because of the lack of large patches of mature and old-growth conifer forests.

State Candidate Species

Of the 8 candidate species for state listing potentially occurring in the study area, 6—the Cascade torrent salamander, Van Dyke's salamander, common loon, pileated woodpecker, Vaux's swift, and Pacific western big-eared bat—were documented during the 1996-1998 field surveys. The 2 candidate species not observed—the wolverine and northern goshawk—could occur in suitable habitat in or near the study area. The WDFW PHS database has a single record of a wolverine observation south of the study area along Canyon Creek from 1973 (letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999). This species, however, occurs at very low densities in Washington and the most suitable habitat in the Lewis River drainage occurs upstream of the Yale Project (Johnson and Cassidy 1997). The WDFW PHS database records for 1996, but not 1999, listed an unconfirmed observation of a northern goshawk considerably outside the study area, west of Cougar Creek (letter from L. Adkins, Cartographer, WDFW, Olympia, Washington, October 18, 1996; letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999). The goshawk may occur in mature and old-growth forest habitat in the study area. Each of the 6 species recorded in the study area is described below.

Cascade Torrent Salamander - Next to western red-backed salamanders, Cascade torrent salamanders were the most commonly observed amphibian in the study area. During 1996 and 1997, a total of 469 observations of this species were made in or along 14 streams and 2 seep/talus slope sites in the study area (Tables 5.1-10 and 5.1-11; Figure 5.1-6). Cascade torrent salamanders were particularly common along the IP streams that had steep gradients, bedrock substrate, waterfalls, and seeps. The only IP stream where Cascade torrent salamanders were not found was IP-13, which has a lower gradient and cobble substrate. Severely eroded segments of streams (e.g., lower IP-11 and upper Panamaker) did not have any torrent salamanders. In addition to being common along the IP streams, Cascade torrent salamanders were found along lower and upper Cougar Creek, Panamaker Creek, and Ole Creek. The greatest density was associated with the seep/talus near the bypass reach bridge.

Van Dyke's Salamander - Van Dyke's salamander was found at only 1 of the 25 sites surveyed for TES salamanders—a south-facing talus slope at the edge of the old lava flow just north of Swift No. 2 Canal (Figure 5.1-6). On November 3, 1997, 1 adult and 1 juvenile were found less than 5 feet apart at the base of a cliff. The adult was under a 12-inch, moss-covered rock; the juvenile was on the surface of a moss-covered rock. Both were approximately 50 feet from a subterranean creek that flowed under the talus. Identification was confirmed by a USFS biologist (pers. comm., V. Marable, Wildlife Biologist, USFS, Mount St. Helens Ranger District, Amboy, Washington, November 4, 1997). Other species found in the immediate vicinity of the Van Dyke's salamanders included western red-backed salamanders and Cascade torrent salamanders (near a seep).

Common Loon - The common loon was observed on Yale Lake several times during the 1996-1998 studies. Individual birds were noted near the confluence of Speelyai Canal with Yale Lake in May 1996 and near Yale Dam in May-June 1997. It is likely that these

individuals were non-breeding adults since Yale Lake lacks the aquatic vegetation and shallow water habitat used by this species for nesting. Smith et al. (1997) reports no confirmed or possible breeding evidence anywhere in southwestern Washington.

Pileated Woodpecker - The pileated woodpecker was recorded over 30 times in the study area during the 1996-1998 field surveys. This species was observed either in or flying over nearly all habitat types but was most frequently noted in upland deciduous forests and in 2 wetlands—Frazier Creek and Beaver Bay—which both have substantial numbers of snags. All observations were during the breeding season. Overall, the study area appears to provide suitable foraging and nesting habitat for the pileated woodpecker; even the early successional stands typically have at least a few large snags and trees (see Section 5.1.1). Nesting habitat is probably more limited than foraging habitat.

Vaux's Swift - The Vaux's swift was documented twice in the study area during the 1996-1998 field surveys. Both were incidental observations made during the breeding season and consisted of a few birds in flight; 1 occurred in wetland habitat and the other in the town of Cougar. Snags in wetlands and in mixed, mid-successional, mature, and old-growth forest stands in the study area may be used for nesting by this species; the reservoir and wetlands would provide nearby foraging habitat.

Pacific Western Big-eared Bat - Records from the USFS indicate use of Moss Cave near the Swift No. 1- Swift No. 2 transmission line by Pacific western big-eared bats since the mid-1960s (letter from C. Senger, Biologist, Western Washington University, Bellingham, Washington, July 1990). The cave appears to be used as a nursery colony, hiberaculum, and communal night roost (letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999). During surveys in 1997 and 1998, 57 and 125 bats, respectively, were counted exiting the cave (memos from M. Garrett, Wildlife Biologist, PacifiCorp, September 10, 1997 and March 16, 1999, Portland, Oregon).

State Monitor Species

Four state monitor species—Cope's giant salamander, tailed frog, great blue heron, and osprey—were observed in the study area during the 1996-1998 studies. The WDFW PHS database has records of long-eared and long-legged myotis in the Lewis River watershed but none in the immediate vicinity of Yale Lake (letter from L. Guggenmos, Cartographer, WDFW, Olympia, Washington, January 25, 1999).

Cope's Giant Salamander - A total of 33 observations of larval/neotenic Cope's giant salamanders were recorded during 1997 amphibian surveys. All observations were along 6 of the IP streams—IP-1, IP-3, IP-5, IP-6, IP-7, and IP-8 (Table 5.1-11, Figure 5.1-6); the WDFW PHS database had records of Cope's giant salamanders from several of these streams. IP-7 was the only creek in which both Pacific giant and Cope's giant salamanders were both observed.

Tailed Frog - Tailed frogs were observed at 3 locations in the study area during 1996-1998 surveys—Swift bypass reach, Ole Creek, and IP-7 (Figure 5.1-6). IP-7, the largest

of the IP streams, had larvae, juveniles, and adults; only larvae were noted in the other 2 streams. The WDFW PHS database also had several observations of tailed frogs in the upper reaches of several of the IP streams. Several larvae were found attached to rocks in the bypass reach during 1996 electroshocking surveys.

Great Blue Heron - Great blue herons were commonly observed during the 1996-1998 field surveys, but no nesting colonies were located in the study area. During the spring and summer seasonal surveys 1 or 2 individual herons were typically recorded in Beaver Bay, Frazier Creek, and Swift wetlands and along Yale Lake (see Table 5.1-14). Fifteen great blue herons were observed along Yale Lake during a survey in fall 1997. It is likely that this species nests somewhere in the Lewis River Valley near the Yale study area.

Osprey - Osprey were commonly observed during the 1996-1998 surveys, generally flying over Yale Lake. The June 1996 helicopter survey located 5 osprey nests, 3 active and 2 inactive, along the Lewis River between Yale Dam and the SR 503 bridge. Two occupied osprey territories were observed along Yale Lake—1 near the dam and 1 on Siouxon Flats (Table 5.1-20). Only the Siouxon Flats site was active; this nest produced 3 young and the adults were frequently observed flying over the lake during the spring and summer. Of the 6 osprey nests along Cougar Creek, only 2 were active (Table 5.1-20). The June 1997 helicopter survey located 2 active osprey nest sites along Yale Lake and 3 along Cougar Creek (Table 5.1-20). WDFW is currently considering the removal of osprey from the Priority species list (pers. comm., N. Nordstrom, PHS Program, WDFW, Olympia, Washington, February 4, 1999).

