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ACRONYMS AND ABBREVIATIONS

4WD	4-wheel drive
ac	acres
AD	adipose fin clipping
ADAAG	Americans with Disabilities Act Accessibility Guidelines for Buildings & Facilities
APE	Area of Potential Effect
APEA	Applicant-Prepared Environmental Assessment
ARG	Aquatics Resource Group
ATS	Advanced Telemetry Systems
ATV	all terrain vehicle
BLM	Bureau of Land Management
BP	Before Present
CCCP	Cowlitz County Comprehensive Plan
CCSCP	Cowlitz County Shoreline Management Master Program
CDF	critical dewatering flow
CIT	Cowlitz Indian Tribe
cm	centimeters
Corps	U.S. Army Corps of Engineers
CRG	Cultural Resource Group
CS plants	culturally sensitive plants
dbh	diameter at breast height
DEQ	(Oregon) Department of Environmental Quality
DNR	Washington Department of Natural Resources
DO	dissolved oxygen
DSF	day-second feet
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FCC	Freshwater Chronic Criteria
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Map
FR	Forest Road
FWS	U.S. Fish and Wildlife Service
GIS	geographic information system
GPNF	Gifford Pinchot National Forest
GPS	global positioning satellite
ha	hectares
HCC	Hydro Control Center
HCP	Habitat Conservation Plan
HEP	Habitat Evaluation Procedure
Hg	mercury
HPC	Hydrometeorological Prediction Center
HPMP	Historic Properties Management Plan
HSC	Habitat suitability criteria

HSI	Habitat Suitability Index
HUD	Department of Housing and Urban Development
IDL	Instrument Detection Limits
IFIM	Instream Flow Incremental Methodology
IHA	Index of hydraulic alteration
IP	International Paper
KOP	Key Observation Point
KSFD	1,000 second feet per day
LAC	Limits of Acceptable Change
LVAD	left ventral adipose fin
LWD	large woody debris
NESC	Northwest Energy Services Company
NGO	non-governmental agency
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NOECs	No observable effects concentrations
NPDES	National Pollutant Discharge Elimination System
NPPC	Northwest Power Planning Council
NRHP	National Register of Historic Places
NRPA	National Recreation and Parks Association
NSOs	natural sequence orders
NTU	nephelometric turbidity unit
NWPP	Northwest Power Pool
NWS	National Weather Service
OAHP	Office of Archaeology and Historic Preservation
OHWL	Ordinary High Water Level
O&M	operations and maintenance
PAH	polycyclic aromatic hydrocarbon
PAOT	persons-at-one time
PCB	polychlorinated biphenyl
PCC	Portland Control Center
PHABSIM	Physical Habitat Simulation
PHS	Priority Habitat Species
PM&E	Protection, Mitigation, and Enhancement Measure
PPL	Pacific Power and Light
PSMFC	Pacific States Marine Fisheries Commission
PUD	Public Utility District
PWC	personal watercraft
QA/QC	Quality Assurance/Quality Control
QPF	Quantitative Precipitation Forecast
READ	Resource Enhancement Alternatives Document
RM	River Mile
RMAP	Road maintenance and abandonment program
ROS	Recreation Opportunity Spectrum
ROW	rights-of-way
RRG	Recreation Resource Group

RRMP	Recreation Resource Management Plan
RV	recreation vehicle
RVD	recreation visitor day
RVAD	right ventral adipose fin
SBR	Swift bypass reach
S/M species	survey and manage species
SCORP	Statewide Comprehensive Outdoor Recreation Plan
sd	standard deviation
SI	Suitability Indices
SOP	Standard Operating Procedures
SR	State Route
TCP	Traditional Cultural Property
TDG	total dissolved gas
TES	threatened, endangered, or sensitive species
TPH	total petroleum hydrocarbon
TPN	total persulfate nitrogen
TRG	Terrestrial Resource Group
TWG	Technical Work Group
TY	Target Year
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAF	velocity adjustment factors
VECC	Variable Energy Content Curves
WAC	Washington Administrative Code
WDF	Washington Department of Fisheries
WDFW	Washington Department of Fish and Wildlife
WDG	Washington Department of Game
WDOE	Washington Department of Ecology
WNHP	Washington Natural Heritage Program
WSDOT	Washington State Department of Transportation
WSEL	water surface elevation
WSWCB	Washington State Weed Control Board
WUA	Weighted Usable Area
WY	Water Year
YN	Yakama Nation

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5.4 BOTANICAL SURVEYS (TER 4)

The Botanical Surveys provide information on the distribution and abundance of the following resources associated with the projects:

- Threatened, Endangered, and Sensitive (TES) Plants – Information on TES plants is required by the FERC for license applications (18 CFR 16.41).
- Survey and Manage (S/M) Plants – Surveys for plants designated as S/M species by the Northwest Forest Plan (USFS and BLM 2000) were requested for U.S. Forest Service (USFS) lands at Drift Creek.
- Noxious Weeds – Surveys for noxious weeds were requested by the Terrestrial Resources Group (TRG) for the Lewis River Watershed Studies. Noxious weeds represent potential threats to native communities, and possibly to several analysis species.
- Culturally Sensitive (CS) Plants – The presence of plants reported to be traditionally gathered by tribes throughout the study area was requested by the Yakama Nation and the Cowlitz Indian Tribe.
- Cottonwoods – Cottonwood (*Populus trichocarpa*) was selected as an analysis species by the TRG. Cottonwood stands along river floodplains provide important shade, bank stabilization, and large woody material.

The botanical surveys are primarily descriptive and are designed to assess the current distribution and existing habitat conditions. The results provide the basis for potential protection and enhancement actions for future management.

5.4.1 Study Objectives

The objectives of the Botanical Surveys are as follows:

- Identify TES plant species in the study area and analyze factors affecting their distribution. TES plants include: (1) all taxa listed, proposed, or candidates for listing as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS); (2) taxa monitored by the Washington Natural Heritage Program (WNHP) on Lists 1, 2, 3, or 4; and (3) taxa on the USFS Sensitive Species Plant List for Region 6 (April 1999). Federally listed species are protected by the federal Endangered Species Act (ESA) of 1973, as amended. The ESA is administered primarily by USFWS. Candidate species and species on the WNHP list or USFS Sensitive Species list are not formally protected by federal or state statutes but are typically included in relicensing studies because of the possibility that they could be listed prior to issuance of the license.
- Document the location and relative abundance of noxious weeds and analyze their effects on analysis species or TES plants.
- Map the current distribution of cottonwoods and evaluate ongoing project effects.

- Determine the presence and general location of plants traditionally gathered by tribes (CS plants).
- Identify S/M vascular plant, moss, and lichen species on USFS lands near Drift Creek.

5.4.2 Study Area

Botanical surveys were focused within the primary study area for the Merwin and Swift Nos. 1 and 2 projects. Surveys for S/M plant species were restricted to USFS-managed lands near Drift Creek, a tributary to Swift Reservoir, that are potentially affected by reservoir-related recreation (approximately 400 acres [162 ha]). Noxious weed, CS plant, and cottonwood locations were also recorded in the primary study area for the Yale Project since these tasks were not part of Yale relicensing studies.

5.4.3 Methods

The primary tasks of the Botanical Surveys are to: (1) review existing data and develop target lists for TES plants, S/M species, CS plants, and noxious weeds; (2) identify potential habitat for TES and S/M species; (3) conduct field surveys; (4) map locations of TES and S/M species, cottonwoods, and noxious weed infestations; and (5) analyze data.

5.4.3.1 Review of Existing Data

Various public agencies, private entities, and conservation organizations were consulted to compile the most recent information regarding documented and potential occurrence of TES plant and noxious weed species in the study area. The following were existing data sources for the Botanical Surveys:

- **U.S. Fish and Wildlife Service** – TES plants. 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 a list of federally protected species and candidate species and develops policies to promote their recovery.
- **Washington State Native Plant Society** – TES plants. 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.
- **U.S. Forest Service** – noxious weeds, USFS Regional Forester's List of Sensitive Species (1999), S/M species. The USFS maintains a list of sensitive species for lands under its jurisdiction (USFS 1999) and a list of Survey and Manage species for lands covered by the Northwest Forest Plan (USFS and BLM 2000).
- **Washington State Department of Natural Resources Natural Heritage Program** – TES plants.

- **PacifiCorp** – noxious weeds, TES plants for Yale Project.
- **Pacific Northwest Exotic Pest Plant Council** – noxious weeds.
- **County Noxious Weed Control Boards** – noxious weeds.

This information and consultation with agency botanists were used to conduct a pre-field review. The pre-field review was used to produce a list of those species likely to occur in the study area.

5.4.3.2 Potential Habitat Mapping

Once the existing information was collected and compiled, areas that represented potential habitat for TES plants and cottonwoods were delineated on cover type maps. This was accomplished using geographical information system (GIS) to identify cover types and/or habitat elements that meet selected criteria. For noxious weeds, high probability areas included reservoir shorelines, disturbed or developed sites, transmission line rights-of-ways (ROWs), and roadsides. These maps were used to guide all field survey efforts.

5.4.3.3 Field Surveys

Surveys for TES plants, noxious weeds, and cottonwood (an analysis species) were combined to the extent feasible to maximize field efficiency. The following sections discuss the various survey components.

TES, CS, and S/M Plants

TES plant surveys were conducted by a research botanist from Oregon State University and an assistant botanist. TES species potentially occurring in the study area were grouped by habitat type and surveyed when plants were most identifiable. Searches were conducted using the “random meander” approach (Nelson 1985) in potential habitat in the study area. Areas with a high probability of supporting TES plant species received 100 percent visual inspection; low probability sites received cursory inspection. Surveys for S/M species were conducted in conjunction with TES plant surveys on 40 acres of USFS lands near Drift Creek at Swift Reservoir. CS plant were recorded during TES plant surveys and incidentally during other field activities.

Portions of the study area including steep slopes, reservoir shorelines, and other inaccessible locations were surveyed using binoculars. Surveys were conducted in 2 separate sessions—1 in the spring and 1 in the summer—to capture the appropriate flowering and fruiting stages for target species.

Wetlands and riparian areas typically represent high probability habitat for TES plants and were thoroughly searched during surveys. In these habitats, sites with significant cottonwood trees and/or evidence of cottonwood regeneration or historical cottonwood presence were also be mapped.

Plants potentially identified as TES were verified in the field using taxonomic keys for the Pacific Northwest (including Hitchcock and Cronquist [1973]). Some species were collected for more thorough examination with a dissecting microscope. The locations of all species found were mapped on cover type maps and/or topographic quadrangles of the study area. For each species observation, data were recorded on habitat, slope, aspect, associated species, soil type, population size, and possible threats. TES plant populations were recorded on the WNHP rare plant survey form. In addition, all common plant species were recorded.

Cottonwoods

Cottonwoods were mapped and documented in conjunction with other botanical surveys. Additional cottonwood surveys were conducted in the fall of 2001 when leaves were changing color and these trees were particularly evident.

Noxious Weed Surveys

Noxious weed surveys included the following 3 types of surveys: (1) area-wide surveys, (2) area-specific surveys, and (3) incidental surveys.

- **Area-wide Surveys** – Area-wide surveys are designed to cover large areas in a relatively short time and were conducted by car or boat, depending on location within the study area. These surveys covered broad areas and were used to search for large and/or obvious noxious weed infestations that were not previously been identified from existing data.
- **Area-specific Surveys** – The purpose of area-specific surveys was to determine the location and extent of specific known or suspected noxious weed infestations. Area-specific surveys focused on sites that were identified by the agency or PacifiCorp/Cowlitz PUD biologists as known noxious weed infestations or likely noxious weed habitat (e.g., disturbed sites). Area-specific surveys were conducted at sites located during the area-wide surveys that required additional data collection.
- **Incidental Surveys** – The purpose of the incidental surveys was to map and record any significant noxious weed populations that were not noted during area-wide or area-specific surveys. Incidental surveys were conducted by biologists participating in other studies such as TES plant surveys and the HEP Study. To aid in the survey effort, biologists were provided with descriptions and photographs of the target species, data forms, and instructions on the noxious weed data collection process.

Data on density (plants/sq yd), habitat, slope, aspect, elevation, soils, and associated species were collected for each noxious weed species occurrence. Factors influencing or promoting the spread of noxious weed species were noted, where possible. For each population of noxious weeds found in the primary study area, noxious weed densities were estimated per square yard and placed in 1 of 4 categories (trace-0.5; 0.6-5; 6-20; >20 sq yd [trace-0.4; 0.5-4; 5-17; >17/sq m).

5.4.3.4 Mapping

The locations of TES plants, S/M plants, noxious weeds, and cottonwoods were mapped on aerial photos, orthophotos, or U.S. Geological Survey (USGS) maps and transferred to a GIS database. All mapped TES locations have a corresponding datasheet to provide information on the species; Section, Township, and Range location; and relevant habitat parameters. All TES data collected during the field surveys were provided to the WNHP for incorporation in their database. Materials submitted included a data form (WNHP Rare Plant Survey Form) and map for each species sighting; voucher specimens were deposited at the Oregon State University herbarium. CS plant species locations were not mapped.

Locations of significant infestations of target noxious weeds were mapped as polygons on USGS maps; small infestation sites were identified as points or linear features. Cottonwood stands were mapped as polygons; large individual trees were noted as points. Small stands of seedlings were only mapped if they could be distinguished from alder stands, which was sometimes not possible if surveyed at a distance.

5.4.3.5 Data Analysis

Data analysis involved an examination of the GIS data layers for TES plants, noxious weeds, and the mapped cottonwoods. Distribution patterns were analyzed relative to the life history requirements of each species and the habitat available in the primary study area and watershed. Road densities, relative elevation/position in the floodplain, adjacent land uses, and project operations were considered as factors potentially affecting species distribution.

5.4.4 Key Questions

Results of the Botanical Surveys can be used to address the following “key” watershed questions identified during the Lewis River Cooperative Watershed Studies meetings.

- What introduced weed species occur in the basin and where do they occur?

