Boundary Hydroelectric Project (FERC No. 2144)

Study No. 18

Rare, Threatened, and Endangered (RTE)

Wildlife Species Study

Final Report

Prepared for
Seattle City Light

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March 2009

Correction page to Study 18, RTE Wildlife Study, as provided by SCL on January 23, 2009

p. 55, last paragraph
Replace the last paragraph with the following paragraph:

While Study 16 showed that erosion is having little effect on existing woody riparian stands, Study 1 demonstrated that both Project and non-Project-related erosion is causing some small level of continuing loss of shoreline habitat. Snags and large trees are limited in the study area and the loss of even a few could influence local nest site availability for the pileated woodpecker. It is possible that erosion along Sand Creek could eventually undercut the tree currently used by nesting bald eagles. However, bald eagles in this territory have used at least two other trees in the BWP for nesting in the past, and other suitable nesting trees are available.

Correction page to Study 18, RTE Wildlife Species Study, as provided by SCL on February 12, 2009

1) p. 3, third bullet, *The Boundary Wildlife Preserve (BWP) (155 acres) and adjoining SCL-owned property (85 acres).*

Subsequent to completion of the final report, SCL discovered a discrepancy between the description of the study area for the “adjoining SCL-owned parcel” and the area that was surveyed during field studies. The BWP was mapped accurately in the study reports and the entire BWP was surveyed as planned; this discrepancy relates only to the "adjoining SCL-owned property."

Terrestrial field crews were working from an incorrect map of the parcel and thus, detailed field surveys took place on only 42 acres of the parcel. Regardless of this error, SCL believes that the conclusions presented in the final study report are still valid.

Additionally, the size of the “adjoining SCL-owned parcel” is 88 acres, not 85 acres.

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Study No. 18: Rare, Threatened, and Endangered (RTE) Wildlife Species Study
Final Report
Boundary Hydroelectric Project (FERC No. 2144)

1 INTRODUCTION

Study No. 18, the Rare, Threatened, and Endangered Wildlife Species Study (RTE Wildlife Study), was conducted in support of the relicensing of the Boundary Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) No. 2144, as identified in the Revised Study Plan (RSP; SCL 2007) submitted by Seattle City Light (SCL) on February 14, 2007, and approved by the FERC in its Study Plan Determination letter dated March 15, 2007. This report describes the field efforts, analyses, and determination of Project effects and represents the completion of the study.

For this study, RTE wildlife species were defined as follows:

- *Federally Listed or Proposed Species*—Species that are listed and protected under the Endangered Species Act (ESA) of 1973, as endangered or threatened, or proposed for listing.

- *Federal Candidate Species*—Species for which the U.S. Fish and Wildlife Service (USFWS) believes it has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Candidate species receive no statutory protection under the ESA. However, the USFWS encourages the formation of partnerships to conserve these species.

- *U.S. Forest Service (USFS)/Bureau of Land Management (BLM) Interagency Special Status Species*—Species on the January 2008 USFS R-6/BLM OR-WA interagency list of special status species. The list, developed under the Interagency Special Status/Sensitive Species Program to create more consistency in the approach by the two agencies in conserving sensitive species, combines the USFS's and the BLM's former sensitive species lists. The list also includes species already protected under the ESA and candidates for listing.

- *USFS Colville National Forest (CNF) Management Indicator Species (MIS)*—Species on the CNF selected for management. These species "were chosen to provide habitat needs of all vertebrate species, to monitor selected habitats that could become limiting to some species through forest management activities, and to provide

sufficient populations of selected species to meet demands for wildlife-related recreation" (CNF 1988).

- *State Species of Concern*—Species that are protected by the state of Washington (Washington Administrative Code 232-12-297):

  - State Endangered Species include "species native to the state of Washington that are seriously threatened with extinction throughout all or a significant portion of their range within the state."

  - State Threatened Species include "species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats."

  - State Candidate Species are those that the Washington Department of Fish and Wildlife (WDFW) will review for possible listing as State Endangered, Threatened, or Sensitive. A species will be considered for designation as a State Candidate if sufficient evidence suggests that its status may meet the listing criteria defined for State Endangered, Threatened, or Sensitive (WDFW 2008a).

  - State Sensitive Species are defined as "species native to the state of Washington that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats" (WDFW 2008a).

- *State Monitor Species*—Species not state listed, but monitored for status and distribution. State Monitor Species are managed by the WDFW to prevent them from becoming endangered, threatened, or sensitive (WDFW 2008b).

- *WDFW Priority Species*—Priority species are those species requiring protective measures and/or management guidelines to ensure their perpetuation. These include state species of concern or species that are commercially or culturally important (WDFW 2008c).

RTE bat species are addressed in detail in the Study 20, Bat Surveys and Habitat Inventory Final Report (SCL 2009a). Deer and elk, both of which are designated as MIS on the CNF and as WDFW Priority Species, and moose, a USFS/BLM sensitive species, are addressed in the Study 19, Big Game Study Final Report (SCL 2009b). Lastly, the great blue heron is addressed both in this report and in the discussion of piscivorous birds in the Study 15, Waterfowl/Waterbird Study Final Report (SCL 2009c).