**Table 5.1-20. Summary of osprey nesting activity in and near the study area for the Yale Hydroelectric Project.**

| 1996 Survey | | 1997 Survey | |
|---|---|---|---|
| **Occupied/Active Sites** | **Inactive Sites** | **Occupied/Active Sites** | **Inactive Sites** |
| Yale Dam: site occupied but nest empty | Siouxon Creek | Yale Dam: 1 adult brooding | Siouxon Creek: not located |
| Siouxon Flats No. 1: 3 young | Cougar Creek No. 1 | Siouxon Flats No. 2: 2 young | Cougar Creek No. 2 |
| Cougar Creek No. 3 | Cougar Creek No. 2 | Cougar Creek No. 1: 1 young | Cougar Creek No. 3 |
| Cougar Creek No. 5: 1 young | Cougar Creek No. 4 | Cougar Creek No. 4: no young | Cougar Creek No. 5 |
| | Cougar Creek No. 6 | Cougar Creek No. 6: 2 young | |

### 5.1.3 Existing Resource Management Plans

The following sections describe the existing federal, state, and local management plans applicable to wildlife and botanical resources in the vicinity of the Yale Project.

#### 5.1.3.1 Federal Management

The management of the bald eagle, northern spotted owl, and peregrine falcon habitat in the project vicinity is partially controlled by the federal recovery plans for these species. On USFS lands, options for spotted owl management are also guided by the Northwest Forest Plan (USFS and BLM 1994). Recovery goals for the bald eagle have been met in the recovery zone that includes the Yale Project (WDFW 1994). Current management objectives for this species include maintaining existing populations, monitoring, and development of site management plans as needed for roost and nest sites (WDFW 1994). Recovery goals for the peregrine falcon have been met throughout its range and the USFWS is considering delisting this species.

Management of the wildlife and botanical resources occurring in the portion of the Mount St. Helens National Volcanic Monument near the Yale Project is covered by the Land and Resource Management Plan for the Gifford Pinchot National Forest (USFS 1990). All wetlands in the project vicinity are also under federal jurisdiction; the U.S. Army Corps of Engineers is responsible for application of federal regulations. The Washington State Department of Ecology (WDOE) has state responsibility for wetlands.

#### 5.1.3.2 State Management

The WDFW is responsible for management of wildlife resources in the project vicinity, although this task is shared with the USFS on federal lands. Currently, the direction of WDFW's management activities in the project vicinity is guided by a program known as the Integrated Landscape Management (ILM) Planning Process for Fish and Wildlife in the Lewis-Kalama River Watershed (WDFW 1998a). The primary goals of the ILM are to: (1) promote close working relationships between landowners and biologists to create realistic plans for the future of fish and wildlife in Washington; and (2) generate land and water decisions that support long-term statewide sustainable populations of fish and wildlife. The focus of ILM is on state priority species and habitats.

The Lewis-Kalama River watershed was selected as the pilot location for the ILM. One of the objectives for selecting this watershed was to provide the WDFW with products that would be useful in negotiating mitigation with PacifiCorp for the original project effects on wildlife (WDFW 1998a). As part of the ILM, the WDFW has prepared watershed plans with population goals and habitat objectives for managing 6 priority wildlife species in the Lewis-Kalama drainage—the bald eagle, spotted owl, Columbia black-tailed deer, elk, Larch Mountain salamander, and Canada goose (for the lower valley only). The plan for deer and elk, for example, states a habitat management goal of 30:70 forage-cover ratio and identifies additional winter range acquisition as a priority. Watershed plans for 4 of the 8 priority habitats—caves, riparian, snag, and instream habitats—in the Lewis River drainage have been completed; the other 4 are in progress. A draft watershed plan for caves has recently been completed.

In addition to its role in implementing the ILM in the Lewis River drainage, the WDFW contributed to the DNR's Siouxon Landscape Plan Summary (DNR 1996). This plan establishes management guidelines for the Siouxon landscape area, which includes DNR

lands along the east side of Yale Lake. Guidelines cover a number of terrestrial resources, including riparian areas, wetlands, wildlife reserve trees, raptor corridors, and elk winter range. Raptor corridors include the shorelines of Yale and Swift reservoirs (DNR 1996). The DNR has committed to managing forest cover in elk winter range to provide hiding and thermal cover in over 50 percent of the area. DNR staff coordinate with WDFW biologists through the Habitat Working Group for the Siouxon landscape area (DNR 1996). The entire eastern shoreline of Yale Lake and portions of the adjoining slope are classified as a raptor management area (DNR 1996). This area supports breeding pairs of ospreys and bald eagles (see Section 5.1.2.5).

The DNR regulates forest practices on private and state land in the project vicinity. The DNR manages lands on Siouxon Ridge and to the southeast of Yale Lake. Forestry on state land must adhere to the DNR Final Habitat Conservation Plan (HCP) for lands within the range of the northern spotted owl (DNR 1997). On state land, the DNR applies buffers ranging from an average of 160 feet on Type 1 waters to 100 feet on Type 4 waters; for Type 5 waters, a buffer is applied to protect channels and unstable ground. Under Policy No. 20 of the Forest Resource Plan (DNR 1992), Type 5 waters are protected when necessary for water quality, fisheries habitat, stream banks, wildlife, and other important elements of the aquatic system. Wetlands 0.25 acre or larger on private land are protected by a buffer. Wetlands from 0.25 to 1 acre receive a 100-foot wide buffer. Wetlands larger than 1 acre receive a buffer width approximately equal to the site potential height of trees in a mature conifer stand or 100 feet, whichever is greater.

On private land, forest practices are regulated by the Washington Forest Practices Rules and Regulations, Title 222 WAC (Washington Forest Practices Board 1997). These regulations require buffers of between 25 feet on small Type 3 waters and 100 feet on Types 1 and 2 waters. On Type 4 waters, trees are to be left where such practices are necessary to protect public resources. At least 25 conifer or deciduous trees, 6 inches in diameter or larger, must be left on each side of every 1,000 feet of stream length within 25 feet of the stream. No provisions are made for Type 5 waters. In forested wetlands, logging is only permitted using low impact harvest systems. Wetland Management Zones (WMZ) are established around non-forested wetlands greater than 0.5 acre on private land. The WMZs range from 25 to 100 feet.

#### 5.1.3.3 County Management

The Growth Management Act (GMA) requires that counties over a certain population size prepare a comprehensive plan and classify, designate, and regulate their natural resources and critical areas. Of the 3 counties in the Lewis River valley, only Clark County is required by the GMA to develop a comprehensive plan. At this time, Clark County has not inventoried many of it resources or critical areas (WDFW 1994).

### 5.1.4 Existing Measures

Over the course of the last several years PacifiCorp has implemented several measures to identify and protect terrestrial resources associated with the Yale Project. These measures are described below.

#### 5.1.4.1 Land Management/Wildlife Surveys

PacifiCorp has inventoried the forest and wetland resources on the 3,300 acres of land in their ownership that surround the Yale Project, including land associated with the Swift No. 1 Project. Although no terrestrial resource mitigation was stipulated in the existing license for the project, PacifiCorp has limited forest management activities on its land pending development of a Wildlife Habitat Management Plan. In addition, PacifiCorp conducts annual surveys for nesting and wintering bald eagles and nesting ospreys in the project vicinity and provides this information to the WDFW. Data on priority and TES species collected during the 1996-1998 relicensing studies was also provided to the WDFW, WNHP, and Washington State Gap Analysis Project.