The tables and figures in the Section 5.4.5 indicate the occurrence of weeds in the study area.

- How have development and recreation in the basin affected terrestrial and riparian habitats and wildlife species, and how might they do so in the future?

These issues are discussed in Section 5.4.6.

- What unique habitats and habitat elements are important to plants and animals in the basin?

Wetlands, riparian areas, and oak woodlands are among the unique habitat types that support a range of plants and wildlife in the study area. The habitats are described in the Vegetation Cover Type Mapping (Section 5.1) and the Wetlands Information Synthesis Study (Section 5.5). Green-fruited sedge, once listed by ONHP but taken

off the list because it was found to be too common, was the only TES plant found in the study area.

- Where are the unique habitats and habitat elements located in the basin?

Locations of unique habitats are provided in Vegetation Cover Type Mapping (Section 5.1) and the Wetlands Information Synthesis Study (Section 5.5).

- What are the current conditions of unique habitats and habitat elements?

The current condition of unique habitats are described in the HEP Study (Section 5.2) and Wetland Information Synthesis Study (Section 5.5).

- Which habitat types and locations may be vulnerable to degradation or destruction in the short and long term?

See Section 5.4.6.

- How can unique habitats and habitat elements best be protected?

Continued implementation of a noxious weed control plan by PacifiCorp and the adjacent public land owners would protect native plant associations. See Section 5.4.7.

- What is the distribution and abundance of threatened, endangered, and other at-risk species in the basin?

No rare plants were found in the study area. Many habitats are disturbed from a variety of current and past land use practices.

5.4.5 Results

Results of the botanical surveys are summarized below. The first section provides the target list of species that were obtained from a review of existing information and used to guide the survey efforts. The remaining sections describe the field survey results.

5.4.5.1 Target Species

The WNHP and USFS provided lists of TES and S/M plant species potentially occurring in the study area (letter from S. Swope Moody, Environmental Coordinator, WNHP, Department of Natural Resources, Olympia, WA, September 24, 1998; pers. comm., M. Wainwright, USFS Biologist, Gifford Pinchot National Forest, Amboy, WA, 1999; pers. comm., Chiska Derr, USFS, Gifford Pinchot National Forest) (TER 4, Appendix 1). Of the 50 vascular plant species on these lists, only 1—cold water corydalis (*Corydalis aquae-gelidae*)—has been recorded within 1 mile (1.6 km) of the study area. The remainder are known from current or historical records in Clark, Cowlitz, or Skamania counties (Appendix 5.4-1). The lists provided by the WNHP and USFS were reviewed by EDAW ecologists and Dr. Scott Sundberg of Oregon State University and refined into a target list of species most likely to occur in the study area (Table 5.4-1). Further edits to the list were supplied by USFS staff. Many of the species on the WNHP list for

Skamania County occur mainly in the Columbia River Gorge and were therefore excluded from the target species list. Several species were also added based on habitat and distribution information. The final target species list of TES and S/M plant species for the Lewis River study area included 38 vascular plants, 4 S/M lichens, and 3 S/M bryophytes (Table 5.4-1). A literature survey was conducted to collect additional distribution and ecology information for the TES species on the target list.

Table 5.4-1. Threatened, endangered, and sensitive (TES) and survey and manage (S/M) plant species potentially occurring in the Lewis River study area.

<i>Scientific Name</i> Common Name	USFWS ¹	USFS ²	WNHP ³	Habitat Conditions/ Flowering Time
Vascular Plants				
<i>Botrychium minganense</i> Mingan moonwort	–	S	R2	Meadows and moist coniferous forests; July–September
<i>Botrychium montanum</i> Victorin’s grapefern	–	S	W	Shady western red cedar forests and grassy areas; July–September
<i>Carex interrupta</i> Green-fruited sedge	–	S	–	Low elevation wet areas, May–July
<i>Carex macrochaeta</i> Large-awned sedge	–	S	S	Wet meadows, sandy beaches, and streambanks, May–July
<i>Chrysolepis chrysophylla</i> Golden chinquapin	–	–	S	Dry, open sites to thick woodlands; April–June
<i>Cimicifuga elata</i> Tall bugbane	SoC	S	T	Mixed coniferous/deciduous forests; June–September
<i>Corydalis aquae-gelidae</i> Cold-water corydalis	SoC	S S/M	T	Moist soil at edges of streams; June–September
<i>Coptis aspleniifolia</i> Spleenwort-leaved goldthread	–	S S/M	S	Mid-elevation moist woods and bogs; April–May
<i>Coptis trifolia</i> Threeleaf goldthread	–	S S/M	–	Bogs and wet forests at low to middle elevations; May–July
<i>Cyperus bipartitus</i> Shining flatsedge	–	S	S	Streambanks and moist soils at low elevations; August–November
<i>Cypripedium fasciculatum</i> Clustered lady slipper	SoC	S S/M	T	Mid- to late-seral Douglas-fir or ponderosa pine overstories; May–June
<i>Cypripedium montanum</i> Mountain lady slipper	–	S/M	W	Dry to moist open woods in partial shade; May–July
<i>Dryopteris carthusiana</i> Toothed wood fern	–	–	R1	Moist wooded slopes, streambanks
<i>Erigeron howellii</i> Howell’s daisy	SoC	S	T	Moist rocky areas; May–July
<i>Epipactis gigantea</i> Giant helleborine	–	–	S	Moist soils around lakes, streams, springs and seeps; April–July
<i>Euonymus occidentalis</i> Western wahoo	–	S	S	Forests of low to middle elevations; May–June
<i>Githopsis specularioides</i> Common blue-cup	–	–	S	Dry, open meadows at low elevations; May–June
<i>Isoetes nuttallii</i> Nuttall’s quillwort	–	–	S	Moist soils at low to middle elevations; April–June

Table 5.4-1. Threatened, endangered, and sensitive (TES) and survey and manage (S/M) plant species potentially occurring in the Lewis River study area (cont.).

<i>Scientific Name</i> Common Name	USFWS ¹	USFS ²	WNHP ³	Habitat Conditions/ Flowering Time
<i>Lindernia dubia</i> var. <i>anagallidea</i> False pimpernel	–	–	R2	Riparian zones; July–October
<i>Lycopodium dendroideum</i> Tree clubmoss	–	S	S	Moist to fairly dry coniferous and deciduous forests
<i>Montia diffusa</i> Branching montia	–	S	–	Moist areas, April–May
<i>Montia howellii</i> Howell’s montia	SoC	S	W	Open moist or vernal moist balds, rock outcrops, gravelly areas; March–May
<i>Ophioglossum pusillum</i> (= <i>O. vulgatum</i> L.) Adder’s tongue	–	S	T	Moist meadows and woods; July–September
<i>Orobanche pinorum</i> Pine broomrape	–	–	W	Open coniferous forests; July–August
<i>Oxalis suksdorfii</i> Western yellow oxalis	–	–	S	Variety of habitats from moist forests to dry open slopes; April–August
<i>Parnassia fimbriata</i> var. <i>hoodiana</i> Fringed grass-of-parnassus	–	S	S	Wetlands, bogs, riparian zones; July–September
<i>Penstemon barrettiae</i> Barrett’s beardtongue	SoC	S	T	Crevices in basalt cliffs, rock outcrops, open talus and along well-drained roadsides; April–June
<i>Platanthera orbiculata</i> Round-leaved orchid	–	S/M	W	Dry to moist coniferous forests; June–August
<i>Pleuricospora fimbriolata</i> Fringed pinesap	–	–	W	Humus in mid-elevation coniferous forest; June–August
<i>Poa laxiflora</i> Loose-flowered bluegrass	–	S	T	Moist, shady forests and rocky slopes of low elevations; June–July
<i>Polemonium carneum</i> Great polemonium	–	S	T	Woodlands and forest openings; May–July
<i>Sidalcea hirtipes</i> Hairy-stemmed checkermallow	–	–	E	Prairies to mountains; June–July
<i>Sidalcea nelsoniana</i> Nelson’s checkermallow	T	–	E	Variety of habitats that have periodic flooding or saturation for extended periods; May–September
<i>Sisyrinchium sarmentosum</i> Pale blue-eyed grass	SoC	S	T	Moist meadows; June–July
<i>Trillium parviflorum</i> Small-flowered trillium	–	–	S	Moist soils in hardwood stands; March–May
<i>Utricularia intermedia</i> Flat-leaved bladderwort	–	S	S	Low to mid-elevation standing water; July–August
<i>Utricularia minor</i> Lesser bladderwort	–	–	R1	Low to mid-elevation standing water; June–September.
<i>Whipplea modesta</i> Yerba de Selva	–	–	R1	Dry, open areas; April–June

Table 5.4-1. Threatened, endangered, and sensitive (TES) and survey and manage (S/M) plant species potentially occurring in the Lewis River study area (cont.).

<i>Scientific Name</i> Common Name	USFWS ¹	USFS ²	WNHP ³	Habitat Conditions/ Flowering Time
Lichens				
<i>Hypogymnia duplicata</i>	–	S/M	P2	Moist coniferous forests, on Douglas-fir, pine twigs, mosses on rocks; all year
<i>Hypogymnia oceanica</i>	–	S/M	P2	Old-growth coniferous forests; all year
<i>Lobaria linita</i>	–	S/M	P2	Moist forests; on trees, shrubs, mossy rocks; all year
<i>Pseudocyphellaria rainierensis</i>	–	S/M	P2	Moist old-growth coniferous forests; all year
Bryophytes				
<i>Diplophyllum plicatum</i>	–	S/M	–	Damp rock faces, all year
<i>Kurzia makinoana</i>	–	S/M	–	
<i>Tritomaria exsectiformis</i>	–	S/M	–	Logs in moist forests

¹ **USFWS Status:** **T**-listed as threatened under the Endangered Species Act (ESA), those species likely to become endangered within the foreseeable future; **SoC**-species of concern, species that need additional information to support a proposal to list as threatened or endangered; not protected under the ESA.

² **USFS Status:** **S/M**-Survey and Manage species designated in the Northwest Forest Plan, as amended (USFS and BLM 2000); **S** – listed on the Region 6 Sensitive Plant Species List (1999).

³ **State Status (WNHP 2000):** **E**-listed as endangered; **T**-listed as threatened; **S**-listed as sensitive; **R1**-review taxa for which more fieldwork is needed to assess their rarity and the degree to which they are threatened; **R2**-review taxa with unresolved taxonomic questions; **W**-watch, species that are more abundant and/or less threatened in WA than previously assumed; **P2**-lichen species for which WNHP is collecting information.

A list of plants traditionally gathered by Native Americans in the Lewis River basin (Hajda 1995) was provided by USFS staff (Table 5.4-2).

To solicit comments on this list, a meeting was held at the cultural center of the Yakama Nation in March 2000. Yakama and Cowlitz tribal representatives were also invited to attend a site visit with project botanists to discuss CS plants and survey methods. Representatives of the Yakama Nation participated in the site visit, but Cowlitz Tribal members and staff were unable to attend. Neither Yakama or Cowlitz tribal representatives suggested revisions to the list developed by Hajda et al. (1995); this list was therefore used to guide survey efforts for CS plants (Table 5.4-2).

A target list of exotic and invasive species was compiled from the Washington State Weed Control Board (WSWCB) list of weeds for Clark, Cowlitz, and Skamania counties, and from the Pacific Northwest Exotic Pest Plant Council list of invasive plants (WSWCB 2000). This target list also included plants that were identified as invasive or particularly problematic by agency and PacifiCorp/Cowlitz PUD biologists and known or suspected to occur in the project vicinity. A draft list was circulated to USFS staff for their input and then finalized with 27 species (Table 5.4-3). There are several species, such as reed canarygrass (*Phalaris arundinacea*), that are invasive weeds and are on the Washington State Noxious Weed List, but were not included on the target list for the Lewis River. Reed canarygrass often dominates wetlands and riparian areas throughout western Washington and is already known to be common in these habitats in the Lewis River

study area. Similarly, there are several species on the target list, trailing blackberry (*Rubus ursinus*) for example, that are not considered weeds in Washington but can be invasive and are of interest to the USFS.

Table 5.4-2. Plants traditionally gathered by Native Americans in the Lewis River basin.

Common Name	Scientific Name	Source ¹
Alder	<i>Alnus</i> sp.	ethno
Beargrass	<i>Xerophyllum tenax</i>	ethno, consult
Blackberry	<i>Rubus ursinus</i>	ethno, consult
Blackcap	<i>Rubus leucodermis</i>	ethno, consult
Blueberry	<i>Vaccinium</i> sp.	ethno, consult
Camas	<i>Camassia quamash</i>	ethno
Wild onion	<i>Allium</i> spp.	ethno
Cedar	<i>Thuja plicata</i>	ethno, consult
Chokecherries	<i>Prunus virginiana</i>	consult
Cranberries	<i>Viburnum opulus</i>	ethno
Currant	<i>Ribes</i> spp.	ethno
Devil's club	<i>Oplopanax horridum</i>	ethno
Elderberry	<i>Sambucus</i> sp.	ethno, consult
Fir	<i>Abies amabilis</i>	ethno
Gooseberries	<i>Ribes</i> sp.	ethno
Grass	<i>Gramineae</i> spp.	ethno
Hawthorn berry	<i>Crataegus</i> sp.	ethno
Hazelnuts	<i>Corylus cornuta</i>	ethno
Huckleberry, big	<i>Vaccinium membranaceum</i>	ethno
Huckleberry, grouse	<i>Vaccinium deliciosum</i>	ethno, consult
Huckleberry, oval-leaved	<i>Vaccinium ovalifolium</i>	ethno, consult
Huckleberry, red	<i>Vaccinium parvifolium</i>	ethno
Kinnikinnick	<i>Arctostaphylos uva-ursi</i>	ethno, consult
Lily, Columbia	<i>Lilium columbianum</i>	ethno
Lovage	<i>Ligusticum canbyi</i>	ethno, consult
May apple (skunk cabbage = Veratrum)	<i>Veratrum</i> sp.	ethno
Moss	<i>Musci</i> sp.	ethno, consult
Moss, green	<i>Musci</i> sp.	ethno, consult
Oregon grape	<i>Berberis aquifolium</i>	ethno
Pine nuts	<i>Pinus</i> sp.	ethno, consult
Pine nuts, white bark	<i>Pinus albicaulis</i>	ethno, consult
Salal berry	<i>Gaultheria shallon</i>	ethno
Salmonberry	<i>Rubus spectabilis</i>	ethno
Serviceberry	<i>Amelanchier alnifolia.</i>	ethno
Sorrel	<i>Rumex</i> sp.	ethno
Spring beauty	<i>Claytonia lanceolata</i>	ethno, consult
Strawberry	<i>Fragaria vesca</i>	ethno, consult
Tule	<i>Scirpus lacustris</i>	ethno
Water parsley	<i>Oenanthe sarmentosa</i>	ethno
Whortleberry	<i>Vaccinium scoparium</i>	ethno
Willow	<i>Salix</i> spp.	ethno

¹ Source: Hajda et al. (1995) - ethno = ethnohistoric sources; consult = consultant sources

Table 5.4-3. Target list of exotic and invasive plant species for the Lewis River study area.