2 STUDY OBJECTIVES

The primary goals of the RTE Wildlife Study were to provide information needed to determine the presence of RTE wildlife species and/or their habitats in the Project vicinity, identify limiting

factors in landscape movement across the Project vicinity, and assess Project effects on RTE species and their habitats. Specific objectives of the study were to:

- Document historical and recent RTE wildlife species observations in the Project vicinity.
- Identify and map new occurrences of select RTE wildlife species in the Project vicinity.
- Document locations and conditions of potential habitat for RTE species and identify any factors that may limit landscape movement of these species across the Project vicinity.
- Identify potential threats to RTE wildlife species or their habitats, including potential Project effects.

3 STUDY AREA

The primary study area for the RTE Wildlife Study (Figure 3.0-1) extended approximately 18 miles along the Pend Oreille River from the Box Canyon tailrace downstream to the U.S.-Canada border and encompassed the following:

- Downstream of Metaline Falls—The reservoir fluctuation zone under normal operations (forebay elevations 1,974–1,994 feet NAVD 88 [1,970–1,990 feet NGVD 29] [1]), and the land within the FERC Project boundary (Project area). The Project area includes most Project facilities, the area 200 horizontal feet (i.e., along the ground surface, perpendicular to the shoreline) beyond the high water level along both reservoir shorelines, and the transmission line right-of-way from the powerhouse to the Bonneville Power Administration interconnection.
- Upstream of Metaline Falls—The reservoir fluctuation zone (approximately 1,986–2,020 feet NAVD [1,982–2,016 feet NGVD 29], as measured at the U.S. Geologic Survey [USGS] gage below Box Canyon Dam), and the land within approximately 200 horizontal feet beyond the high water level (approximately 2,019 feet NAVD 88 [2,015 feet NGVD 29]) along both reservoir shorelines extending to the FERC Project boundary for the Box Canyon Project.[2]
- The Boundary Wildlife Preserve (BWP) (155 acres) and adjoining SCL-owned property (85 acres).
- 100 feet around any Project works areas that extend outside the Project boundary.

[1] SCL is in the process of converting all Project information from an older elevation datum (National Geodetic Vertical Datum of 1929 [NGVD 29]) to a more recent elevation datum (North American Vertical Datum of 1988 [NAVD 88]). As such, elevations are provided relative to both data throughout this document. The conversion factor between the old and new data is approximately 4 feet (e.g., the crest of the dam is 2,000 feet NGVD 29 and 2,004 feet NAVD 88).

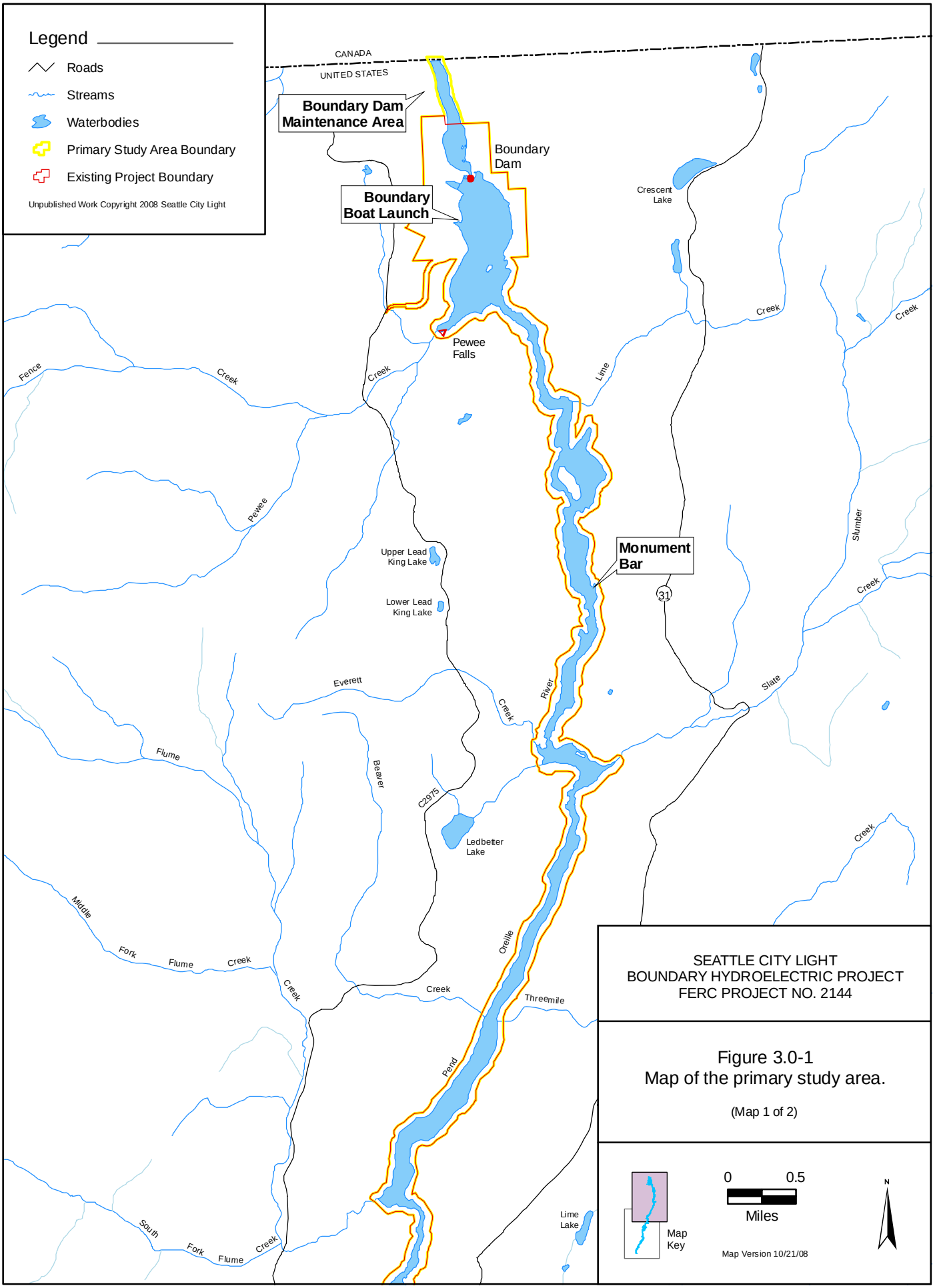
[2] As indicated in this and other study reports in the Updated Study Report, SCL agreed it is appropriate to study the existing fluctuation range of the reservoir; however, for development of the Preliminary Licensing Proposal (PLP) and License Application, SCL will base its assessment of potential protection, mitigation, and enhancement measures on that portion of the fluctuation zone that is determined to be under the influence of Boundary Project operations, versus the effects of inflows and Metaline Falls that are beyond the control of the Project.