A portion of PacifiCorp's land in the vicinity of Yale Dam is managed for wildlife as part of the Merwin Wildlife Habitat Management Program (MWHMP). Management practices for lands in this program focus on wildlife and are defined in a Standard Operating Procedures manual prepared by PacifiCorp and accepted by the WDFW (PacifiCorp 1990).

#### 5.1.4.2 Moss Cave Protection

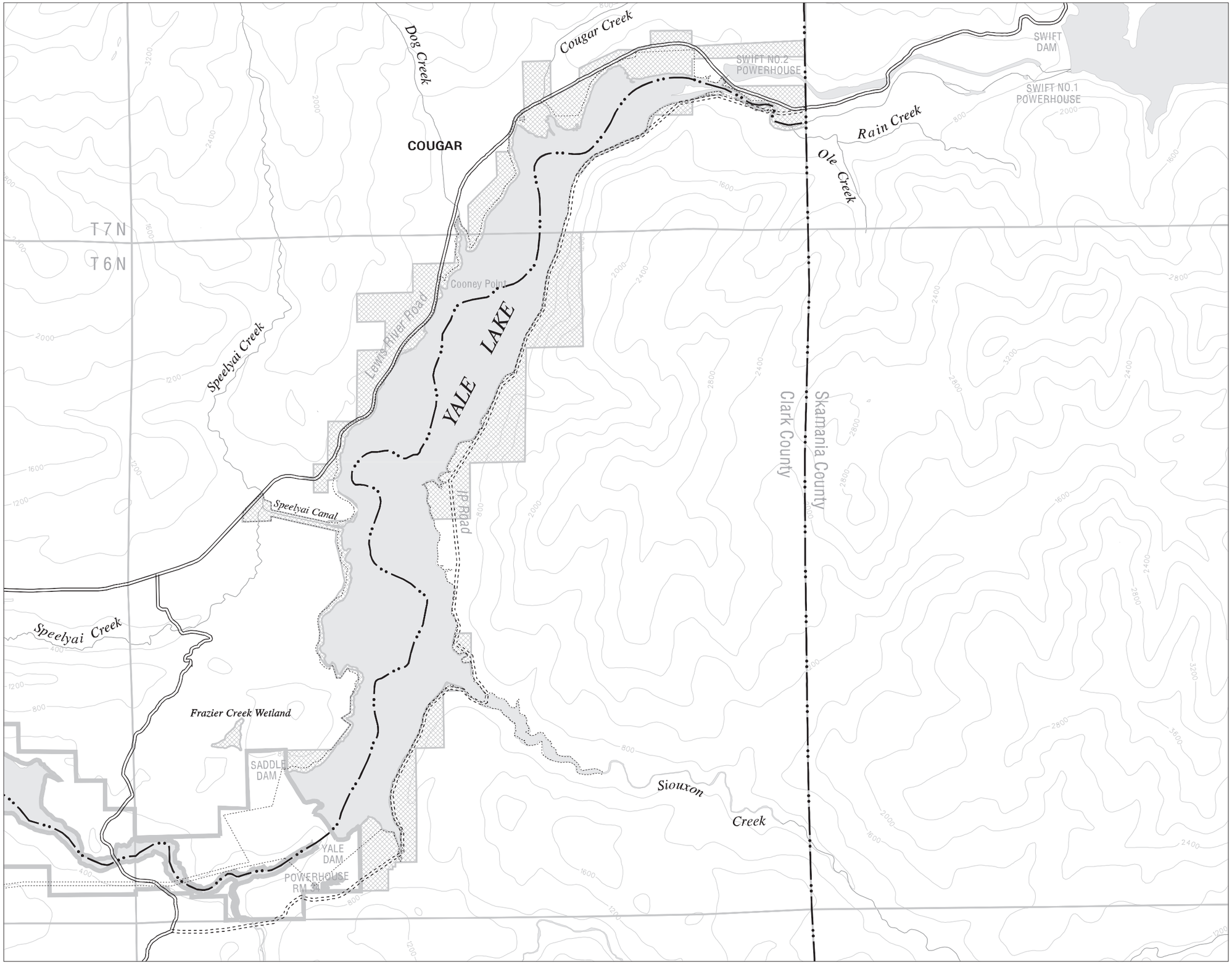
The USFS and PacifiCorp take joint responsibility for ensuring that gates on access roads to the Moss Cave are closed (letter from A. Prucell, Wildlife Biologist, USFS, Mount St. Helens National Monument, Amboy, Washington, July 29, 1985). In 1985, PacifiCorp also agreed to schedule ROW maintenance activities near the cave before May 15 or after September 15 to avoid disturbing the Pacific western big-eared bats that use this cave for a nursery colony (memo from S. Wilder, Biologist, PacifiCorp, Portland, Oregon, July 29, 1985). In 1997, PacifiCorp worked with the USFS, The Nature Conservancy, and the property owner to install a gate at the cave entrance (letter from S. Wilder, Biologist, PacifiCorp, Portland, Oregon, December 17, 1996).

#### 5.1.4.3 Wetland Management

PacifiCorp maintains water control structures at the Swift and Frazier Creek wetlands to ensure stable water levels in the event of beaver dam failure. PacifiCorp maintains a 100-foot buffer around Frazier Creek wetland and 150-foot buffers around all other wetlands on their lands. At Beaver Bay, PacifiCorp manages the campground to minimize impacts to the adjacent wetland habitat.

### 5.2 PROPOSED ENHANCEMENT MEASURES

PacifiCorp proposes to develop and implement a Wildlife Habitat Management Plan similar to the ongoing Merwin Project program. The purpose of the plan will be to guide the management, protection, and enhancement of wildlife habitat near the Yale Project. The management plan will be applied to approximately 2,045 acres of PacifiCorp-owned property along Yale Lake, between Yale Dam and the Swift bypass reach (Figure 5.2-1). The boundaries for lands to be included in the plan are tentative and may be adjusted based on further discussions with WDFW and other stakeholders. In addition, PacifiCorp




## Legend

- Proposed Yale Wildlife Habitat Management Plan
- Merwin Wildlife Habitat Management Area
- County Line
- Township/Range Line
- FERC Project Boundary

**HYDROGRAPHY**

- Waterbody
- Stream

**TRANSPORTATION**

- Primary Road
- Secondary Road

NORTH

0 1 2 Miles

Scale 1:52000

# Yale Hydroelectric Project

## Figure 5.2-1 Wildlife Habitat Management Lands



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February 24, 1999

will also continue to manage the 5,600-acre Merwin Wildlife Habitat Management Area (MWHMA) located immediately downstream of the Yale Project.

PacifiCorp has begun discussions with the resource agencies and other interested parties regarding additional lands to complement the existing 2,045 acres proposed for inclusion in the Yale Wildlife Habitat Management Plan. Lands targeted in these discussions will likely be those that provide habitat for PHS species or habitat that complements management objectives and priorities of the stakeholders.