Species Common Name Scientific Name	Washington State Noxious Weed List Classification^{1,3}	Exotic Pest Plants of Concern Classification^{2,3}
Bull thistle <i>Cirsium vulgare</i>	-	-
Canada thistle <i>Cirsium arvense</i>	C	Most invasive-widespread
Dalmation toadflax <i>Linaria genistifolia</i>	B-designate (Clark, Cowlitz & Skamania Cos.)	Most invasive-widespread
Diffuse knapweed <i>Centaurea diffusa</i>	B-designate (Clark, Cowlitz & Skamania Cos.)	Most invasive-widespread
Field bindweed <i>Convolvulus arvensis</i>	C	
Giant knotweed <i>Polygonum sachalinense</i>	C	Red alert-high potential to spread
Gorse <i>Ulex europaeus</i>	B-designate (Cowlitz Co.)	-
Himalayan blackberry <i>Rubus discolor</i>	-	Most invasive-widespread
Houndstongue <i>Cynoglossum officinale</i>	C	-
Japanese knotweed <i>Polygonum cuspidatum</i>	C	Red alert-high potential to spread
Johnsongrass <i>Sorghum halepense</i>	A	-
Meadow knapweed <i>Centaurea pratensis</i>	B-designate (Cowlitz & Skamania Cos.)	-
Poison hemlock <i>Conium maculatum</i>	C	-
Policeman's helmet <i>Impatiens glandulifera</i>	B-designate (Clark, Cowlitz & Skamania Cos.)	-
Purple starthistle <i>Centaurea calcitrapa</i>	A	-
Purple loosestrife <i>Lythrum salicaria</i>	B-designate (Clark, Cowlitz & Skamania Cos.)	Most invasive-widespread
Ragweed <i>Ambrosia artemisiifolia</i>	-	-
Russian knapweed <i>Centaurea repens</i>	B-designate (Clark, Cowlitz & Skamania Cos.)	-
Scot's broom <i>Cytisus scoparius</i>	B	Most invasive-widespread
South American waterweed <i>Elodea densa</i>	-	-
Spotted knapweed <i>Centaurea maculosa</i>	B-designate (Clark, Cowlitz & Skamania Cos.)	Red alert-high potential to spread
St. John's wort <i>Hypericum perforatum</i>	C	Most invasive-widespread

Table 5.4-3. Target list of noxious weeds for the Lewis River study area (cont.)

Species Common Name <i>Scientific Name</i>	Washington State Noxious Weed List Classification ^{1,3}	Exotic Pest Plants of Concern Classification ^{2,3}
Spiny cocklebur <i>Xanthium spinosum</i>	C	-
Tansy ragwort <i>Senecio jacobaea</i>	B	Most invasive-widespread
Trailing blackberry <i>Rubus ursinus</i>	-	-
Yellow toadflax <i>Linaria vulgare</i>	C	-
Yellow starthistle <i>Centaurea solstitialis</i>	B-designate (Clark, Cowlitz & Skamania Cos.)	Most invasive-widespread

¹ **Class A** - Weeds that are non-native species with a limited distribution in Washington; eradication is required by law.

Class B - Species established in some regions of Washington. In counties where a Class B species is unrecorded or of limited distribution, prevention of seed production is required. In these counties, the weed is listed as a Class B designate, meaning it is designated for control by state law. In areas where a Class B species is already abundant or widespread, control is a county option.

Class C - Species is widely established and can be controlled if locally desired.

² From the Washington Native Plant Society.

³ The lack of an entry in both columns indicates that the species has no formal designation as a weed but is considered exotic or invasive by botanists who developed or reviewed the target list.

5.4.5.2 TES Plants

Surveys for TES and CS plant species in the vicinity of Lake Merwin were conducted from May 8-12 and June 20-23, 2000. Similar surveys of lands associated with the Swift Nos. 1 and 2 projects were conducted from May 7-11 and July 16-20, 2001. These surveys included searches for S/M plant species on USFS lands near Drift Creek. Surveys were focused in areas that provided habitat conditions for the plants on the target species list. Habitats most likely to support TES plants included wetlands, talus or rock outcrops, riparian corridors, oak woodlands, and undisturbed coniferous forest. Habitats less likely to support TES plants were surveyed in a more cursory manner.

Only 1 TES species—green-fruited sedge (*Carex interrupta*)—was located during surveys in the vicinity of Swift and Merwin projects. No S/M plant species were found on USFS lands near Drift Creek. Green-fruited sedge was found in a wetland along the south shore of the Lewis River between Lake Merwin and Yale Dam upstream of the Highway 503 bridge. This wetland is dominated by reed canarygrass, which is tolerant of a wide range of hydrologic conditions and may eventually out-compete the small patches of green-fruited sedge in this location. Green-fruited sedge was also found at the base of the Swift canal berm, in a wetland between the canal and the road leading to the Swift No. 1 powerhouse. In addition, it was documented in several wetlands associated with the Yale Project during surveys conducted in 1997 (PacifiCorp 1999). Green-fruited

sedge was designated as a Watch species by the WNHP as recently as 1998 but is no longer listed.

5.4.5.3 Noxious Weeds

Nine of the 27 target weed species were found in the study area, with most infestations concentrated in around project facilities, roads, ROWs and other disturbed sites (Tables 5.4-4 – 5.4-6; Figure 5.4-1). Weeds identified in the study area include bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), Himalayan blackberry (*Rubus discolor*), Japanese knotweed (*Polygonum cuspidatum*), policeman’s helmet (*Impatiens glandulifera*), Scot’s broom (*Cytisus scoparius*), St. John’s wort (*Hypericum perforatum*), Tansy ragwort (*Senecio jacobaea*), and trailing blackberry (*Rubus ursinus*) Information on each of these species is summarized below.

Table 5.4-4. General locations of weed infestations in the vicinity of the Merwin Project.

Species	Highway 505 Corridor	Merwin Dam	Downstream of Merwin Dam	Speelyai Bay Area ¹	Cresap Bay Area ²	Transmission Line ROW	South Shore
Canada thistle <i>Cirsium arvense</i>				X		X	
Bull thistle* <i>Cirsium vulgare</i>							
Himalayan blackberry <i>Rubus discolor</i>			X	X	X		X
Japanese knotweed <i>Polygonum cuspidatum</i>			X				
Policeman’s helmet <i>Impatiens glandulifera</i>			X				
Scot’s broom <i>Cytisus scoparius</i>	X	X	X	X	X	X	X
St. John’s wort <i>Hypericum perforatum</i>			X			X	
Tansy ragwort* <i>Senecio jacobaea</i>							
Trailing blackberry <i>Rubus ursinus</i>		X		X			

¹ Includes the area east and west of Speelyai Bay.

² Includes the area from Cresap Bay to the west.

* Indicates species not found in this portion of the project study area.

Table 5.4-5. General locations of weed infestations in the vicinity of the Yale Project.

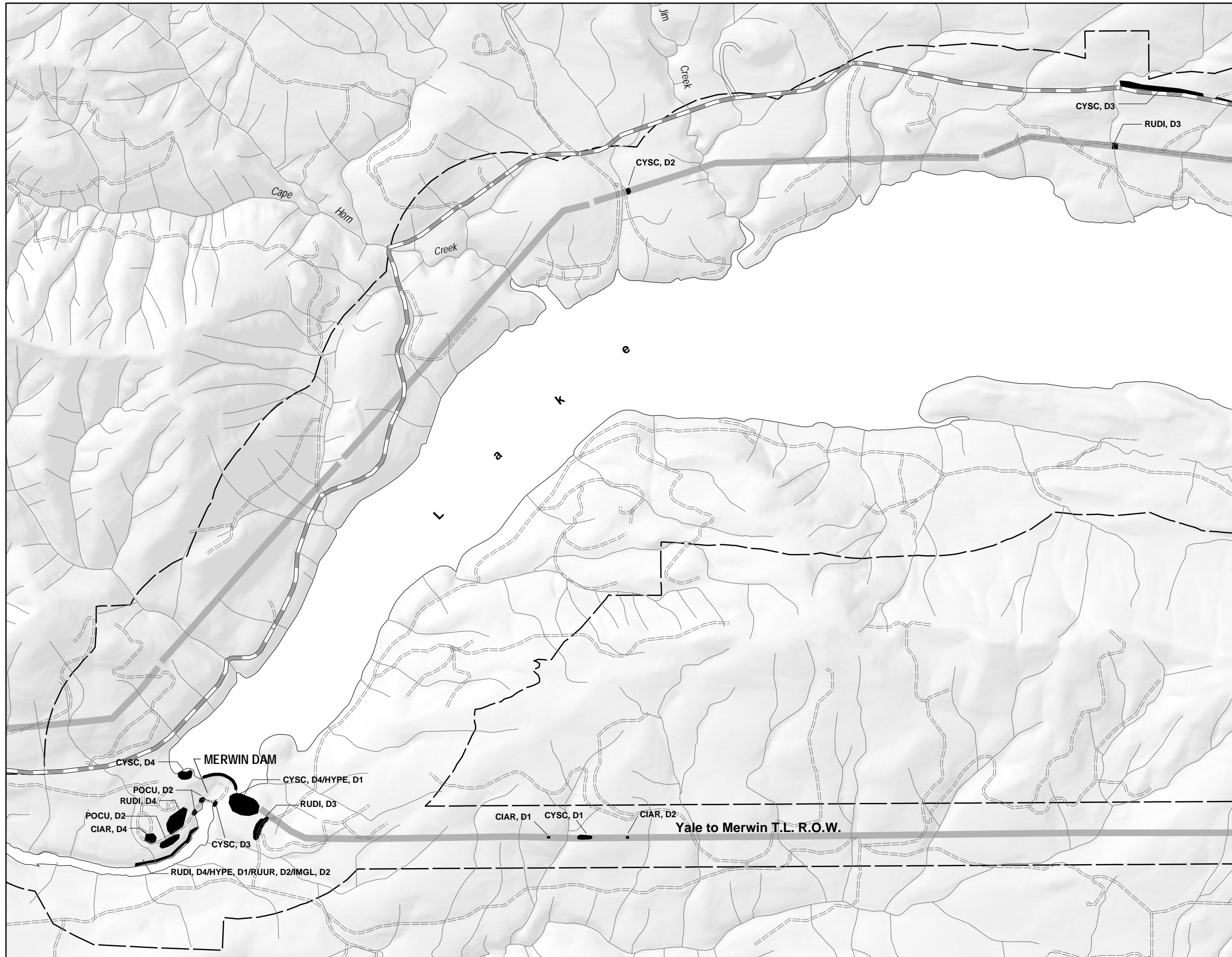
Species	Highway 503 Corridor	Saddle and Yale Dam Areas	Down-stream of Yale Dam	Beaver Bay	West Shore	Transmission Line ROW	East Shore
Canada thistle <i>Cirsium arvense</i>	X	X			X	X	X
Bull thistle <i>Cirsium vulgare</i>		X					X
Himalayan blackberry <i>Rubus discolor</i>	X	X		X	X	X	X
Japanese knotweed* <i>Polygonum cuspidatum</i>							
Policeman's helmet* <i>Impatiens glandulifera</i>							
Scot's broom <i>Cytisus scoparius</i>	X	X	X	X	X	X	X
St. John's wort <i>Hypericum perforatum</i>					X	X	X
Tansy ragwort <i>Senecio jacobaea</i>							X
Trailing blackberry* <i>Rubus ursinus</i>							

* Indicates species not found in this portion of the project study area.

Table 5.4-6. General locations of weed infestations in the vicinity of Swift Nos. 1 and 2 Projects.

Species	Lewis River Road Corridor	Swift Dam	Swift Bypass Reach	North Side	South Side	Transmission Line ROW	Swift Canal
Canada Thistle <i>Cirsium arvense</i>				X	X		X
Bull Thistle* <i>Cirsium vulgare</i>							
Himalayan blackberry <i>Rubus discolor</i>			X				X
Japanese knotweed* <i>Polygonum cuspidatum</i>							
Policeman's helmet* <i>Impatiens glandulifera</i>							
Scot's broom <i>Cytisus scoparius</i>	X	X	X	X		X	X
St. John's wort* <i>Hypericum perforatum</i>							
Tansy ragwort <i>Senecio jacobaea</i>				X	X		
Trailing blackberry* <i>Rubus ursinus</i>							

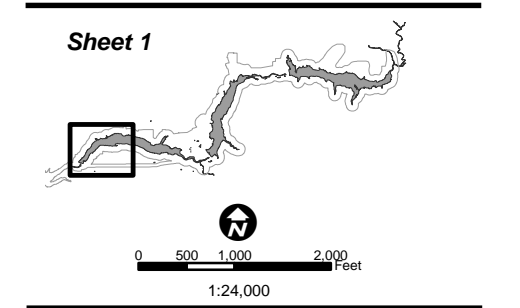
* Indicates species not found in this portion of the project study area.