- 50 feet along both sides of Project-related roads, which include the road between Boundary Dam and Vista House, the road to the dam off County Road 2975, and the road from Vista House to State Route 31.
- 100 horizontal feet along both sides of the river from Boundary Dam to the U.S.-Canada border (approximately 0.9 mile).

For purposes of addressing RTE wildlife species with large home ranges, a secondary study area (Figure 3.0-2) was established that covers the area between the near ridgelines east and west of the study area. The eastern boundary of the secondary study area roughly aligns with Boundary Ridge, Crowell Mountain, and Sand Creek Mountain and the ridge between the reservoir and Sullivan Lake. On the west side, the boundary follows a line connecting Frisco, Abercrombie, Litton, and Baldy mountains.

The range of water surface elevations recorded during the survey periods for this study is presented below; this range represents typical operating conditions for the period in which data were collected. Existing conditions at the time of surveys were considered adequate to acquire all data required for this study:

- From Box Canyon Dam to Metaline Falls—Elevation 1,991–2,009 feet NAVD 88 (1,987–1,995 feet NGVD 29), as measured at the USGS gage 12396500.
- From Metaline Falls to Boundary Dam—Elevation 1,968–1,993 feet NAVD 88 (1,964–1,989 feet NGVD 29), as measured at the SCL gage located in the Boundary forebay.