The ultimate goal is to provide for the adequate and equitable protection and enhancement of terrestrial resources in the entire Lewis River basin, as defined by a settlement agreement for relicensing all PacifiCorp's Lewis River projects. These lands would be managed under a comprehensive Lewis River Wildlife Habitat Management Plan. This plan would incorporate the Yale and Merwin Wildlife Habitat Management Plans and would cover lands owned by PacifiCorp for terrestrial resource conservation.

Management activities on PacifiCorp lands near Yale Lake will focus on protecting or enhancing selected habitats. The Yale Wildlife Habitat Management Plan will be developed cooperatively with the resource agencies in 1999 and 2000 and will involve the following steps:

1. Select appropriate habitat management goals.

2. Determine quantifiable methods for assessing baseline habitat conditions.

3. Collect data on current habitat conditions for target species to use as a baseline.

4. Identify and implement appropriate habitat management measures based on the baseline and desired conditions.

5. Monitor effectiveness and determine if additional or contingency measures are necessary.

These components are briefly described in the following sections.

### 5.2.1 Habitat Management Goals

Overall management goals for the Yale Wildlife Habitat Management Plan will be developed in consultation with the resource agencies. As a starting point, this process will consider the goals included in the WDFW's PHS Program and Lewis River Watershed ILM Plan, the USFS's Mount St. Helens Volcanic National Monument/Gifford Pinchot National Forest Plan, DNR's Siouxon Management Plan, and the Merwin Wildlife Habitat Management Plan. In general, it is expected that goals for the Lewis River basin will focus on big game habitat management and conservation and stewardship of TES species and priority habitats, such as old-growth, snag-rich habitats, wetland/riparian habitat, and caves. For each goal, a set of feasible and measurable objectives will be developed for habitats associated with the Yale Project.

### 5.2.2 Habitat Condition Assessment

Once specific management objectives are defined, appropriate methods for measuring the baseline habitat conditions and monitoring future changes will be developed. Potential approaches currently under consideration include use of the following: (1) detailed vegetation cover type mapping to determine acreage of habitat types, (2) habitat models such as Habitat Suitability Index (HSI) models to objectively assess the quality of habitat for a set of target species, and (3) new and existing data to determine the habitat suitability for selected priority habitats and species. These approaches may require measuring vegetation composition and structure and landscape-level variables to supplement existing data; assessing wetland and stream habitat; documenting TES occurrences and suitable habitat; establishing permanent photo points; and possibly other tools. The target species selected for the Yale Wildlife Habitat Management Plan will be chosen in consultation with the agencies.

### 5.2.3 Baseline Conditions Evaluation

For the purpose of the Yale Lake Wildlife Habitat Management Plan, 1999 conditions will be used as the baseline. The baseline habitat conditions will be evaluated to determine the management activities needed to achieve management objectives. In 1999, PacifiCorp, in cooperation with the agencies, will develop and implement methods to describe existing wildlife habitat on PacifiCorp lands. As other mitigation/enhancement lands are acquired, PacifiCorp will document baseline conditions.

### 5.2.4 Habitat Management Measures

The baseline cover type and habitat data will be analyzed to determine the habitat parameters that need to be enhanced for each target species. State forest practices, WDFW PHS recommendations, ILM action plan recommendations, HSI models, the Merwin Wildlife Habitat Management Plan, and the DNR Habitat Conservation Plan would then be used to guide development of parcel-specific prescriptions for habitat improvement. Implementation would begin in 2001 on lands owned by PacifiCorp and dedicated to wildlife management. In the interim, PacifiCorp would not harvest any timber on the 2,045 acres proposed to be covered by the plan unless mutually agreed to with the resource agencies. The plan would include a variety of habitat protection and enhancement measures that would be organized into the following 4 major sections:

- Conservation and Stewardship of TES Species - At a minimum, measures for protecting and enhancing known and potential populations and habitats of TES species are expected to include the following: (1) continued monitoring to determine annual use of the project vicinity by bald eagles and osprey; (2) development of a nest site management plan for the 1 bald eagle nest site along Yale Lake; (3) management and enhancement of habitat for spotted owls and other raptors, particularly on lands adjacent to DNR's Siouxon Landscape; (4) procedures to determine the potential effects of any proposed recreation developments, new roads, or changes in project operations on TES species; and (5) management of existing

mature and old-growth forest for the purpose of maintaining critical habitat elements, including snag enhancement.

- Protection of Riparian/Wetland Habitat - Measures for protection and enhancement of riparian and wetland habitat in the vicinity of the Yale Project will likely be focused on the 3 large wetlands—Beaver Bay, IP, and Frazier Creek—and riparian areas along tributaries to Yale Lake. Specific measures would include but not be limited to the following: (1) maintenance of the existing water control structure at Frazier Creek wetland; (2) management of the Beaver Bay wetland to minimize encroachment into the buffer or wetland and other disturbances related to the adjacent campground; (3) installation and maintenance of a water control structure at the IP wetland; (4) establishment of hydrophytic shrubs, as appropriate, along selected sections of wetland shoreline; (5) establishment of buffers along riparian and wetland areas in PacifiCorp ownership that meet or exceed State Forest Practices requirements to provide protection from disturbances related to project operations, recreation, or timber harvest; (6) protection of trees and snags in riparian and wetland areas used by raptors; and (7) assessment of the feasibility of revegetating selected portions of the drawdown zone to improve riparian and wetland habitat adjacent to Yale Lake.

- Big Game Habitat Management - All lands covered by the Yale Wildlife Habitat Management Plan would use practices similar to those established for PacifiCorp's Merwin Wildlife Habitat Management Area. The focus of this program would be to establish and maintain a mosaic of habitats that provide cover and forage for big game as well as other species (e.g., neotropical migratory birds). Existing meadows, the Swift-Bonneville Power Administration (BPA) transmission line ROW, and shrublands would be managed to provide permanent forage areas for big game. Selected timber harvest would include clearcutting and thinning of forest areas. Planting and reseeding programs would then be used to create temporary forage areas and promote the establishment of hiding and thermal cover. Snags would be maintained in harvest units or created as necessary to comply with State Forest Practices and safety criteria. In addition, any roads on PacifiCorp property not required for public access would be gated.

- Control of Noxious Weeds and Exotic Wildlife – PacifiCorp would develop and implement a pilot program to control or eradicate noxious or undesirable plant species at selected sites (e.g., reed canary grass in wetlands). The feasibility of eradicating exotic wildlife such as bullfrogs will also be assessed. If such actions are feasible, PacifiCorp would then implement a test study to determine its effectiveness.

### 5.2.5 Monitoring

PacifiCorp would monitor actions implemented as part of the Yale Wildlife Habitat Management Plan to document success of various habitat enhancement measures. The monitoring will occur throughout the new license period at intervals determined through consultation with the resource agencies. Periodic meetings and site visits would be

conducted to discuss monitoring reports and the need to implement contingency measures.

## 5.3 ENHANCEMENT MEASURES NOT INCLUDED IN PACIFICORP'S PROPOSAL

As requested by the resource agencies during Stage 1 consultation, a Wildlife Habitat Management Plan is PacifiCorp's primary proposal for terrestrial resources. The Yale Wildlife Habitat Management Plan will cover 2,045 acres of PacifiCorp property near the Yale Project, as well as additional lands identified in discussions with WDFW. There were no requested enhancement measures that have been excluded from PacifiCorp's proposal.