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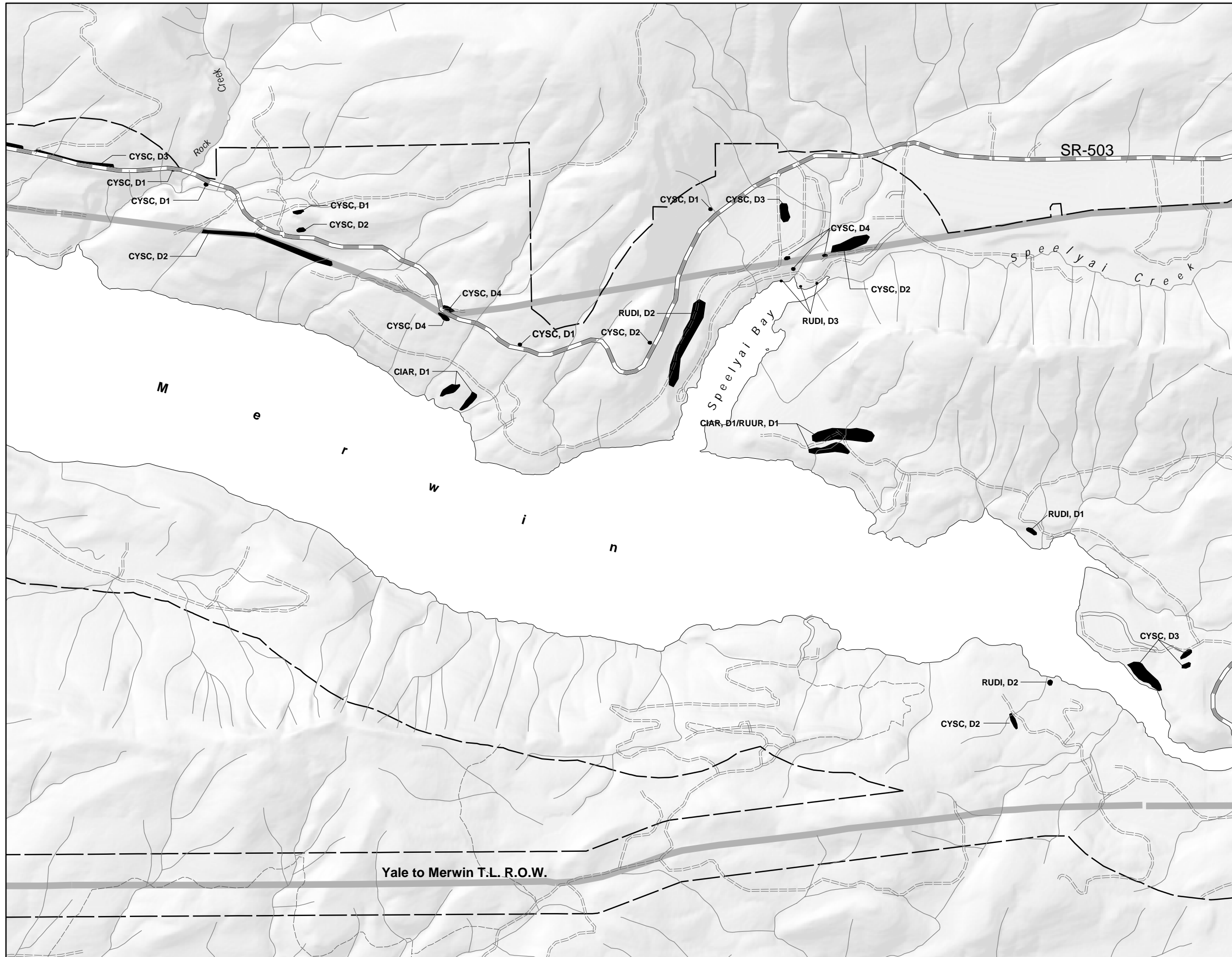
■ Weed Infestation	
CODE	SPECIES
CIAR	Canada Thistle
CYSC	Scot's Broom
CIVU	Bull Thistle
HYPE	St. John's Wort
IMGL	Policeman's Helmet
POCU	Japanese Knotweed
RUDI	Himalayan Blackberry
PUUR	Trailing Blackberry
SEJA	Tansy Ragwort
DENSITY	
D1	Trace - 0.5 plants/square yard
D2	0.6 - 5 plants/square yard
D3	6 - 20 plants/square yard
D4	> 20 plants/square yard

Road	
---	Trail
---	Unimproved
---	Light Duty
---	Primary
---	Secondary
---	Railroad
---	Stream
---	Transmission Line R.O.W.
□	Open Water
□	Study Area



Lewis River Hydroelectric Projects

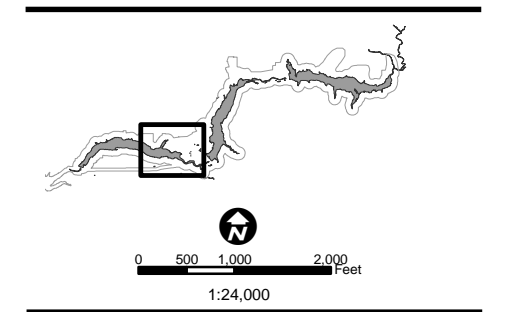
FIGURE 5.4-1 (1 of 7)
Exotic/Invasive Plant Species Locations



Legend

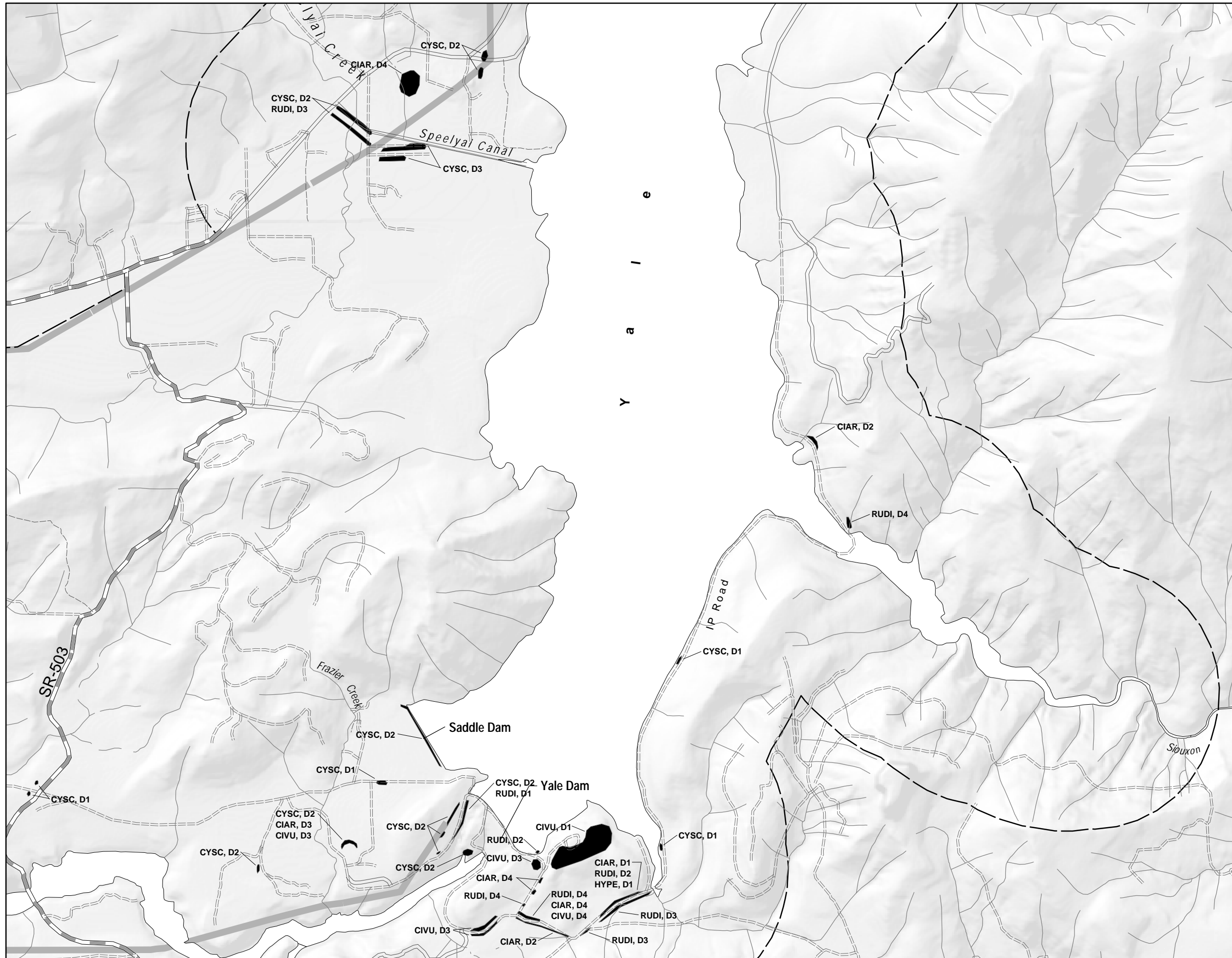
■ Weed Infestation	
CODE	SPECIES
CIAR	Canada Thistle
CYSC	Scot's Broom
CIVU	Bull Thistle
HYPE	St. John's Wort
IMGL	Policeman's Helmet
POCU	Japanese Knotweed
RUDI	Himalayan Blackberry
PUUR	Trailing Blackberry
SEJA	Tansy Ragwort
DENSITY	
D1	Trace - 0.5 plants/square yard
D2	0.6 - 5 plants/square yard
D3	6 - 20 plants/square yard
D4	> 20 plants/square yard

- Road
- Trail
 - Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
 - Stream
 - Transmission Line R.O.W.
 - Open Water
 - Study Area



Lewis River Hydroelectric Projects

FIGURE 5.4-1 (2 of 7)
Exotic/Invasive Plant Species Locations



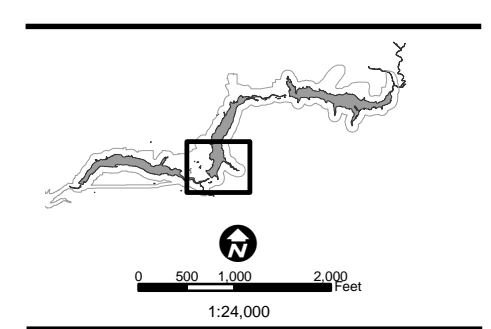
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■ Weed Infestation

CODE	SPECIES
CIAR	Canada Thistle
CYSC	Scot's Broom
CIVU	Bull Thistle
HYPE	St. John's Wort
IMGL	Policeman's Helmet
POCU	Japanese Knotweed
RUDI	Himalayan Blackberry
PUUR	Trailing Blackberry
SEJA	Tansy Ragwort

DENSITY	DESCRIPTION
D1	Trace - 0.5 plants/square yard
D2	0.6 - 5 plants/square yard
D3	6 - 20 plants/square yard
D4	> 20 plants/square yard

- Road
 - Trail
 - === Unimproved
 - == Light Duty
 - == Primary
 - == Secondary
 - Railroad
- Stream
- Transmission Line R.O.W
- Open Water
- Study Area



Lewis River Hydroelectric Projects

FIGURE 5.4-1 (3 of 7)
Exotic/Invasive Plant Species Locations



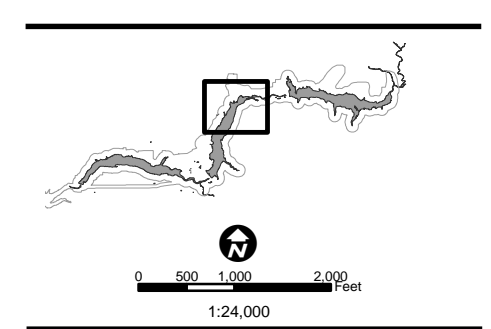
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■ Weed Infestation

CODE	SPECIES
CIAR	Canada Thistle
CYSC	Scot's Broom
CIVU	Bull Thistle
HYPE	St. John's Wort
IMGL	Policeman's Helmet
POCU	Japanese Knotweed
RUDI	Himalayan Blackberry
PUUR	Trailing Blackberry
SEJA	Tansy Ragwort