Legend
Roads
Streams
Waterbodies
Primary Study Area Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
CANADA
UNITED STATES
Boundary Dam Maintenance Area
Boundary Boat Launch
Boundary Dam
Pewee Falls
Crescent Lake
Monument Bar
31
Upper Lead King Lake
Lower Lead King Lake
Ledbetter Lake
Lime Lake
Fence Creek
Pewee Creek
Lime Creek
Slumber Creek
Slate Creek
Everett Creek
Flume Creek
Beaver Creek
C2975
Middle Fork Flume Creek
South Fork Flume Creek
Threemile Creek
Pend Oreille River
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 3.0-1
Map of the primary study area.
(Map 1 of 2)
Map Key
0
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Miles
Map Version 10/21/08
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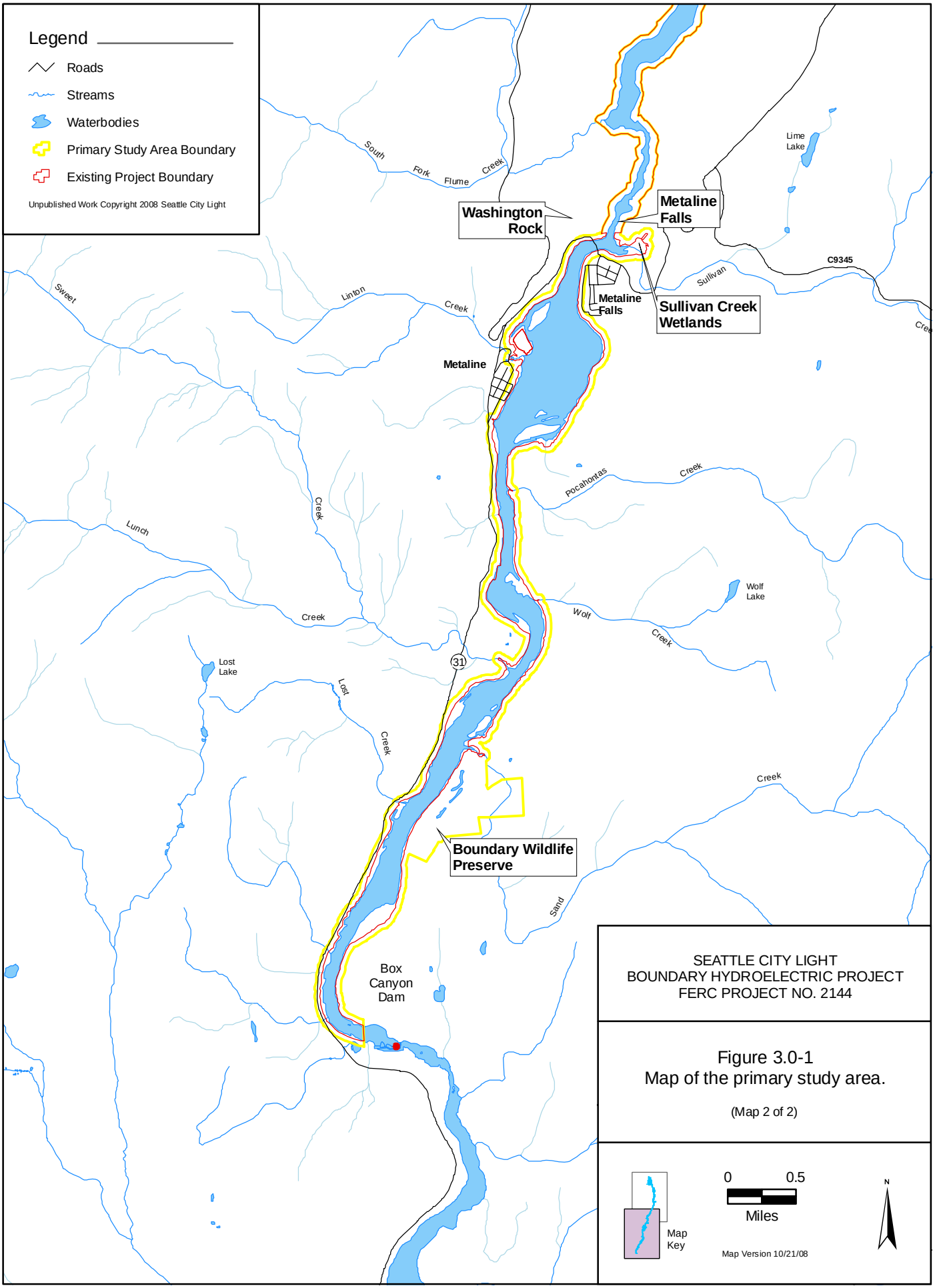
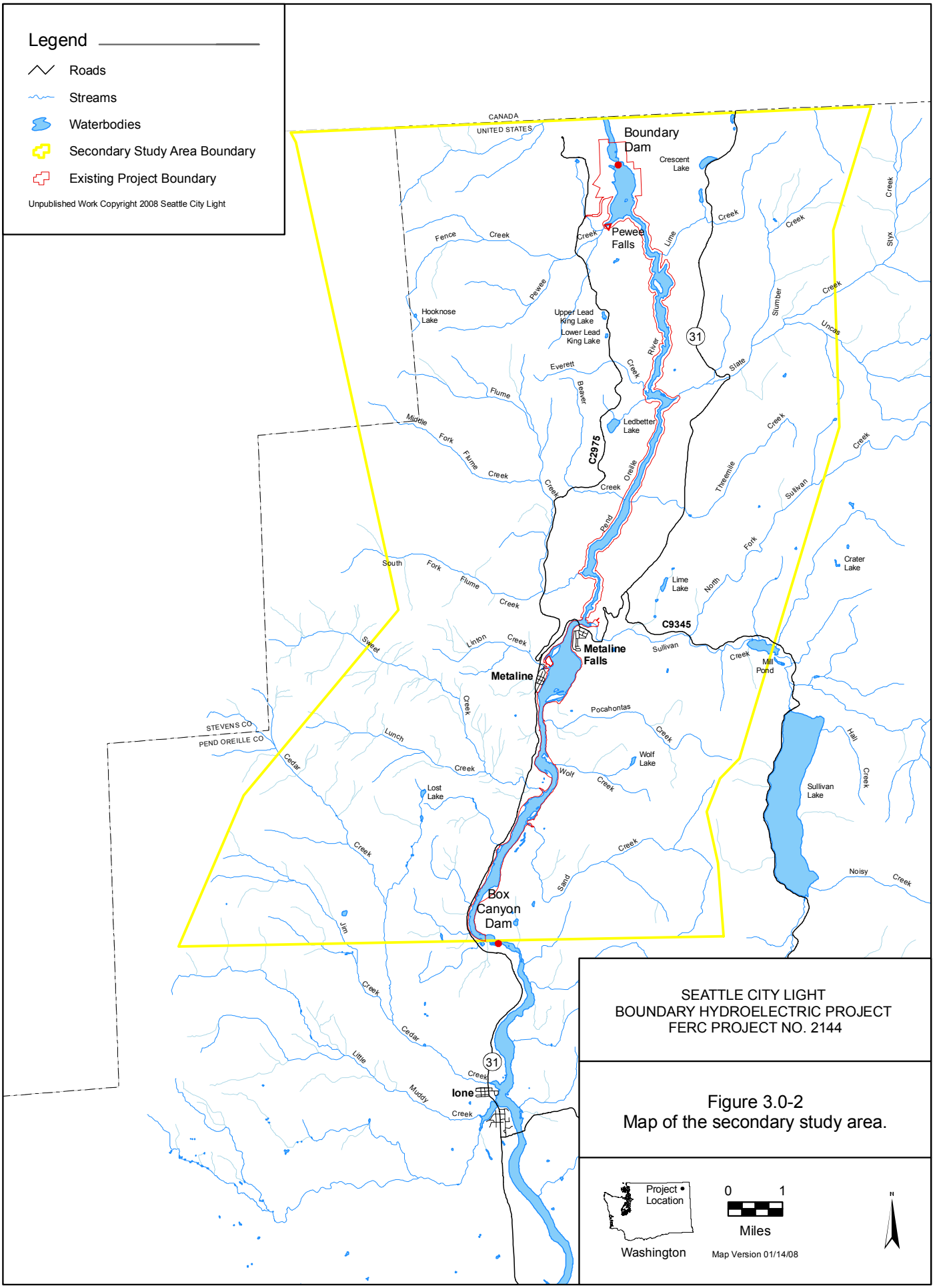


SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144

Figure 3.0-1
Map of the primary study area.

(Map 2 of 2)


Legend
Roads
Streams
Waterbodies
Secondary Study Area Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
CANADA
UNITED STATES
Boundary Dam
Crescent Lake
Pewee Falls
Hooknose Lake
Upper Lead King Lake
Lower Lead King Lake
Ledbetter Lake
C2975
C9345
Lime Lake
Crater Lake
Metaline Falls
Metaline
Mill Pond
Sullivan Lake
Wolf Lake
Lost Lake
Box Canyon Dam
Ione
STEVENS CO
PEND OREILLE CO
31
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 3.0-2
Map of the secondary study area.
Project Location
Washington
0
1
Miles
Map Version 01/14/08
N

4 METHODS

Four tasks were identified as part of this study. The methodologies for these tasks are described in detail below.

4.1. Information Update

The purpose of this task was to update the list of RTE species (from the RSP) that potentially occur in the study area. The primary sources for the update included:

- WDFW, Priority Habitats and Species (PHS) Program
- USFS/BLM Interagency Special Status/Sensitive Species List
- USFWS Endangered Species List
- BLM, Spokane Office (Jason Lowe)
- WDFW, Spokane Office (Steve Zender, Dana Base, Howard Ferguson)
- USFS, CNF Headquarters (Chris Loggers)
- USFS, CNF Sullivan Lake Ranger District (Mike Borysewicz)

Species were added to the RTE species list if new information indicated they could potentially occur in the Project vicinity or if a species was assigned a new status meeting the RTE criteria.

4.2. Identification of Potential Habitat for RTE Wildlife Species

Potential habitat can be defined as the resources and conditions in an area that meet one or more life requisites for a given organism. Three key criteria were applied to identify potential habitat for a given species in the study area: 1) presence of suitable vegetative associations, nesting structures, feeding areas, etc.; 2) appropriate elevational range (the elevational range of the study area is approximately 1,700 to 2,600 feet); and 3) current or historical distribution. Although elevation and distribution are often strongly correlated with vegetative conditions, especially for forest species, this distinction is not always clear. Areas were not considered potential habitat for a species if they were well outside of the current or historical range of that species.

Identification of potential habitat in the study area for RTE wildlife species utilized the following process:

1. Available habitats in the study area were characterized concurrently with RTE wildlife surveys (Section 4.3).
2. Published literature was reviewed to determine the habitat requisites and distributional range (including elevational range) for each RTE species.
3. Species with elevational or distributional ranges beyond the study area were removed from further consideration.
4. Species that only use the study area occasionally (e.g., for migration or dispersal) were removed from further consideration.
5. For the remaining species, potential habitat was identified from the available habitats in the study area based on the results from steps 1 and 2.