## 5.4 AGENCY AND TRIBAL CONSULTATION

During Stage 1 and 2 consultation, PacifiCorp consulted with the USFWS, WDFW, USFS, Cowlitz and Yakama tribes, DNR, and WDOE regarding terrestrial resource issues. The WDFW and USFWS were the only agencies to provide specific comments on wildlife and botanical issues and associated relicensing studies. American Rivers also provided comments.

### 5.4.1 Stage 1 Consultation and Stage 2 Consultation Prior to the Draft Application

Agency consultation during Stage 1 consisted primarily of written comments on the FSCD; verbal comments made at the meeting on the FSCD (December 17, 1996) generally reiterated the written ones. Agency consultation during Stage 2 prior to the draft License Application consisted primarily of comments from the WDFW and USFWS on the FTR for Terrestrial Resources (PacifiCorp 1998b). Most of the comments on the FTR were editorial, or requests for clarification or inclusion of additional data. PacifiCorp incorporated the requested changes, as appropriate, to the information on existing resources presented in Section 5.1 and revised the FTR. Agency comments during Stage 1 Consultation and Stage 2 Consultation prior to the draft License Application are presented in Appendix 1.3-1 and are outlined by issue in Sections 5.4.1.1 through 5.4.1.16.

#### 5.4.1.1 Issue: Original Project Impacts

The USFWS stated that PacifiCorp should use the original landscape as baseline conditions to identify the effects of the Yale Project on terrestrial resources and develop "adequate and equitable" protection, mitigation, and enhancement measures, as mandated by the Federal Power Act (FPA) (letter from D. Frederick, Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996).

PacifiCorp did not conduct studies of the original impacts of the project on wildlife because FERC final relicensing rules require the evaluation and mitigation of changes to existing conditions with the project, not speculation on present-day conditions without

the project as baseline (18 CFR Part 16 Section 16.8; 54(105) FR 237775-23776; 55(1) FR 8-9).

5.4.1.2 Issue: Land/Wildlife Management

WDFW stated that they planned to develop a wildlife enhancement proposal separate from PacifiCorp (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996). Both WDFW and USFWS requested that PacifiCorp use the Habitat Evaluation Procedure (HEP) to assess both proposals to compare the benefits of the 2 proposals, project future values under different management scenarios, and monitor results of the selected plan. The USFWS also suggested that PacifiCorp conduct studies to explore potential enhancement or additional protection opportunities for any known threatened, endangered, or candidate (TEC) species (letter from D. Frederick, Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996).

PacifiCorp and the resource agencies are in the process of conducting watershed studies for the North Fork Lewis River basin. The results of these studies will be used to develop a number of terrestrial resource protection and enhancement measures for the basin that will form the basis for a settlement agreement for licensing all 4 hydroelectric projects on the Lewis River. Both the WDFW and USFWS are participants in the watershed studies and will be involved in developing an overall plan for terrestrial resources that will include TEC taxa as well as WDFW priority species. The watershed studies will assess and track the effects of the hydroelectric projects, other activities in the basin, and proposed protection and enhancement measures on wildlife using a number of "analysis species" selected by participants. To ensure that terrestrial resources, including TEC species, associated with the Yale Project are protected during the watershed process, PacifiCorp has agreed to work with the WDFW to develop a Yale Wildlife Habitat Management Plan for the Yale Project that would be implemented in 2001 (see Section 5.2).

5.4.1.3 Issue: Study Area

WDFW requested that PacifiCorp expand the study area for the Yale Project to include the following: (1) lands influenced by the project; (2) lands that influence project resources; (3) lands likely to be recommended for mitigation purposes; (4) the Swift bypass reach and adjacent lands; and (5) Cougar, Speelyai, and Panamaker creek drainages (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996). In its Stage 2 comments, WDFW requested further study area expansion to include: (1) priority habitats that are adjacent to PacifiCorp's ownership; and (2) all high probability habitats for TES species potentially affected by operation activities (i.e., timber harvest, roads, ROW maintenance, recreation) (letter from L. Vigue, Fish and Wildlife Biologist, WDFW, Olympia, Washington, March 12, 1998). Similarly, the USFWS requested that the study area be expanded to include an area jointly determined by PacifiCorp, the WDFW, and the USFWS. At a minimum the USFWS suggested that the study area include the Cougar Creek drainage to the boundary of the Mount St. Helens National Volcanic Monument (letter from D. Frederick,

Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996). In its Stage 2 consultation comments, the USFWS also requested expansion of the primary study area as defined by the watershed studies but stated that this recommendation would be made during the watershed studies process, as appropriate (letter from N. Gloman, Acting Supervisor, USFWS, North Pacific Coast Ecoregion, Lacey, Washington, March 31, 1998). WDFW requested that cumulative impact analysis should include the entire North Fork Lewis River watershed.

The study area for relicensing studies was defined to include all property in the vicinity of the Yale Project owned by PacifiCorp, as well as lands that may be influenced by project operations. PacifiCorp agreed to expand the study area to include the Swift bypass reach; as needed, specific studies were conducted outside the study area in the Cougar, Speelyai, and Panamaker drainages. The study area for the watershed studies and cumulative impact analysis covers the North Fork Lewis River watershed upstream from the confluence of the East Fork. As shown on Figure 5.1-1, the study area does include the abandoned river channel flowing into Yale Lake; lands adjacent to the river channel; portions of Cougar, Speelyai, and Panamaker creek drainages; priority habitats that are adjacent to PacifiCorp's ownership; and all high probability habitats for TES species potentially affected by project-related operations. The study area for Yale relicensing will be part of the study area for the watershed studies and cumulative impact analysis.

5.4.1.4 Issue: The Yale Drawdown Zone

The USFWS requested that PacifiCorp assess the impacts of reservoir inundation and water level fluctuation on wildlife and riparian zones, stating that "the drawdown zone may interfere with the breeding cycles of amphibians and furbearers." In addition, the USFWS recommended that PacifiCorp explore the possibility of establishing vegetation in the inundation zone of the reservoir, and/or constructing strategically placed subimpoundments to maintain the water zone through a longer period to help increase riparian cover and diversity (letter from D. Frederick, Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996).

PacifiCorp agreed to conduct studies to determine the effects of shoreline exposure on wildlife. These studies included evaluating the effects on shoreline wetlands and use of aerial photography to determine the extent of the drawdown area during the winter. In addition, surveys were conducted during the fall and winter to determine wildlife use of the drawdown area. A study plan was provided to the agencies in January 1997; methods and results were also described in the FTR for Terrestrial Resources (PacifiCorp 1998b) and are summarized in Section 5.1. PacifiCorp also investigated methods used by other utilities to reduce the effects of winter drawdowns on wildlife, including vegetation plantings in the drawdown zone (PacifiCorp 1998b).

5.4.1.5 Issue: Study Plans

The WDFW and USFWS requested that PacifiCorp prepare detailed study plans describing the methods to be used to conduct terrestrial resource studies for Yale relicensing. These study plans should include schedules and be submitted for agency

review (letter from D. Frederick, Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996 and letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp believed that the FSCD contained sufficient detail on methods for proposed studies. In addition, detailed descriptions of methods, including any modifications to those outlined in the FSCD, were presented in the ITR (PacifiCorp 1997), which was sent out for agency review in January 1997. PacifiCorp agreed to prepare study plans for any new studies agreed upon during First Stage Consultation. The agencies did not comment on the study plan provided for the reservoir drawdown studies or on the methods described in the ITR (PacifiCorp 1997) or FTR (PacifiCorp 1998b).