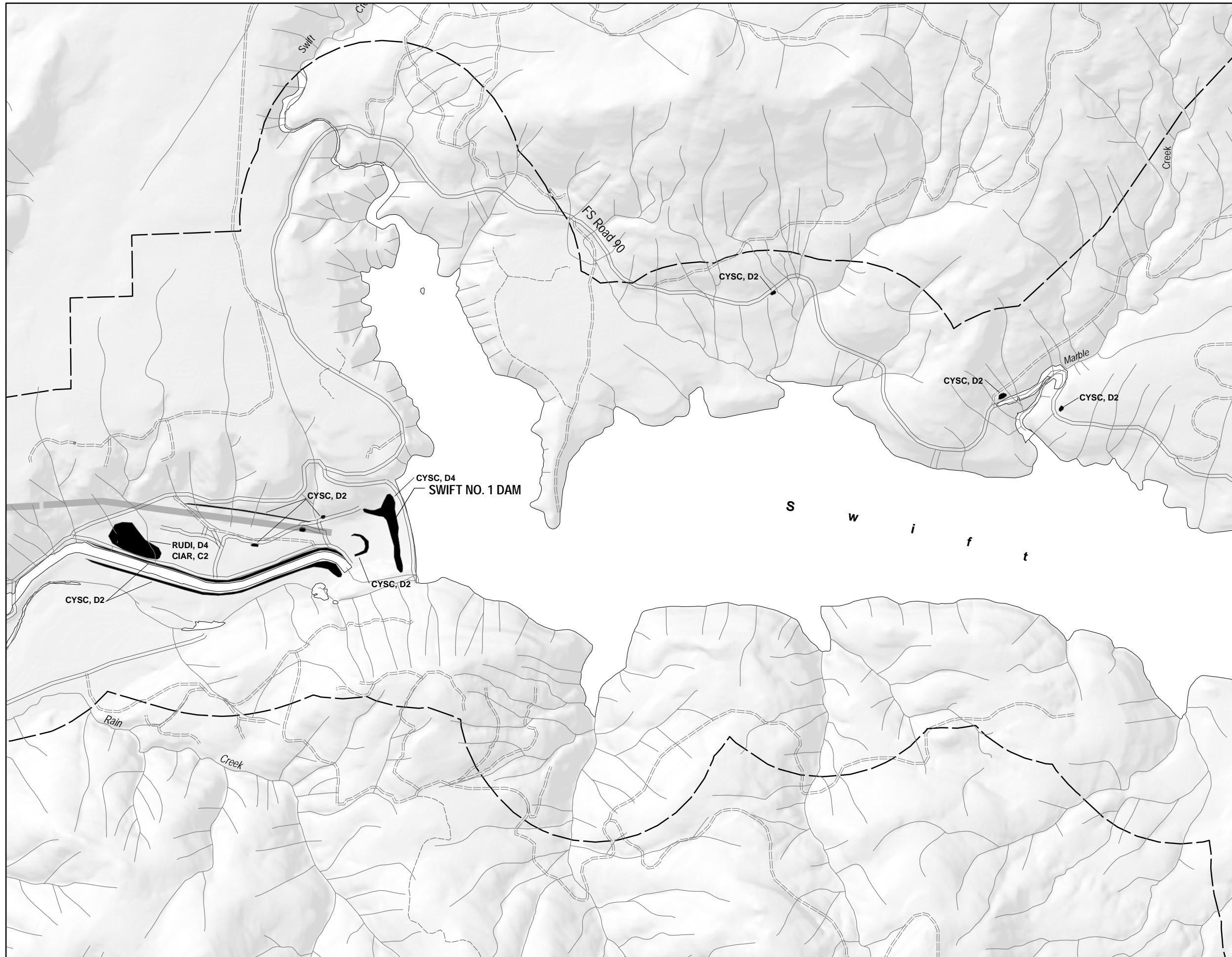
DENSITY	DESCRIPTION
D1	Trace - 0.5 plants/square yard
D2	0.6 - 5 plants/square yard
D3	6 - 20 plants/square yard
D4	> 20 plants/square yard

- Road
 - Trail
 - == Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
- Stream
- Transmission Line R.O.W
- Open Water
- Study Area



Lewis River Hydroelectric Projects

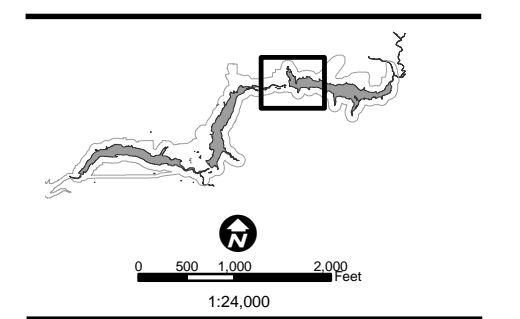
FIGURE 5.4-1 (4 of 7)
Exotic/Invasive Plant Species Locations



Legend

■ Weed Infestation	
CODE	SPECIES
CIAR	Canada Thistle
CYSC	Scot's Broom
CIVU	Bull Thistle
HYPE	St. John's Wort
IMGL	Policeman's Helmet
POCU	Japanese Knotweed
RUDI	Himalayan Blackberry
PUUR	Trailing Blackberry
SEJA	Tansy Ragwort
DENSITY	
D1	Trace - 0.5 plants/square yard
D2	0.6 - 5 plants/square yard
D3	6 - 20 plants/square yard
D4	> 20 plants/square yard

Road	
---	Trail
---	Unimproved
---	Light Duty
---	Primary
---	Secondary
---	Railroad
---	Stream
---	Transmission Line R.O.W
□	Open Water
□	Study Area



*Lewis River
Hydroelectric Projects*

FIGURE 5.4-1 (5 of 7)
Exotic/Invasive Plant
Species Locations



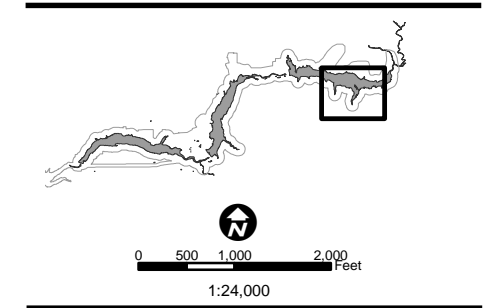
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Weed Infestation

CODE	SPECIES
CIAR	Canada Thistle
CYSC	Scot's Broom
CIVU	Bull Thistle
HYPE	St. John's Wort
IMGL	Policeman's Helmet
POCU	Japanese Knotweed
RUDI	Himalayan Blackberry
PUUR	Trailing Blackberry
SEJA	Tansy Ragwort

DENSITY	
D1	Trace - 0.5 plants/square yard
D2	0.6 - 5 plants/square yard
D3	6 - 20 plants/square yard
D4	> 20 plants/square yard

- Road**
- Trail
 - === Unimproved
 - == Light Duty
 - Primary
 - Secondary
 - Railroad
 - ~ Stream
 - Transmission Line R.O.W
 - Open Water
 - Study Area



Lewis River Hydroelectric Projects

FIGURE 5.4-1 (6 of 7)
Exotic/Invasive Plant Species Locations



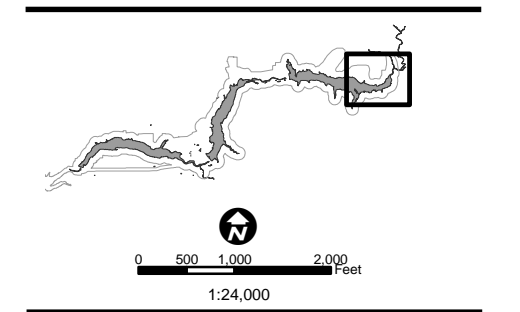
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■ Weed Infestation

CODE	SPECIES
CIAR	Canada Thistle
CYSC	Scot's Broom
CIVU	Bull Thistle
HYPE	St. John's Wort
IMGL	Policeman's Helmet
POCU	Japanese Knotweed
RUDI	Himalayan Blackberry
PUUR	Trailing Blackberry
SEJA	Tansy Ragwort

DENSITY	
D1	Trace - 0.5 plants/square yard
D2	0.6 - 5 plants/square yard
D3	6 - 20 plants/square yard
D4	> 20 plants/square yard

- Road**
- Trail
 - === Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area



Lewis River Hydroelectric Projects

FIGURE 5.4-1 (7 of 7)
Exotic/Invasive Plant Species Locations

- **Bull Thistle and Canada Thistle** - Canada thistle is usually an herbaceous component of recently logged areas. Dense infestations of this species were located at only a few sites in the vicinity of the Merwin Project. A recent clearcut east of Speelyai Bay had large patches of Canada thistle, but most infestations were small and scattered throughout the study area. Canada thistle is a common roadside weed at Yale Lake and is often found in association with Himalayan blackberry. Bull thistle is less common than Canada thistle but was found in similar habitats in clearcuts, along roadsides, and in disturbed areas. Infestations of this species occur primarily in the vicinities of Saddle and Yale dams. Individual plants are commonly seen along roadsides in the vicinity of Yale and Swift reservoirs and adjacent to the Swift Canal.
- **Himalayan Blackberry** – Himalayan blackberry is ubiquitous in disturbed sites, particularly in moist locations with abundant light (Hoshovsky 1998a). It was commonly seen along roads near culverts. Because this plant is so common in the study area, only large infestations were mapped (Figure 5.4-1). Many small patches also occur. One of the largest infestations occurs on the west side of Speelyai Bay. Other large patches occur below Merwin Dam, at Cresap Bay, below Saddle and Yale dams, in the bypass reach below Swift Dam, and along Swift canal.
- **Japanese Knotweed** - Japanese knotweed is increasingly a problem species in western Washington and Oregon and merits vigorous control to prevent its spread (The Nature Conservancy, nd). This species grows up to 10 feet (3 m) tall and forms large clusters which displace virtually all other vegetation. It spreads by seed and by rhizomes, which can reach a length of 20 feet (6 m). Many infestations occur along rivers, which carry seeds and rhizomes from existing stands (Seiger 1999). In the study area, Japanese knotweed was limited to a borrow pit below Merwin Dam and to several large patches along the river downstream of the dam.
- **Policeman's Helmet** – Policeman's helmet is in the impatiens family and was only found along the Lewis River within 0.5 mile (0.8 km) below Merwin Dam. This species is a Class B designate in Clark, Cowlitz, and Skamania counties, with control required by Washington State law. It appears to be spreading throughout the Northwest but is not yet widespread in Washington. A related native species—common touch-me-not or jewelweed (*Impatiens noli-tangere*)—dominates the riparian area along Speelyai Creek.
- **Scot's Broom** - Infestations of Scot's broom are scattered throughout the study area, particularly in open areas along the Lewis River Road/USFS Road No. 90. South of Lake Merwin it was absent from most of the transmission line ROW, primarily because PacifiCorp removes this species by mowing or cutting. It was present, however, in other transmission/utility corridors in the study area. It also has invaded oak woodlands, a relatively rare habitat in the study area. These sites have an open canopy with a dry substrate, which is optimal for Scot's broom growth (Hoshovsky 1998b). PacifiCorp has undertaken control efforts at these sites as well, but seedlings were observed in several oak woodlands. Relatively small but dense patches of Scot's broom occur below Saddle and Yale Dam and along roadsides in the vicinity

of Yale Lake. Large patches of Scot's broom also occur along the Swift canal, in the Swift bypass reach, and at the base of Swift Dam.

- **St. John's Wort** - St. John's wort is a common roadside weed scattered throughout the study area. It occurred in thick infestations in relatively few areas: immediately downstream of Merwin Dam, on 1 section of the transmission line ROW near the dam, along Highway 503 along Yale Lake, and along roads on the east sides of the lake. It was present at low densities throughout the transmission line ROWs at the Swift, Yale, and Merwin projects.
- **Tansy Ragwort** – Tansy ragwort is a biennial or short-lived perennial from a taproot and is wide spread in Washington, Oregon, and California. Tansy ragwort was observed only at the north end of Yale Lake and in several locations on the south side of Swift Reservoir. This species was not observed in the vicinity of the Merwin Project.
- **Trailing Blackberry** – Trailing blackberry is another ubiquitous species in the study area. The only native blackberry species in the Pacific Northwest, it is found in the understories of virtually all vegetation types, typically at low densities. In some disturbed areas, however, it can form thick patches, excluding the establishment of other species. Dense patches of trailing blackberry were found in only 4 locations in the study area, in 2 clearcuts east of Speelyai Bay, along the Lewis River downstream of Merwin Dam, and overgrowing decadent Scot's broom under a canopy of red alder on Eagle Island.

5.4.5.4 CS Plants

Most of the CS plants are common species found in a variety of plant associations. Species not found in the study area include grouse huckleberry (*Vaccinium deliciosum*), oval-leaved huckleberry (*Vaccinium ovalifolium*), Columbia lily (*Lilium columbianum*), lovage (*Ligusticum canbyi*), may apple (*Veratrum* sp.), and whortleberry (*Vaccinium scoparium*). Few CS species were noted around project facilities, dams, powerhouses, ROWs, or other disturbed areas by active clearing and mowing and associated human activities. Tables 5.4-7–5.4-9 show the occurrence of CS plants throughout the study area.

Most of the CS plants are widely distributed in the study area, which is logical, as Native Americans incorporated a wide variety of plants into their daily lives. Some of these species may be present in the study area at low densities and were not encountered during the field surveys. Widespread species include blackberries (*Rubus* spp.), blueberries (*Vaccinium* spp.), chokecherry (*Prunus virginiana*), grasses (*Gramineae* spp.), hazelnut (*Corylus cornuta*), huckleberry (*Vaccinium* spp.), kinnikinnick (*Arctostaphylos uva-ursi*), moss (*Musci* spp.), Oregon grape (*Berberis aquifolium*), salal (*Gaultheria shallon*), willow (*Salix* spp.). While relatively common, some species were associated with specific habitats. For instance, cedar (*Thuja plicata*), salmonberry, tulle, and water parsley were associated with moist soil conditions or wetlands. Chokecherry, elderberry (*Sambucus* spp.), and currant (*Ribes* spp.) were often associated with open spaces along the edge of forests. Lodgepole pine (*Pinus contorta*) was found on lava flows near Yale Lake and

Table 5.4-7. General locations of culturally sensitive plants in the vicinity of the Merwin Project.

Common Name ^{1,2}	General Location						
	Eagle Island	Lewis River downstream of Merwin Dam	Lake Merwin - North Shore	Lake Merwin - South Shore	Speelyai Bay	Cresap Bay	Transmission Line ROW
Alder	X	X	X	X	X	X	X
Beargrass			X	X			
Blackberry	X	X	X	X	X	X	X
Blackcap	X	X	X	X	X	X	X
Blueberry	X	X	X	X	X	X	X
Camas			X	X			
Wild onion			X	X			
Cedar		X	X	X	X	X	
Chokecherries		X	X	X			
Cranberries			X	X			X
Currant			X	X			X
Devil's club		X	X	X	X	X	
Elderberry	X	X	X	X	X	X	X
Fir		X	X	X			
Gooseberries			X	X			X
Grass	X	X	X	X	X	X	X
Hawthorn berry							
Hazelnuts	X	X	X	X	X	X	X
Huckleberry, big		X	X	X	X	X	X
Huckleberry, grouse							
Huckleberry, oval-leaved							
Huckleberry, red	X	X	X	X	X	X	X
Kinnikinnick		X	X	X	X	X	X
Lily, Columbia							
Lovage							
May apple							
Moss	X	X	X	X	X	X	X
Moss, green	X	X	X	X	X	X	X
Oregon grape	X	X	X	X	X	X	X
Pine nuts							
Pine nuts, white bark							
Salal berry	X	X	X	X	X	X	X
Salmonberries	X	X	X	X	X	X	X
Serviceberry	X	X	X	X	X	X	X
Sorrel		X		X			
Spring beauty	X	X	X	X	X	X	X
Strawberries		X	X	X			X
Tule	X	X	X	X	X	X	
Water parsley	X	X	X	X	X	X	
Whortleberry							
Willow	X	X	X	X	X	X	X

¹ Source: Hajda et al. (1995)

² See Table 5.4-2 for scientific names.