Except for amphibians, nearly all of the RTE species for which there is potential habitat in the study area are wide-ranging and use habitat types such as the reservoir, shorelines, and mixed conifer forests. Potential habitats were therefore mapped only for amphibians. It was agreed (during a March 4, 2008, meeting with relicensing participants) that maps for other RTE species would not be produced because they would not provide additional information beyond what could be readily described in text.

4.3. RTE Wildlife Surveys and Habitat Assessment

Because of the number and diversity of RTE wildlife species potentially occurring in the study area, several types of field surveys were conducted to collect data on species presence, habitat suitability, and potential Project-related effects. Survey efforts were focused on amphibian and avian species using the primary study area. RTE mammals potentially occurring in the primary study area are wide ranging and tend to be observed on an occasional basis. Although targeted surveys of RTE mammals were not conducted for this study, information on high-quality habitat in the primary study area, possible movement corridors, and potential bottlenecks to movement was collected to help identify key areas that could support these species. The following sections describe the field survey and habitat assessment efforts that were conducted.

4.3.1. Amphibian Surveys

The visual encounter survey (VES) technique (Heyer et al. 1994) was used to survey for target amphibians and their egg masses (western toad, Columbia spotted frog, and northern leopard frog) in potential habitats during the 2007 spring field season. VES is a survey technique that is effective in still or slow-moving water with good visibility. It is accomplished by walking systematically through the habitat area (i.e., wetland or pond) and searching the water column, substrate, and/or emergent or submergent vegetation. VES involved 60 to 90 minutes of searching at each site and was supplemented by dip netting to find amphibians that were difficult to see due to size or coloration. Based on the maps of potentially suitable habitat, 9 sites were targeted for amphibian surveys; however, the total number of sites surveyed at least once was increased to 19 to include other potentially suitable sites found during initial field efforts. Most of the 19 sites were surveyed four times between April and June 2007, although some sites were deemed unsuitable for RTE amphibian species after a single survey (Everett Island, Everett Creek, Flume Creek, and seven backwater channels along the upper reservoir). The chief reasons for considering a site unsuitable as breeding habitat for the RTE amphibian species were the presence of predatory fish and/or dewatering.

4.3.2. Seasonal Surveys for Avian RTE Species

Surveys to determine the use of primary study area habitats by RTE avian species were conducted quarterly between May 2007 and September 2008. Surveys of the reservoir and adjacent habitats, including cliffs and waterfalls, were conducted by boat. Surveyors drove the boat slowly and used binoculars to look for birds; all observed species were recorded.

Land-based surveys were conducted in the following habitats and locations (see Figure 5.3-1):

- The coniferous, riparian, and meadow habitats of the BWP, west of the railroad tracks
- Sullivan Creek wetlands

- Rocky habitats from Washington Rock to Metaline Falls (proper)
- Coniferous forest habitat at Monument Bar
- The mixed conifer and open habitats of the transmission line right-of-way near Boundary Dam
- The Boundary forebay boat launch area
- The mixed conifer habitat in the vicinity of the maintenance facilities below Boundary Dam
- The riparian and mixed conifer habitats on the east side of the Pend Oreille River between Boundary Dam and the Canadian border

Night surveys to detect calling by RTE owl species were conducted quarterly between May 2007 and September 2008 at the BWP. Night-calling birds noted during the evening bat surveys (Study 20 [SCL 2009a]) were also recorded. In addition to the scheduled seasonal avian surveys, field staff recorded all RTE species observed during all other wildlife surveys. In total, information on RTE wildlife was collected during 22 separate surveys conducted between April 2007 and September 2008.

Spring and summer seasonal surveys for RTE avian species were also used to document the locations and status of bald eagle and osprey nests in the study area. The locations of all nests observed were recorded with a Global Positioning System (GPS) unit. Nest activity status was determined by observing if adults were present on the nest. During subsequent surveys, active eagle nests were monitored to determine if eggs hatched. Fledgling success and nest site productivity were determined by looking for immature birds roosting near the nest with adults. Productivity data for osprey, however, were limited because it was not possible to see into the nests (in addition, all nests were outside of the study area). Surveyors also noted where ospreys and eagles were seen roosting, perching, and foraging and noted any nearby sites of human development and use.

4.3.3. RTE Wildlife Habitat Assessment

The purpose of this task was to 1) determine if there are any particular areas that represent high quality habitat for one or more RTE species and 2) to map locations along the reservoir that represent crossing opportunities and travel corridors for RTE mammals.

Specific sites or areas that represent high-quality habitat for RTE species were identified and mapped during the field surveys and entered into the Geographic Information System (GIS). Sites with high quality habitat have an important role in maintaining RTE wildlife populations in the study area and were defined to include:

- Habitats that were observed to support RTE wildlife species, especially multiple species;
- Relatively unique or rare habitats that are required by one or more RTE species for breeding, foraging, or cover;
- Sites that have a particular habitat parameter (e.g., snags) required by one or more RTE species for breeding, foraging, or cover.