5.4.1.6 Issue: Cover Type Classification and Mapping

In their review of the cover type mapping study proposed in FSCD, WDFW requested that PacifiCorp incorporate the following recommendations: (1) group upland forest types by average dbh in addition to existing age class groupings; (2) classify seasonally flooded, unvegetated reservoir shoreline separately from wetland or riparian habitat to recognize that this type doesn't provide wildlife habitat; and (3) transfer cover type polygons from aerial photos using orthorectification rather than a zoom stereo transfer scope (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp agreed to add information on average dbh to the description of each upland forest type (see Section 5.1.1); data on dbh were also collected for each age class grouping. PacifiCorp also agreed that it was not appropriate to classify reservoir shorelines as wetland or riparian habitat. Reservoir shorelines were classified as uplands; the cover type maps produced for the Yale Project indicate high and low water lines and show the seasonal drawdown area (see Figure 5.1-1). PacifiCorp did not agree to use orthorectification, which is a process that creates a digital orthophoto from aerial photos, thus allowing cover type polygons to be digitized directly from the photos into the GIS. PacifiCorp created digital orthophotos for most of the Yale study area using 1995 aerial photography. Cover type polygons were then mapped directly onto hard copies of these orthophotos using the aerial photographs as an aid. Distortion was corrected by delineating polygons directly onto the orthophotos, which are orthorectified by definition. In addition, it is possible to produce very accurate maps using a zoom stereoscope in the transfer process if current, high quality orthophotos are available and thorough field verification is conducted. The greatest sources of error in cover typing involve lack of field verification and neglecting the orthophoto transfer process to resolve parallax and correct photographic distortion.

5.4.1.7 Issue: Survey Areas for TES Wildlife

The WDFW requested that PacifiCorp expand TES species surveys to include high probability habitats within 100 feet of project facilities. Surveys should also be expanded to include priority habitats that are adjacent to PacifiCorp's ownership and all high probability TES sites potentially affected by operational activities; priority habitats should

include mature forests with old-growth characteristics (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp agreed to conduct surveys in high probability habitats within 100 feet of project facilities. In addition, PacifiCorp conducted surveys at all sites potentially affected by operational activities and in priority habitats that were outside its ownership but within the study area, including mature forests with old-growth characteristics. No specific areas have been identified for new or expanded recreational development or project-related modifications. The procedures to ensure that surveys are conducted prior to initiating a new development or modification would be part of the Wildlife Habitat Management Plan (see Section 5.2).

5.4.1.8 Issue: TES Amphibian Surveys

The WDFW suggested that surveys for the Larch Mountain and Van Dyke's salamanders include reference sites that are known locations for these species (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

The Draft Survey Protocols for Component/Strategy 2 Amphibian Species (Subgroup 1996) do not recommend use of reference sites for either Larch Mountain or Van Dyke's salamanders. For Larch Mountain salamanders, the concern is disturbance. Van Dyke's salamanders use such a wide range of habitats that conditions at reference sites may not be predictive; best professional judgment is advised. PacifiCorp biologists conducting searches for Larch Mountain and Van Dyke's salamanders visited several survey locations in the study area with C. Crisafulli, the USFS ecologist (Pacific Northwest Research Station, USFS, Amboy, Washington) who participated in developing the survey protocols for these species. It was his request that known locations not be included in surveys to minimize disturbance to these species.

5.4.1.9 Issue: TES Surveys

The WDFW requested that PacifiCorp add the following surveys for TES species: (1) streamside surveys for adult Cope's giant salamanders; (2) instream surveys for Van Dyke's salamander in Type IV and V streams; (3) surveys of potential roost structures for Pacific western big-eared bats; and (4) surveys for band-tailed pigeons (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp agreed to search for adult Cope's giant salamander along streams, although adults of this species are rarely seen (Leonard et al. 1993). As stated in the FSCD, searches for Van Dyke's salamanders were conducted in small streams, which included Types IV and V. The band-tailed pigeon, a WDFW priority species with no TES status, was included in the seasonal surveys (see Section 5.1.2.3). Potential roost structures, primarily bridges, were searched for bats.

5.4.1.10 Issue: Survey Protocols for TEC Species

The USFWS stated that PacifiCorp should use recognized, published protocols for all surveys of TEC species. For species without protocols, surveys should be based on sound biological principles and reviewed by the USFWS prior to initiation. The USFWS asked to receive documentation of any new occurrences of TEC species found in the study area (letter from D. Frederick, Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996).

The only TEC species known to occur in the project vicinity are the bald eagle, spotted owl, and peregrine falcon. PacifiCorp conducts annual helicopter surveys to determine use of the project vicinity by nesting and wintering bald eagles. In addition, all observation of eagles made during field studies were recorded. There are no records of spotted owl nests on PacifiCorp lands; all are on adjacent USFS and DNR lands. Surveys for spotted owls were not requested by the resource agencies and none were planned or conducted. No specific surveys were conduced for peregrine falcons as the study area lacks cliffs suitable for nesting. PacifiCorp always informs the USFWS of any new occurrences of TEC species in the project vicinity.

5.4.1.11 Issue: TES Species Status

The WDFW requested that PacifiCorp periodically update TES species lists for the project vicinity to ensure accuracy. In addition, PacifiCorp should request a list of TES species from the USFWS (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp agreed to request a list of TES species from the USFWS and to check and update species status periodically. TES species lists used for the final License Application were updated in January and February 1999.

5.4.1.12 Issue: TES Bird Surveys

The WDFW recommended that PacifiCorp design specific surveys for TES birds instead of searching for these species in conjunction with other TES surveys (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp modified the methods for the seasonal surveys to focus primarily on avian species; a summary of these methods was provided to the WDFW as an attachment to PacifiCorp's response to agency comments on the FSCD. Three to 6 survey sites, each 2.5 acres in size, were established in each of the major cover types. The species area method was used to record birds inside and outside the site. These surveys, coupled with incidental observations made during other field investigations, indicated use of study area habitats by a number of TES avian species (see Section 5.1.2.3).

5.4.1.13 Issue: Vegetation Data

The WDFW requested that PacifiCorp collect data on vegetative attributes for inclusion in the cover typing scheme to better define the habitat information for use in the associated studies (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp agreed to collect additional information on the vegetative attributes of cover types in the study area (see Section 5.1.1). The information collected included the parameters listed on the landcover field form provided by the WDFW (e.g., average dbh, understory composition).

5.4.1.14 Issue: TES Plant Surveys

The USFWS requested that PacifiCorp conduct surveys for TES plant species whose range and habitat type occur within project lands (letter from D. Frederick, Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996).

A search of the WNHP database found no records of TES plant species within 1 mile of the Yale Project. However, PacifiCorp agreed to contact botanists at the Monument and WNHP to determine if there are any TES plants that potentially occur within the study area. As result of this consultation, surveys for TES plants were conducted in the study area in 1997 (see Section 5.1.1.2).

5.4.1.15 Issue: Big Game

The WDFW requested that PacifiCorp conduct a study to determine the specific migration route used by elk from their summer to winter ranges and back. This study may need to use telemetry and should be coordinated with the USFWS and WDFW (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, August 9, 1996).