Table 5.4-8. General locations of culturally sensitive plants in the vicinity of the Yale project.

Common Name ^{1,2}	General Location						
	Lewis River Road Corridor	Saddle Dam and Yale Dam	Downstream of Yale Dam	Beaver Bay	West Shore	Transmission Line ROW	East Shore
Alder	X	X	X	X	X	X	X
Beargrass				X	X		X
Blackberry	X	X	X	X	X	X	X
Blackcap	X	X	X	X	X	X	X
Blueberry	X	X	X	X	X	X	X
Camas				X	X		
Wild onion					X		
Cedar		X	X	X	X	X	
Chokecherries		X	X	X	X		
Cranberries							X
Currant		X	X	X	X		X
Devil's club		X	X	X	X	X	X
Elderberry	X	X	X	X	X	X	X
Fir		X	X	X	X		X
Gooseberries			X		X		X
Grass	X	X	X	X	X	X	X
Hawthorn berry							
Hazelnuts	X	X	X	X	X	X	X
Huckleberry, big	X	X	X	X	X	X	X
Huckleberry, grouse							
Huckleberry, oval-leaf							
Huckleberry, red	X	X	X	X	X	X	X
Kinnikinnick	X	X	X	X	X	X	X
Lily, Columbia							
Lovage							
May apple							
Moss	X	X	X	X	X	X	X
Moss, green	X	X	X	X	X	X	X
Oregon grape	X	X	X	X	X	X	X
Pine nuts							
Pine nuts, white bark							
Salal berry	X	X	X	X	X	X	X
Salmonberries	X	X	X	X	X	X	X
Serviceberry	X	X	X	X	X	X	X
Sorrel							
Spring beauty	X	X	X	X	X	X	X
Strawberries		X	X	X	X	X	X
Tule	X	X	X	X	X	X	
Water parsley	X	X	X	X	X	X	
Whortleberry							
Willow	X	X	X	X	X	X	X

¹ Source: Hajda et al. (1995)

² See Table 5.4-2 for scientific names.

Table 5.4-9. General locations of culturally sensitive plants in the vicinity of the Swift Nos. 1 and 2 projects.

Common Name ^{1,2}	General Location						
	Lewis River Road Corridor	Swift Dam	Swift By-Pass Reach	North Shore	South Shore	Transmission Line ROW	Swift Canal
Alder	X	X	X	X	X	X	X
Beargrass				X	X		
Blackberry	X	X	X	X	X	X	X
Blackcap	X			X	X	X	X
Blueberry	X	X	X	X	X	X	
Camas				X	X		
Wild onion				X			
Cedar		X	X	X	X	X	
Chokecherries	X	X	X	X	X		
Cranberries							
Currant			X	X	X		
Devil's club				X	X		
Elderberry	X	X	X	X	X	X	
Fir				X			
Gooseberries			X	X	X		
Grass	X	X	X	X	X	X	X
Hawthorn berry							
Hazelnuts	X	X	X	X	X	X	
Huckleberry, big		X	X	X	X	X	
Huckleberry, grouse							
Huckleberry, oval-leaf							
Huckleberry, red	X	X	X	X	X	X	
Kinnikinnick	X	X	X	X	X	X	X
Lily, Columbia							
Lovage							
May apple							
Moss	X	X	X	X	X	X	X
Moss, green	X	X	X	X	X	X	X
Oregon grape	X	X	X	X	X	X	
Pine nuts				X			
Pine nuts, white bark							
Salal berry	X	X	X	X	X	X	X
Salmonberries	X	X	X	X	X	X	X
Serviceberry	X	X	X	X	X	X	
Sorrel							
Spring beauty	X	X	X	X	X	X	X
Strawberries		X	X	X			X
Tule	X	X	X	X	X	X	
Water parsley	X	X	X	X	X	X	
Whortleberry							
Willow	X	X	X	X	X	X	

¹ Source: Hajda et al. (1995), ² See Table 5.4-2 for scientific names.

salmonberry (*Rubus spectabilis*), serviceberry (*Amelanchier alnifolia*), spring beauty (*Claytonia lanceolata*), tule (*Scirpus lacustris*), water parsley (*Oenanthe sarmentosa*), and Lake Merwin, scattered ponderosa pine (*Pinus ponderosa*) are located at the upstream end of Swift Reservoir. However, neither of these pines provide large nuts suitable for foraging.

5.4.5.5 Cottonwoods

Cottonwoods occur in several general locations within the study area. They were found along the free flowing reaches immediately downstream of the dams, on benches above project reservoir shorelines, along seeps or drainages, and in wetlands (Figure 5.4-2). Shorelines around the project reservoirs are generally moderate or steep slopes dominated by second-growth Douglas-fir (*Pseudotsuga menziesii*) forests and do not support cottonwood.

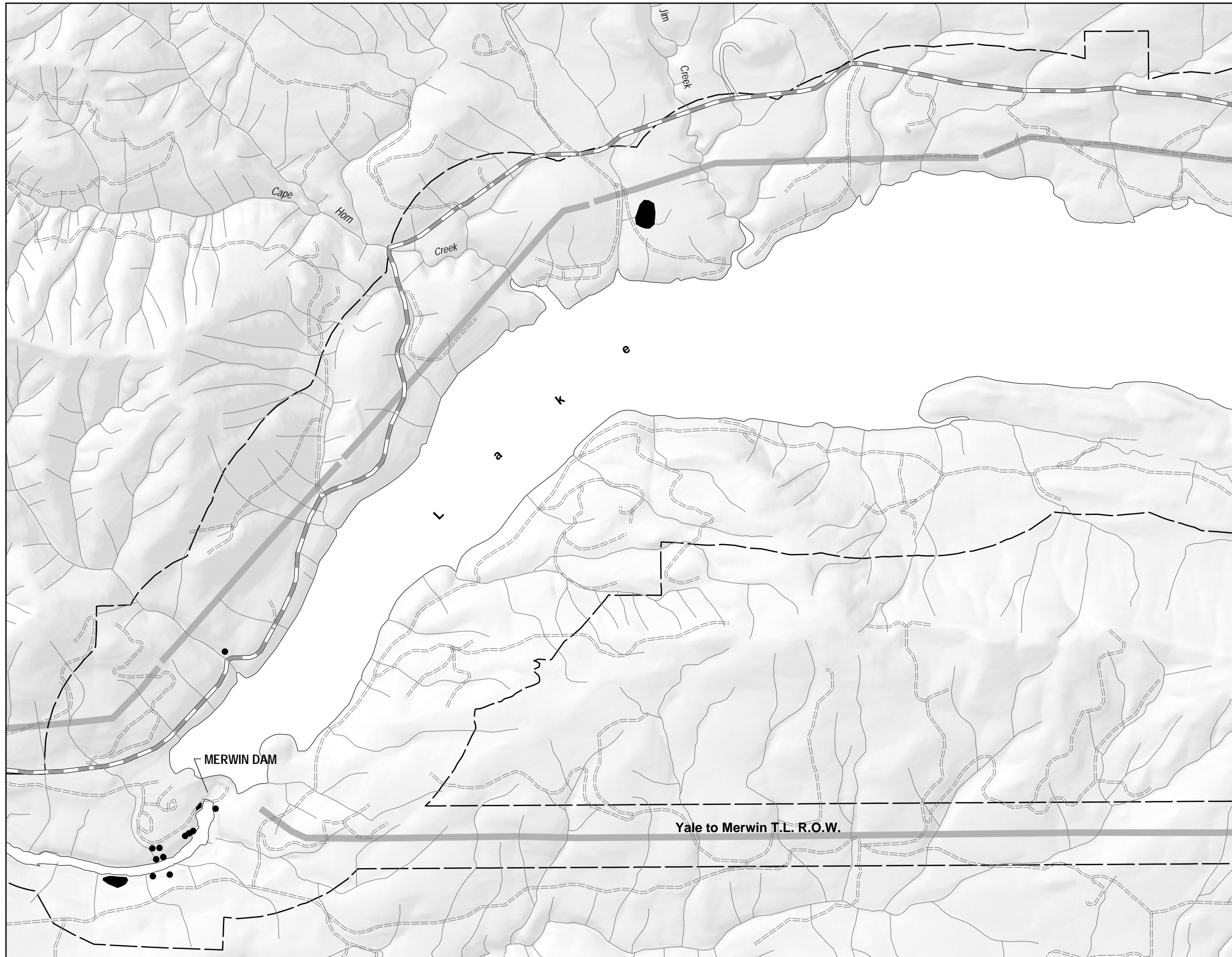
Individual cottonwoods are scattered below Merwin Dam, with one stand located on a bench beside the river. Few cottonwoods were observed along the shoreline of Lake Merwin, but several large trees (>24 inch dbh [61 cm]) were observed on benches up to 75 feet (23 m) above the reservoir full-pool elevation. In addition, a few large individuals and small stands of large trees occur at some distance from the reservoir (Figure 5.4-2). These are apparently unassociated with floodplains or drainages, but may reflect a changed hydrologic regime. Small cottonwoods probably occur in scattered drainages on the south side of the reservoir but much of this area is inaccessible and privately owned land and therefore was not intensely surveyed.

One small cottonwood stand and scattered individual trees occur in the vicinity of Yale Dam; only scattered individuals were observed along the reservoir shoreline. The largest concentrations of cottonwoods occur at the upstream end of the reservoir and along the adjoining Swift bypass reach. Individual cottonwood trees occur on benches above the lake, in small patches in tributaries to the reservoir, and on the island immediately downstream of the Swift No. 2 powerhouse.

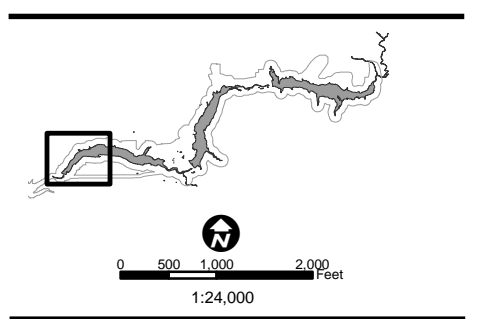
Large stands (> 3 acres [1.2 ha]) of cottonwood occur in the Swift bypass reach along the channel, on islands, and on benches within the floodplain. Cottonwoods are also found in the wetlands near Swift canal and below Swift Dam. There are only a few scattered cottonwoods along the western half of Swift Reservoir. Cottonwoods occur more often along the eastern half of the reservoir on benches above the shoreline or in tributary drainages.

5.4.6 Discussion

No currently listed TES species were observed in the study area. The green-fruited sedge, once designated as a List 4 species by WNHP but no longer listed because it is too common, occurs in 2 wetlands. The persistence of green-fruited sedge in the wetland on the Lewis River shoreline between Yale Dam and Lake Merwin appears to be threatened by reed canarygrass, which dominates this location. The lack of TES species generally reflects the disturbed nature of most of the study area. Roads, agricultural and residential development, clearcuts, and second-growth Douglas-fir forest dominate the landscape. These conditions are not optimal for the occurrence of rare plants. Most CS plants were widespread throughout the study area, often occupying a number of plant associations.

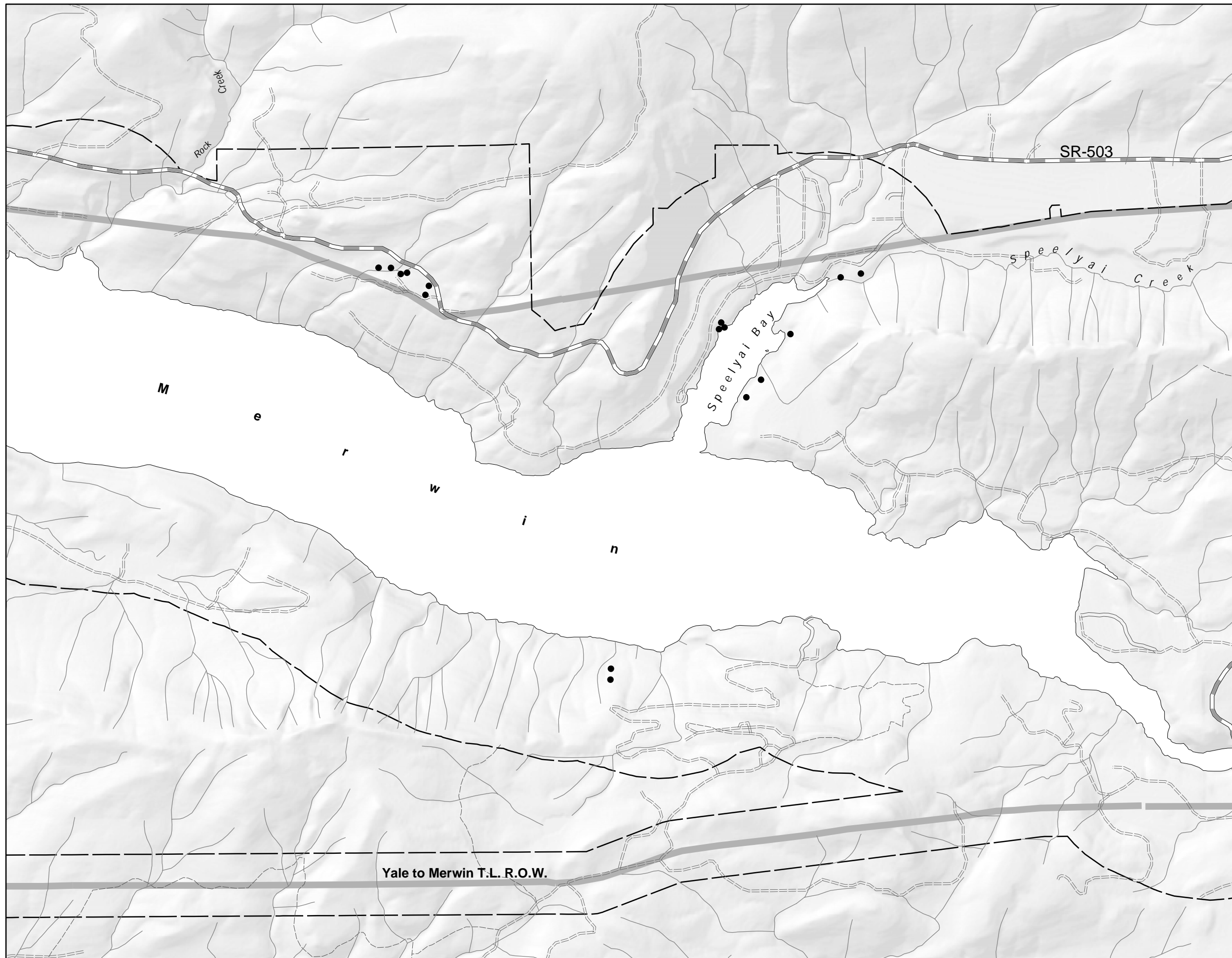


- Legend**
- Large Cottonwood Tree
 - Cottonwood Stand
- Road**
- - - Trail
 - - - Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area