Qualitative data were also recorded to describe the condition of high quality habitats for the purposes of future management. As noted above, continuous habitats used by ubiquitous species (e.g., reservoir waters for beavers or foraging bald eagles and osprey) were not mapped because no useful information would result from mapping these large areas.

Rivers, lakes, and reservoirs can present barriers to dispersing wildlife, and eroded banks have the potential to restrict wildlife access to water. Identifying reservoir-crossing opportunities and possible barriers to movement is important in assessing potential Project impacts to key RTE species, especially wide-ranging large mammals. In conjunction with Study 19, the Big Game Study (SCL 2009b), locations representing potential crossing opportunities and travel corridors for RTE mammal species (e.g., wolves, grizzly bears, and lynx) were identified in the study area, with an emphasis on the Canyon Reach (Metaline Falls to the downstream end of Z Canyon (Project river mile [PRM] 26.8 to 18.0). The purpose was to assess landscape permeability in both the primary and secondary study areas. Potential crossing sites were identified where major trail systems matched on both sides of the reservoir (providing easy access to and from the water), and where field or anecdotal observations suggest crossing use by large mammals. Similarly, travel corridors through the secondary study area were defined as areas with low topographical resistance (such as stream drainages and draws) and high concealment cover. Historical records of dispersing mammals (e.g., lynx and grizzly bear) were also used to help identify potential crossing locations.

4.4. Effects Assessment

The effects assessment describes observed and potential Project and non-Project effects on populations of RTE species currently existing in the primary study area and the habitats on which they depend. Information from Study 1, Erosion Study Final Report (SCL 2009d), and Study 21, Recreation Resource Study Final Report (SCL 2009e), as well as hydrologic data, were used to assess observed and potential effects.

5 RESULTS

5.1. Information Update

A review of information from the WDFW, USFWS, USFS, and BLM did not result in any changes to the list of RTE species (SCL 2007) potentially occurring in northeastern Washington. However, the black tern was added to the list in response to a relicensing participant request. Also, the western small-footed bat, a State Monitor Species, was not originally included on the RTE list because information on the distribution of this species suggested they did not occur in the Project vicinity (Johnson and Cassidy 1997). This species was acoustically detected in 2007 during the Study 20 Bat Study (SCL 2009a) and by the BLM (Shuster and Williams 2007), and was added to the RTE list. Including the black tern and western small-footed bat, a total of 43 RTE species have the potential to occur in the study area (Table 5.1-1).

Table 5.1-1. List of rare, threatened, and endangered wildlife species occurring or potentially occurring in the Project study area as determined from information provided by the USFS, USFWS, the BLM, and WDFW.

Scientific Name **Common Name**	**USFWS Status[1]**	**USFS/BLM Status[2]**	**WDFW Status[3]**	**Suitable Habitat[4]**
Amphibians (3)				
Bufo boreas western toad	—	—	SC,PS	Breeds at lake margins, ponds, and wetlands.
Rana luteiventris Columbia spotted frog	—-	—	SC,PS	Breeds in cool, temporary water.
Rana pipiens northern leopard frog	—	S	SE,PS	Permanent to semi-permanent lentic habitats for breeding; overwinter in water.
Birds (28)				
Gavia immer common loon	—	S	SS,PS	Secluded lakes, emergent wetlands.
Podiceps nigricollis eared grebe	—	S	PS	Lakes and wetlands.
Aechmophorus occidentalis western grebe	—	—	SC,PS	Lakes and wetlands.
Pelecanus erythrorhynchos American white pelican	—	S	SE,PS	Large lakes and emergent wetlands.
Ardea herodias great blue heron	—	MIS	SM,PS	Nests in trees; forages in wetlands and rivers.
Grus canadensis sandhill crane	—	S	SE,PS	Emergent wetlands, meadows.
Cathartes aura turkey vulture	—	—	SM	Nests in caves and crevices in cliffs; forages in open habitats.
Pandion haliaetus osprey	—	—	SM	Nests in large trees or on platforms near water.
Aquila chrysaetos golden eagle	—	—	SC,PS	Typically nests on cliffs or large trees in open or semi-open habitats.
Haliaeetus leucocephalus bald eagle	—	—	ST,PS	Forest stands with large trees near water.
Accipiter gentilis northern goshawk	—	—	SC,PS	Mature conifer forests.
Falco columbarius merlin	—	—	SC,PS	Conifer stands near openings.
Falco peregrinus anatum American peregrine falcon	—	S	SS,PS	Cliffs for nesting.
Strix varia barred owl	—	MIS	—	Lower elevation mature and old growth forest.
Otus flammeolus flammulated owl	—	—	SC,PS	Open mature conifer forests.
Strix nebulosa great gray owl	—	S	SM	Mature mixed conifer forest.