PacifiCorp does not believe that the Yale Project affects elk migration patterns. However, in the past PacifiCorp has contributed funds to the WDFW in support of big game studies in the Lewis River drainage and does not believe that additional population and movement studies would provide data relevant to the goals of relicensing studies. Information on big game from Merwin Project studies, the ILM Plan, and the results of the relicensing studies for Yale will be used to develop a management plan that includes measures to protect and enhance habitat for big game.

5.4.1.16 Issue: Conflicts Between Recreation and Wildlife

The USFWS requested that PacifiCorp conduct a study to identify zones of recreation impact and proposals for correcting the conflict between recreation use and wildlife. Use of the eastern shore by boaters should be quantified and plans made to protect wildlife habitat values in this area. Planning should be coordinated with adjacent land owners

(letter from D. Frederick, Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, August 7, 1996).

PacifiCorp conducted extensive recreation surveys and plans to identify areas of potential conflicts with wildlife resources. The results of recreation and wildlife studies will be used in the Yale Wildlife Habitat Management Plan to develop approaches for managing wildlife-recreation conflicts and to protect wildlife values. Studies were coordinated with adjacent landowners and considered public safety, water quality, and law enforcement.

### 5.4.2 Stage 2 Consultation - Comments on the Draft License Application

The WDFW, USFWS, and American Rivers provided comments on the terrestrial resource sections of the draft License Application. Agency comments on the draft License Application are compiled in Appendix 1.3-1 and are summarized by issue in Sections 5.4.2.1 through 5.4.2.8.

#### 5.4.2.1 Issue: Original Project Impacts

The USFWS believes that looking only at current conditions circumvents the "adequate and equitable" protection, mitigation, and enhancement mandate of the Federal Power Act (FPA), as amended by the Electric Consumers Protection Act (ECPA) (letter from N. Gloman, Acting Supervisor, USFWS, North Pacific Coast Ecoregion, Lacey, Washington, November 12, 1998). The WDFW indicated that PacifiCorp needs to address unmitigated wildlife losses from the original license (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, November 17, 1998). American Rivers believes that PacifiCorp should determine project-related losses and gains (letter from M. Delp and M. Pollock, American Rivers, Seattle, Washington, November 18, 1998).

As part of relicensing the 4 Lewis River projects, PacifiCorp hopes to reach a settlement agreement with the agencies that defines "adequate and equitable" protection, mitigation, and enhancement measures for terrestrial resources. The settlement agreement would be the basis of a Comprehensive Wildlife Habitat Management Plan for terrestrial resources in the Lewis River basin. In the interim, PacifiCorp is willing to manage 2,045 acres of its ownership in the vicinity of Yale Lake as wildlife habitat. These lands include some areas that are also managed for recreation, but have seasonal closures to provide for the needs of wildlife. In addition, discussions are being conducted with the agencies and other stakeholders for wildlife management for the Yale Project.

#### 5.4.2.2 Issue: Land/Wildlife Management

The USFWS indicated the following: (1) the 2,045 acres of mitigation land offered by PacifiCorp is inadequate to mitigate for past and continuing impacts, (2) HEP should be used to assess the adequacy of mitigation land, (3) the Wildlife Habitat Management Plan should address all wildlife species not just big game, and (4) monitoring and contingency plans should be part of the proposed wildlife management plan (letter from N. Gloman,

Acting Supervisor, USFWS, North Pacific Coast Ecoregion, Olympia, Washington, November 12, 1998).

The WDFW indicated that the 2,045 acres of mitigation land proposed by PacifiCorp is inadequate to address unmitigated wildlife habitat losses from the original license and is inconsistent with previous offers of 3,200 to 3,300 acres (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, November 17, 1998). The WDFW also stated that snag-poor areas, riparian areas, wetland buffers, raptor habitat, and exotic species should be addressed in the Wildlife Habitat Management Plan and that HEP should be used to assess mitigation lands. The WDFW believes that PacifiCorp's proposed implementation of the Yale Wildlife Habitat Management Plan in 2001 does not meet WDFW's goal of protecting resource opportunities during the APEA interim.

American Rivers indicated that PacifiCorp should conduct a study to identify sites that could be purchased where riparian vegetation and wetlands could be restored (letter from M. Delp and M. Pollock, American Rivers, Seattle, Washington, November 18, 1998). They also believe that HEP should be used to determine appropriate mitigation.

PacifiCorp and the resource agencies are in the process of conducting watershed studies for the North Fork Lewis River basin. The results of these studies will be used to develop a number of terrestrial resource protection and enhancement measures for the basin that will form the basis for a settlement agreement for licensing all 4 hydroelectric projects on the Lewis River. Both the WDFW and USFWS are participants in the watershed studies and will be involved in developing an overall plan for terrestrial resources that will include the following: TES and TEC species stewardship; exotic species control; WDFW priority species and habitats such as snag-rich areas, caves, riparian zones, and wetlands and associated buffers; big game habitat; and raptor habitat. The watershed studies will assess and track the effects of the hydroelectric projects, other activities in the basin, and proposed protection and enhancement measures on wildlife using a number of "analysis species" selected by participants, PacifiCorp, and resource agencies.

To ensure that terrestrial resources, including TES species, associated with the Yale Project are protected during the watershed process, PacifiCorp has agreed to work with the WDFW and USFWS to develop a Yale Wildlife Habitat Management Plan for the Yale Project that would be implemented in 2001 (see Section 5.2). This plan would cover the 2,045 acres of PacifiCorp land near Yale Lake and other lands to be acquired in the next several years. The estimates of 3,200 to 3,300 acres of mitigation lands previously presented by PacifiCorp incorrectly included over 1,000 acres that are already part of the Merwin Wildlife Habitat Management Area.

PacifiCorp does not believe that the use of the HEP represents the best approach for evaluating habitats and assessing the lands included in the Yale Wildlife Habitat Management Plan. PacifiCorp, however, is considering use of HSI models developed by the HEP to measure baseline conditions for the Wildlife Habitat Management Plan and monitoring the effectiveness of the various enhancement measures that would be included in the plan. PacifiCorp would develop contingency plans through consultation with the resource agencies to ensure success.

PacifiCorp has begun discussions with WDFW and USFWS to identify potential future land acquisitions and to determine an appropriate funding mechanism, such as a revolving trust fund. PacifiCorp will acquire lands as soon as parcels are identified and funding is available. The focus of land acquisition will be on priority habitats and species, habitat important to recovery of listed species, and sites in danger of development. In the interim, PacifiCorp will begin developing the management plan by assessing baseline conditions on its 2,045 acres. No timber harvest will occur on these PacifiCorp lands until the management plan is approved or unless mutually agreed upon with WDFW.

5.4.2.3 Issue: Study Area

In their comments on the draft License Application, the WDFW requested that lands north of Saddle Dam and east of Yale Lake be included in the study area as they represent potential enhancement areas (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, November 17, 1998).

PacifiCorp intends to include the lands north of Saddle Dam in the study area for the Lewis River watershed studies. The lands east of Yale Lake, including the Swift bypass reach and forested lands owned by PacifiCorp west of Swift Dam, were included in the study area for the Yale Project. There are 1,007 acres of PacifiCorp land near Saddle Dam that are within the Yale study area but are already included in the Merwin Wildlife Habitat Management Plan. The 647 acres of PacifiCorp land near Swift No. 1 Dam were not included in Yale Lake Wildlife Habitat Management Lands because they are associated with the Swift No. 1 Project. However, lands associated with the Swift No. 1 Project will be included in the comprehensive Lewis River Wildlife Habitat Management Plan.