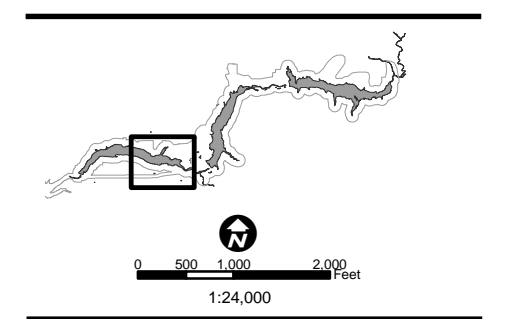
*Lewis River
Hydroelectric Projects*

FIGURE 5.4-2 (1 of 7)
Cottonwood Locations



Legend

- Large Cottonwood Tree
- Cottonwood Stand
- Road
 - Trail
 - Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area



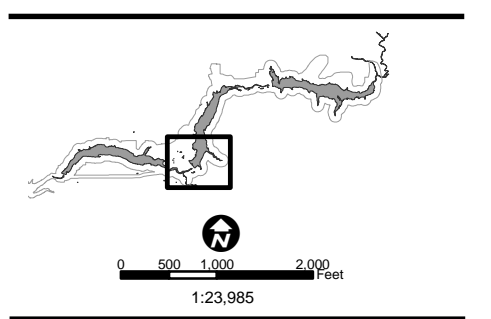
*Lewis River
Hydroelectric Projects*

FIGURE 5.4-2 (2 of 7)
Cottonwood Locations



Legend

- Large Cottonwood Tree
- Cottonwood Stand
- Road
 - Trail
 - Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area

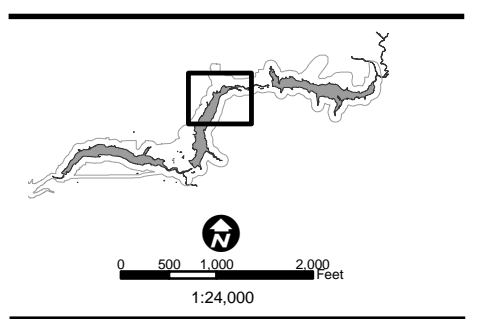


*Lewis River
Hydroelectric Projects*

FIGURE 5.4-2 (3 of 7)
Cottonwood Locations

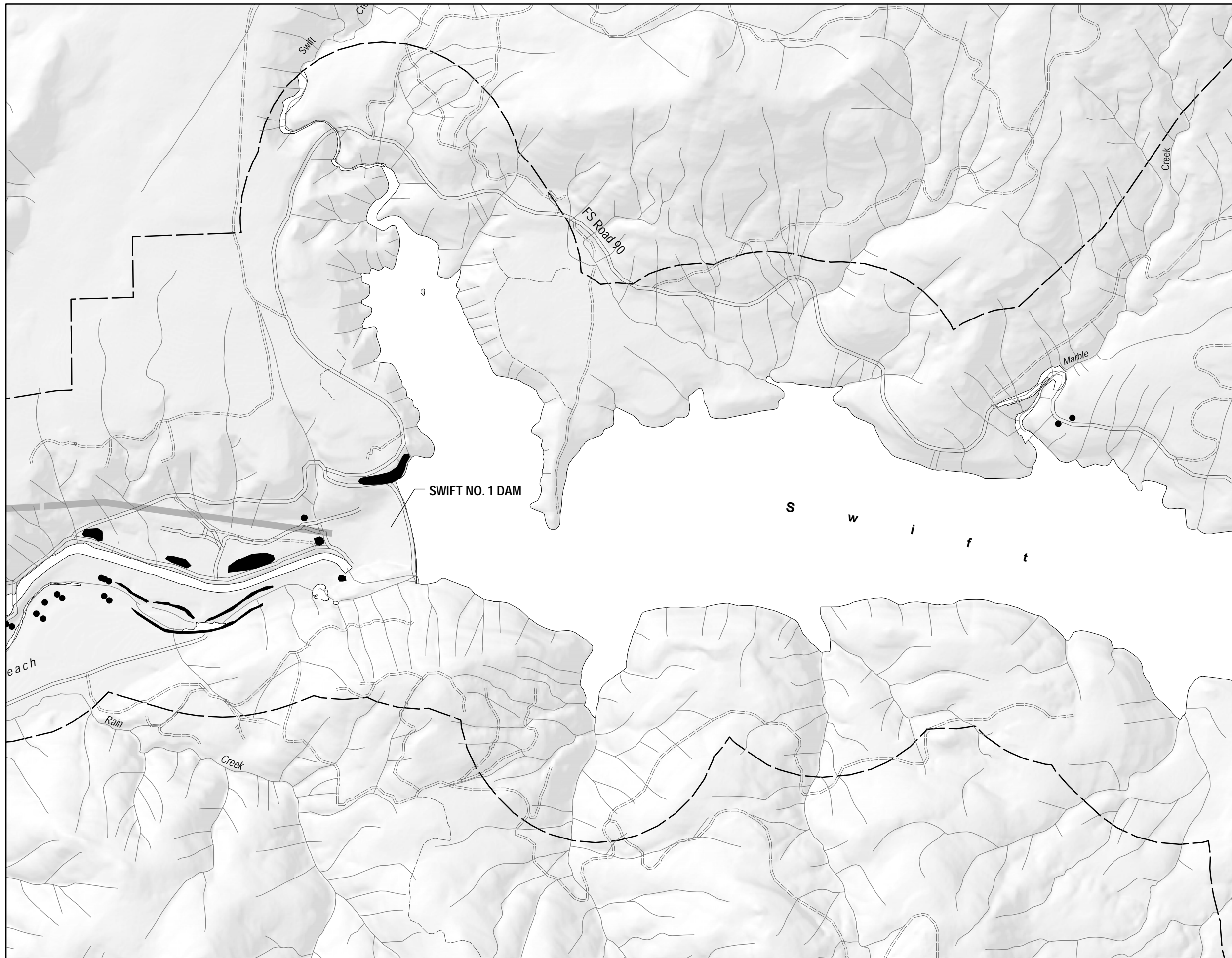


- Legend**
- Large Cottonwood Tree
 - Cottonwood Stand
- Road**
- - - Trail
 - - - Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area

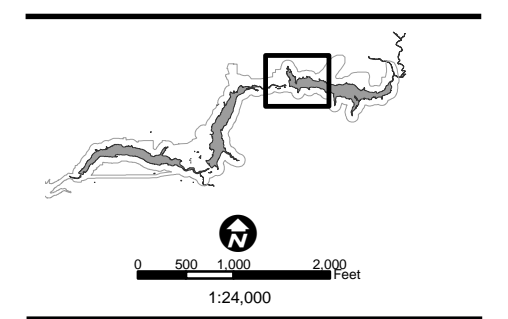


*Lewis River
Hydroelectric Projects*

FIGURE 5.4-2 (4 of 7)
Cottonwood Locations

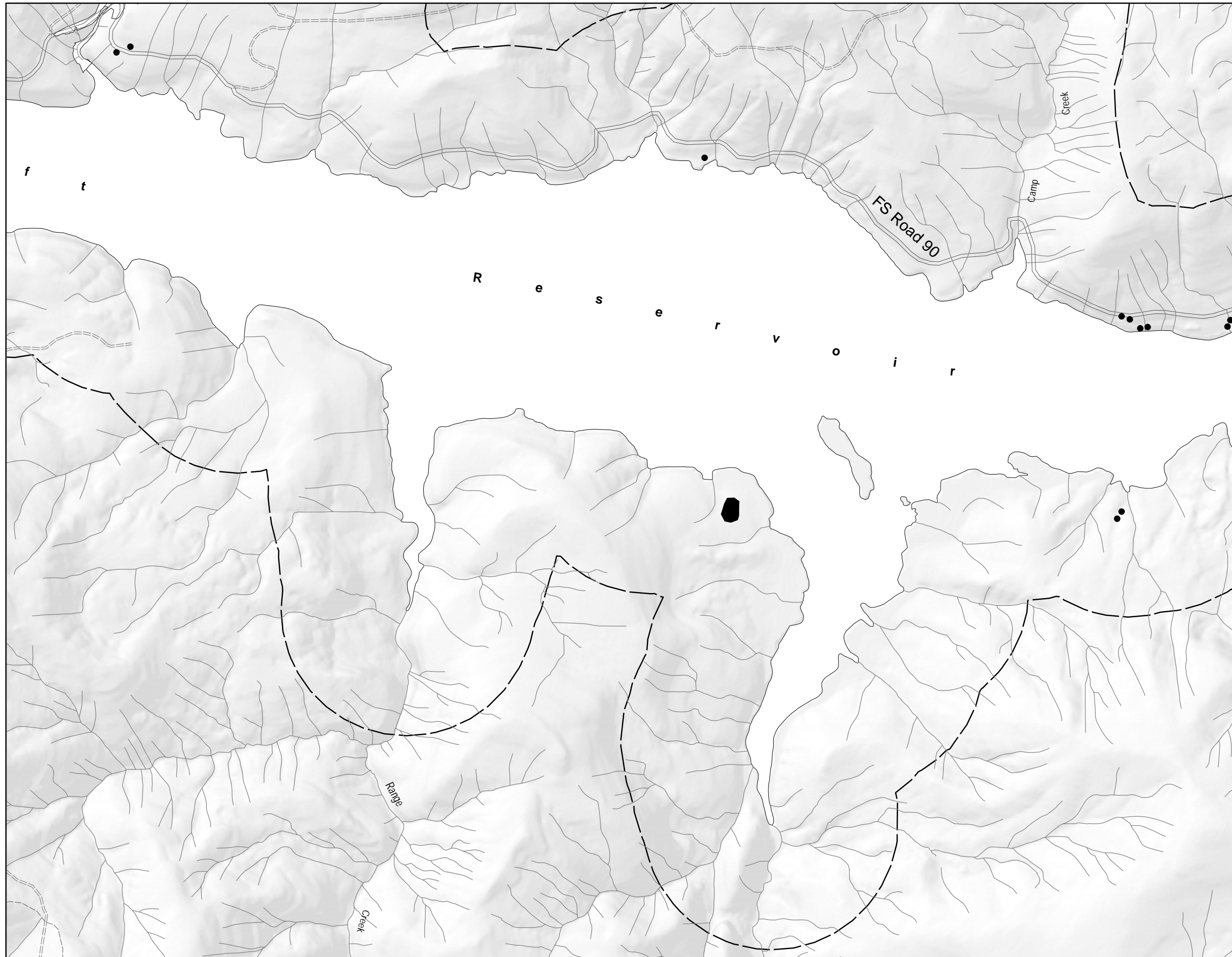


- Legend**
- Large Cottonwood Tree
 - Cottonwood Stand
- Road**
- Trail
 - Unimproved
 - Light Duty
 - Primary
 - Secondary
 - Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area

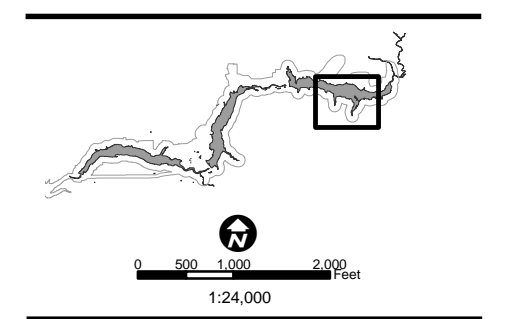


*Lewis River
Hydroelectric Projects*

FIGURE 5.4-2 (5 of 7)
Cottonwood Locations



- Legend**
- Large Cottonwood Tree
 - Cottonwood Stand
- Road**
- Trail
 - ==== Unimproved
 - ==== Light Duty
 - ==== Primary
 - ==== Secondary
 - +— Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area

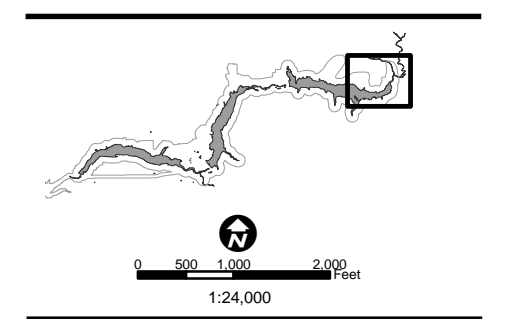


*Lewis River
Hydroelectric Projects*

FIGURE 5.4-2 (6 of 7)
Cottonwood Locations



- Legend**
- Large Cottonwood Tree
 - Cottonwood Stand
- Road**
- - - Trail
 - - - Unimproved
 - == Light Duty
 - == Primary
 - == Secondary
 - - - Railroad
- ~ Stream
- Transmission Line R.O.W
- Open Water
- Study Area



*Lewis River
Hydroelectric Projects*

FIGURE 5.4-2 (7 of 7)
Cottonwood Locations

Overall, weed infestations occupy a relatively small portion of the study area for the Lewis River Projects. Most weed species thrive in full sun, and the second-growth Douglas-fir stands that dominate the study area generally shade out most invasive species. However, weed infestations are common around project facilities, disturbed open ground, and along roadsides. The most prevalent weed species are Scot's broom, Himalayan blackberry, and Canada thistle. Scot's broom occurs along the south-facing slopes of the Lewis River Road, within transmission line rights-of-way, and near project facilities. Himalayan blackberry generally occurs along roadways and adjacent to project facilities in wet/moist areas, while Canada thistle most commonly occurs along roadways and in clearcuts.