5.4.2.4 Issue: The Yale Drawdown Zone

The USFWS commented that PacifiCorp should mitigate for the effects of reservoir drawdown on wildlife, including possible revegetation or reducing the Yale Lake water level fluctuations (letter from N. Gloman, Acting Supervisor, USFWS, North Pacific Coast Ecoregion, Lacey, Washington, November 12, 1998).

The WDFW stated that PacifiCorp should evaluate the effects of spring and summer water level fluctuations on amphibians and furbearers and summarize literature on vegetation establishment possibilities in the drawdown zones areas (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, November 17, 1998).

PacifiCorp agreed to conduct studies to determine the effects of shoreline exposure on wildlife. These studies included evaluating the effects on shoreline wetlands and use of aerial photography to determine the extent of the drawdown area during the winter. In addition, surveys were conducted during the fall and winter to determine wildlife use of the drawdown area. A study plan was provided to the agencies in January 1997; methods and results were also described in the FTR for Terrestrial Resources (PacifiCorp 1998b) and are summarized in Section 5.1. PacifiCorp has provided additional information on

the effects of water level fluctuations on amphibians and mammals in this License Application (see Section 5.1). PacifiCorp also investigated methods used by other utilities to reduce the effects of winter drawdowns on wildlife, including vegetation plantings in the drawdown zone. These methods were summarized in the FTR for Terrestrial Resources (PacifiCorp 1998b).

PacifiCorp is willing to consider investigating the feasibility of measures to improve the drawdown zone for wildlife in the proposed Wildlife Habitat Management Plan. Although stabilizing the level of Yale Lake would certainly have some benefits for some mammals and amphibians, it would greatly reduce the operating flexibility of the project and affect the ability of the reservoir to prevent or minimize the effects of flood events on downstream residents.

5.4.2.5 Issue: TES Species Status

The WDFW provided updated information on the status of several TES species in their comments on the draft License Application (letter from C. Leigh, Fish and Wildlife Scientist, WDFW, Olympia, Washington, November 17, 1998). PacifiCorp has integrated this information with data obtained from the DNR, WDFW PHS, and USFWS in January and February 1999 in Section 5.1 of this License Application.

5.4.2.6 Issue: Transmission Line ROW Effects

The USFWS indicated that PacifiCorp should address the effects of the transmission line ROW on terrestrial wildlife and evaluate the potential value of this habitat for wildlife (letter from N. Gloman, Acting Supervisor, USFWS, North Pacific Coast Ecoregion, Lacey, Washington, November 12, 1998).

Outside of the Merwin Wildlife Habitat Management Area, PacifiCorp owns only 1 acre of land along the Yale to Merwin transmission line ROW. PacifiCorp ownership includes approximately 76 acres of the ROW located north and west of Yale Lake. Wildlife habitat on the ROW consists primarily of early successional shrub stands and areas dominated by bracken fern, although a few WDFW priority habitats also occur on the ROW. PacifiCorp land along the ROW near Yale Lake will be included in the Yale Wildlife Habitat Management Plan.

5.4.2.7 Issue: Riparian Zone Effects and Mitigation

The USFWS indicated that the riparian habitat near Yale Lake lacks complexity and diversity and that PacifiCorp should consider acquisition of significant riparian zone areas along tributary streams on the east shore of the reservoir (letter from N. Gloman, Acting Supervisor, USFWS, North Pacific Coast Ecoregion, Lacey, Washington, November 12, 1998). American Rivers commented that PacifiCorp should study the effects of flow regulation on riparian vegetation and wetlands along the Lewis River downstream of Merwin and between the projects (letter from M. Delp and M. Pollock, American Rivers, Seattle, Washington, November 18, 1998).

PacifiCorp agrees that many of the tributaries along the east side of Yale Lake should be protected. The headwaters of virtually all of these streams, however, are on lands owned by the DNR. Forest practices on state lands are subject to the DNR's Habitat Conservation Plan (HCP) (DNR 1997), which stipulates riparian buffers. PacifiCorp owns the lower portions of several of the streams; these sections would be protected by buffers under the Yale Wildlife Habitat Management Plan that meet or exceed state forest practices. PacifiCorp is pursuing options to acquire lands along Cougar Creek and elsewhere in the project vicinity to protect riparian habitat.

PacifiCorp plans to map riparian habitat near Eagle Island downstream of Merwin Dam and will conduct additional investigations of the Swift bypass reach as part of the Lewis River watershed studies.

#### 5.4.2.8 Issue: Watershed Analysis

American Rivers commented that PacifiCorp should conduct a watershed analysis using the Watershed Analysis Protocol developed by the Washington DNR (letter from M. Delp and M. Pollock, American Rivers, Seattle, Washington, November 18, 1998).

After extensive evaluation, PacifiCorp does not believe that a Washington DNR watershed analysis is the best approach to studying and analyzing effects of the Lewis River hydroelectric projects. Instead, PacifiCorp proposes a collaborative process with the resource agencies that involves studies designed to evaluate cumulative as well as individual effects of the 4 Lewis River projects, and attempts to meet some of the goals outlined in the ILM Program for this drainage (Geppert et al. 1998). This approach and any resulting protection, mitigation, and enhancement measures would focus on the lands, operations, and ecological processes over which PacifiCorp has some control.

## 5.5 CONTINUING IMPACTS

PacifiCorp's proposed Yale Wildlife Habitat Management Plan will protect and enhance over 2,000 acres for wildlife. In addition, this plan will include measures to ensure that TES species are not adversely affected by activities related to project operations, including new recreational developments, ROW maintenance, or timber harvest. Operation of the Yale Project over the next license period will, however, have the following continuing effects on terrestrial resources:

- The daily and seasonal water level fluctuations of Yale Lake will continue to preclude the establishment of riparian vegetation along the shorelines and limit the use of the reservoir by amphibians and aquatic furbearers.

- The presence of Yale Lake will continue to affect habitat connectivity for some wildlife species.

- The cutbanks along much of Yale Lake will continue to erode and limit wildlife access to the water.

- The vegetation along the transmission line ROW will continue to be maintained in early seral stages.

- Wildlife in the project vicinity will continue to be subjected to disturbances from recreation and project maintenance activities.

- Roads, recreational developments, and project facilities will continue to affect wildlife habitat quality in the project vicinity.

## 5.6 IMPLEMENTATION, SCHEDULE, AND COST

The Yale Wildlife Habitat Management Plan would be developed cooperatively with the WDFW in 1999 and 2000. Implementation would begin in 2001, although it is likely that not all measures would be initiated at the same time. Anticipated costs associated with the plan and measures likely to be included are as follows:

- Development of the Yale Wildlife Habitat Management Plan - $50,000 over 2 years (1999-2000).

- Annual monitoring surveys for bald eagles and osprey - $5,000/year over 30 years.

- Development of a bald eagle nest site management plan - $5,000.

- Management of existing open habitats on PacifiCorp lands to provide forage areas for big game - $30,000 over the term of the new license.

- Protect and enhance existing wetlands - $100,000 over the term of the new license.