The combination of agriculture, development, clearcuts, and roadways in the study area and adjacent lands has encouraged the spread of weeds. Disturbed areas around the project dams and maintenance facilities are fertile ground for the spread of weeds. Scot's broom is prevalent on some islands in the Swift bypass reach in areas that appear to have been scoured from the 1996 flood. From inspection of historic photographs of Eagle Island, it appears that Scot's broom was more prevalent on the island in 1998 than it is currently. Alder (*Alnus rubra*) and cottonwood have overgrown Scot's broom over much of the island. A narrow strip of Scot's broom persists along the northeast perimeter of Eagle Island and in a few interior locations.

Oak woodlands occupy a minor area in the landscape of the study area and provide habitat for some uncommon, though not rare, plants. Scot's broom is a potential invasive species with the potential to become a threat to these sites because of their dry, often south-facing slopes, which are conducive to Scot's broom growth. While there was evidence of small (< 3 foot [1 m] tall) Scot's broom in some oak woodlands, PacifiCorp conducts regular Scot's broom control in these habitats on their lands. With continued weed control, these oak woodlands should continue to persist in the study area.

Land use practices such as clear-cutting, agriculture, road-building, and development within the study area provide a vast seed source and travel corridors for noxious weeds. Intensive recreation use can spread weeds from vehicles and people's clothing and vegetation disturbance. It is likely that development on private lands and continued logging on public lands in the vicinity will continue to affect weed distribution in the study area. Management of recreation along the reservoirs will aid in habitat preservation and reduction of disturbed habitats where weeds can flourish.

Cottonwoods are most common and occur in the greatest density along the shoreline of the Lewis River below Merwin Dam, on Eagle Island, and in the Swift bypass reach. The presence of wide, relatively stable islands and gravel bars provides suitable conditions for cottonwood growth (Johnson 1994). In contrast, the river channel below Yale and Merwin is more constrained and a reflection of the geology. Lava flows affect the range of channel movement and limit the development of island and larger gravel bars, conditions less conducive to cottonwood growth and survival. The dense second-growth coniferous forest around the reservoir dominates the landscape, and cottonwoods are generally limited to drainages, wetlands, and some upland benches above the reservoirs. Most tributaries to the reservoirs are generally small and are bordered primarily by red alder and not cottonwood.

Recommendations

The following actions are recommended for limiting noxious weeds and maintaining habitat diversity within the study area:

- Continue noxious weed control on PacifiCorp lands in coordination with public land management efforts. Weed control on PacifiCorp land should concentrate on project roads, project facilities, and oak woodlands.
- Limit dispersed camping to designated sites to reduce habitat disturbance and the spread of weeds.
- Preserve riparian and wetland corridors through the use of buffers during timber harvest planning and implementation on PacifiCorp lands.

5.4.7 Schedule

No further data collection is anticipated for TES or CS plants, noxious weeds, or cottonwoods. This report is the final documentation for these studies.

5.4.8 References

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WSWCB (Washington State Weed Control Board). 2000.
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5.4.9 Comments and Responses on Draft Report

This section presents stakeholder comments provided on the draft report, followed by the Licensees' responses. The final column presents any follow-up comment offered by the stakeholder and in some cases, in italics, a response from the Licensees.

Commenter	Volume	Page/ Paragraph	Statement	Comment	Response	Response to Responses
WDFW – KAREN KLOEMPKEN	2	TER 04	Analysis of TES plants.	Where is the analysis of TES plants and factors affecting their distribution?	This information is presented in Section 5.4.6.	
WDFW – KAREN KLOEMPKEN	2	TER 04	Analysis of Noxious Weeds.	Where is the analysis of how noxious weeds affect the analysis species or TES plants?	This information is presented in Section 5.4.6.	
WDFW – KAREN KLOEMPKEN	2	TER 04	Evaluation of on going project effects on cottonwood trees.	Where is the evaluation of on going project effects on distribution of cottonwood trees?	This information is presented in Section 5.4.6.	
USDA Forest Service: Mitch Wainwright	2	TER 04-3 5.4.3.3	Surveys for Survey and Manage plant species were conducted on the USFS parcel at Drift Creek.	The results of Survey and Manage plant surveys at Drift Creek are not reported.	No S/M plant species were found during surveys in the vicinity of Drift Creek. Several sentences were added to Section 5.4.5.2 for clarification.	
WDFW – KAREN KLOEMPKEN	2	TER 04-5 Sec. 5.4.3.4 Mapping; para 2; last sentence	Cottonwood seedling stands.	How is it possible that a research botanist from OSU could not distinguish between alder seedling and cottonwood seedling stands?	It is difficult to distinguish seedling species from a distance. Not all deciduous stands could be confirmed.	
WDFW – KAREN KLOEMPKEN	2	TER 04-9 para (last)	Reed canarygrass.	Why wasn't reed canarygrass included in Table 5.4.3 of exotic and invasive plant species? The fact that	The target list of exotic and invasive plants was developed in cooperation	

Commenter	Volume	Page/ Paragraph	Statement	Comment	Response	Response to Responses
				<p>it is common in wetlands in Washington and in the Lewis River study area doesn't make it any less of an exotic and/or invasive species. It is no different than Scot's broom as an invasive species, which was included in Table 5.4.3.</p>	<p>with the TRG and the USFS botanist, and as stated in the text, not all invasive and exotic plants were included. Reed canarygrass is very pervasive in western WA and there are no control programs for this species in most counties. Scot's broom and a number of other species, however, are controlled by PacifiCorp in the project area.</p>	

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TER 4 Appendix 1

TES Plant Species

TER 4 Appendix 1. TES Plant Species.

Species	USFWS	USFS	State	Potential/Known Occurrence ²
Vascular Plants				
Barrett's beardtongue (<i>Penstemon barrettiae</i>)	SC	S	T-	SK
Bog clubmoss (<i>Lycopodiella inundata</i>)	-	-	S	SK
Bolandra (<i>Bolandra oregona</i>)	-	-	S	CL, SK
Bradshaw's lomatium (<i>Lomatium bradshawii</i>)	E	-	E	CL
Branching montia (<i>Montia diffusa</i>)	-	S	S	CL, SK
Canyon bog-orchid (<i>Platanthera sparsiflora</i>)	-	-	S	SK
Cold-water corydalis (<i>Corydalis aquae-gelidae</i>)	SC	S/M, S	T	CL, CO, SK/Drift Cr.
Clustered lady slipper (<i>Cypripedium fasciculatum</i>)	SC	S/M,S	T	SK/Drift Cr.
Columbia yellow-cress (<i>Rorippa columbiana</i>)	SC	S	T	SK
Diffuse stickseed (<i>Hackelia diffusa</i> var <i>diffusa</i>)	-	-	S	SK
False pimpinell (<i>Lindernia dubia</i>)	-	-	R	CL
Few-flowered collinsia (<i>Cypripedium fasciculatum</i> var <i>bruceae</i>)	-	S	S	SK
Flat-leaved bladderwort (<i>Utricularia intermedia</i>)	-	S	S	SK
Fringed grass-of-parnassus (<i>Parnassia fimbriata</i>)	-	S	S	SK
Giant helleborine (<i>Epipactis gigantea</i>)	-	-	S	CL, SK
Golden chinquapin (<i>Chrysolepis chrysophylla</i>)	-	-	S	SK
Golden indian-paintbrush (<i>Castilleja levisecta</i>)	T	-	E	CL
Gorge daisy (<i>Erigeron oreganus</i>)	SC	-	T	SK
Great polemonium (<i>Polemonium carneum</i>)	-	S	T	CL, SK
Green-fruited sedge (<i>Carex interrupta</i>)	-	S	W	Yale, Merwin
Hairy-stemmed checker-mallow (<i>Sidalcea hirtipes</i>)	-	-	E	CL
Howell's daisy (<i>Erigeron howellii</i>)	SC	S	T	SK
Howell's rush (<i>Juncus howellii</i>)	-	-	R	SK
Idaho gooseberry (<i>Ribes oxycanthoides</i> ssp. <i>irrigum</i>)	-	-	S	CL
Lance-leaved grape-fern (<i>Botrychium lanceolatum</i>)	-	-	S	SK
Large-awn sedge (<i>Carex macrochaeta</i>)	-	S	S	SK
Lesser bladderwort (<i>Utricularia minor</i>)	-	-	R	CL, CO, SK
Moonwort (<i>Botrychium lunaria</i>)	-	S/M, S	S	SK
Mountain grapefern (<i>Botrychium montanum</i>)	-	S/M, S	S	SK/Drift Cr.
Mountain lady slipper (<i>Cypripedium montanum</i>)	-	S/M	W	SK/Drift Cr.
Nelson's checkermallow (<i>Sidalcea nelsoniana</i>)	T	-	E	CO
Northern microseris (<i>Microseris borealis</i>)	-	-	S	SK
Nuttall's quillwort (<i>Isoetes nuttallii</i>)	-	-	S	CO
Oregon coyote-thistle (<i>Eryngium petiolatum</i>)	-	-	T	CL
Oregon sullivantia (<i>Sullivantia oregana</i>)	SC	-	T	SK
Pale blue-eyed grass (<i>Sisyrinchium sarmentosum</i>)	SC	S	T	SK
Round-leaved orchid (<i>Platanthera orbiculata</i>)	-	S/M	W	SK/Drift Cr.
Small-flowered trillium (<i>Trillium parviflorum</i>)	-	-	S	CL
Soft-leaved willow (<i>Salix sessilifolia</i>)	-	-	T	CO
Spleenwort-leaved goldthread (<i>Coptis aspleniifolia</i>)	-	S/M, S	S	SK/Drift Cr.
St. John's moonwort (<i>Botrychium pinnatum</i>)	-	-	S	SK

TER 4 Appendix 1. TES Plant Species (cont.)

Species	USFWS	USFS	State	Potential/Known Occurrence ²
Tall bugbane (<i>Cimicifuga elata</i>)	SC	S	T	CL, CO, SK
Threelobed goldthread (<i>Coptis trifolia</i>)	-	S/M, S	-	SK/Drift Cr.
Torrey's peavine (<i>Lathyrus torreyi</i>)	SC	-	T	CL
Victorin's grape-fern (<i>Botrychium minganense</i>)	-	S	R	SK/Drift Cr.
Water howellia (<i>Howellia aquatilis</i>)	T	S	T	CL
Western ladies-tresses (<i>Spiranthes porrifolia</i>)	-	-	S	SK
Western yellow oxalis (<i>Oxalis suksdorfii</i>)	-	-	S	CL
Wheeler's bluegrass (<i>Poa nervosa</i>)	-	-	S	CL, CO
White-top aster (<i>Aster curtus</i>)	SC	-	S	SK
Lichens				
<i>Hypogymnia duplicata</i>	-	S/M	P2	SK/Drift Cr.
<i>Lobaria linita</i>	-	S/M	P2	SK/Drift Cr.
<i>Pseudocyphellaria rainierensis</i>	-	S/M	P2	SK/Drift Cr.
Bryophytes				
<i>Diplophyllum plicatum</i> (liverwort)	-	S/M	-	SK/Drift Cr.
<i>Kurzia makinoana</i> (liverwort)	-	S/M	-	SK/Drift Cr.
<i>Tritomaria exsectiformis</i> (liverwort)	-	S/M	-	SK/Drift Cr.

¹ TES status is from the following sources: (1) Endangered, Threatened & Sensitive Vascular Plants of Washington—with Working Lists of Rare Non-Vascular Species (Washington Natural Heritage Program [WNHP], Department of Natural Resources [DNR] August 1997); (2) Northwest Forest Plan, as amended (USFS and BLM 2000); and (3) USFS Region 6 Sensitive Plant Species List (1999).

USFWS Status: **E**-listed as endangered under the Endangered Species Act (ESA), those species likely to become extinct within the foreseeable future; **T**-listed as threatened under the ESA, those species likely to become endangered within the foreseeable future; **SC**-species of concern, species that need additional information to support a proposal to list as threatened or endangered; not protected under the ESA.

USFS Status: **S/M**-Survey and Manage species designated in the Northwest Forest Plan, as amended (USFS and BLM 2000); **S** – listed on the Region 6 Sensitive Plant Species List (1999).

State Status: **E**-listed as endangered; **T**-listed as threatened; **S**-listed as sensitive; **R**-review, species for which more information is needed to accurately assess their status; **W**-watch, species that are more abundant and/or less threatened in WA than previously assumed; **P2**-lichen species for which WNHP is collecting information.

² Species has been: (1) recorded in Clark (CL), Cowlitz (CO), and/or Skamania (SK) counties (letter from S. Swope-Moody, Environmental Coordinator, WNHP, DNR, Olympia, WA September 24, 1998); (2) documented during Yale relicensing studies (PacifiCorp 1999) or field studies at Merwin in 2000; or (3) potentially occur on USFS lands at Drift Creek (pers. comm., Mitch Wainwright, USFS Biologist, 1999). County designations in italics indicate that species occurrence is based on historical records only. Species on the WNHP Watch List were not included unless they have been found in the project vicinity during relicensing studies or are listed by the USFS as potentially occurring near Drift Creek.