Table 5.1-1, continued…

Scientific Name **Common Name**	**USFWS Status[1]**	**USFS/BLM Status[2]**	**WDFW Status[3]**	**Suitable Habitat[4]**
Aegolius funereus boreal owl	—	—	SM	Subalpine forests.
Chlidonias niger black tern	—	—	SM	Nests on lake shores and marshes.
Melanerpes lewis Lewis's woodpecker	—	—	SC,PS	Nests in large, dead cottonwood trees.
Picoides arcticus black-backed woodpecker	—	—	SC,PS	Post-fire forests with standing dead trees.
Picoides tridactylus three-toed woodpecker	—	MIS	SM	Nests in mature lodgepole pine or sub-alpine fir; forages on dead standing trees.
Picoides albolarvatus white-headed woodpecker	—	—	SC,PS	Ponderosa pine or mixed conifer forests.
Dryocopus pileatus pileated woodpecker	—	MIS	SC,PS	Forests with large trees and snags.
Chaetura vauxi Vaux's swift	—	—	SC,PS	Roosts and nests in tree cavities.
Cypseloides niger black swift	—	—	SM	Nests in colonies on protected cliffs beneath waterfalls.
Dendragapus obscurus blue grouse	—	MIS	Game, PS	Nests in open forests with grass/shrub understory at lower elevations.
Lanius ludovicianus loggerhead shrike	—	—	SC,PHS	Open, savannah-like habitats.
Sialia mexicana western bluebird	—	—	SM	Fields and open woods.
Mammals (12)				
Myotis evotis long-eared myotis	—	—	SM,PS	Hibernates in caves; summer day roosts under bark of trees in coniferous forests.
Myotis volans long-legged myotis	—	—	SM,PS	Mid-elevation forests; hibernates in winter in mines or caves.
Myotis ciliolabrum western small-footed myotis	—	—	SM,PS	Cliffs and rocky outcrops; roosts in rocky crevices.
Corynorhinus townsendii Townsend's big-eared bat	—	S	SC,PS	Maternity colonies and roosts found in caves, mines and buildings in a variety of habitats.
Castor canadensis beaver	—	MIS	Game	Aquatic and riparian habitats with aspen and willow.
Martes americana American marten	—	MIS	Game, PS	Mature and old growth mesic conifer forests with downed trees at moderate to high elevations.
Martes pennanti fisher	—	S	SE,PS	Closed canopy forests with abundant logs and snags and riparian and wetland habitats.
Gulo gulo wolverine	—	S	SC,PS	Conifer forests at higher elevations.

Table 5.1-1, continued…

Scientific Name Common Name	USFWS Status[1]	USFS/BLM Status[2]	WDFW Status[3]	Suitable Habitat[4]
Canis lupus gray wolf	FE	FE	SE,PS	Various habitats secluded from human activity.
Ursus arctos grizzly bear	FT	FT, MIS	SE,PS	Various habitats secluded from human activity.
Lynx canadensis Canada lynx	FT	FT	ST,PS	Various habitats secluded from human activity; typically at higher elevations.
Rangifer tarandus caribou woodland caribou	FE	FE, MIS	SE,PS	High elevation forests.

Notes:
1 USFWS (U.S. Fish and Wildlife Service) — FE = Federal Endangered; FT = Federal Threatened.
2 USFS (U.S. Forest Service)/BLM (Bureau of Land Management) — S = Sensitive; MIS = USFS Management Indicator Species.
3 WDFW (Washington Department of Fish and Wildlife) — SE = State Endangered; ST = State Threatened; SC = State Candidate; SS = State Sensitive; SM = State Monitor. All SE, ST, SC, and SS species are also designated Priority species (PS) by the WDFW; there are also a number of game species that are designated PS. Game species that have no other status except PS were not included (e.g., wild turkey).
4 Johnson and Cassidy (1997); Nagorsen and Brigham (1993); Smith et al. (1997).

5.2. Identification of Potential Habitat for RTE Wildlife Species

Based on the literature, the study area lacks habitat for 3 species and is well outside of the distributional or elevational range for another 12 species of the 43 RTE species known to occur or potentially occurring in northeastern Washington. Nonetheless, it is possible that the study area is used occasionally by some of these species during dispersal. There are historical PHS records for some of these species in the secondary study area (Figure 5.2-1), but these are either winter records (great gray owl) or most likely sightings of dispersing animals (lynx and woodland caribou). Information on the habitat for each of the 15 species not likely to occur in the study area is summarized below.

- ***Northern leopard frog***. Historically, populations of this frog were widely scattered across eastern Washington, but most of them disappeared, possibly due to predation from invasive bullfrogs (*Rana catesbeiana*) (McAllister et al. 1999). Four historic populations occurred along the Pend Oreille River south of the study area but all four populations are now considered extirpated (McAllister et al. 1999).

- ***American white pelican***. Although American white pelicans commonly use large reservoirs like Boundary Reservoir, breeding and migrating records from Washington (Smith et al. 1997; Wahl et al. 2005) show this species is confined to the central Columbia Basin and is not expected to occur in the Project vicinity.

- ***Sandhill crane***. Large flocks of migrating sandhill cranes overfly central Washington but nesting is confined to Yakima and Klickitat counties (Smith et al. 1997; Wahl et al. 2005).

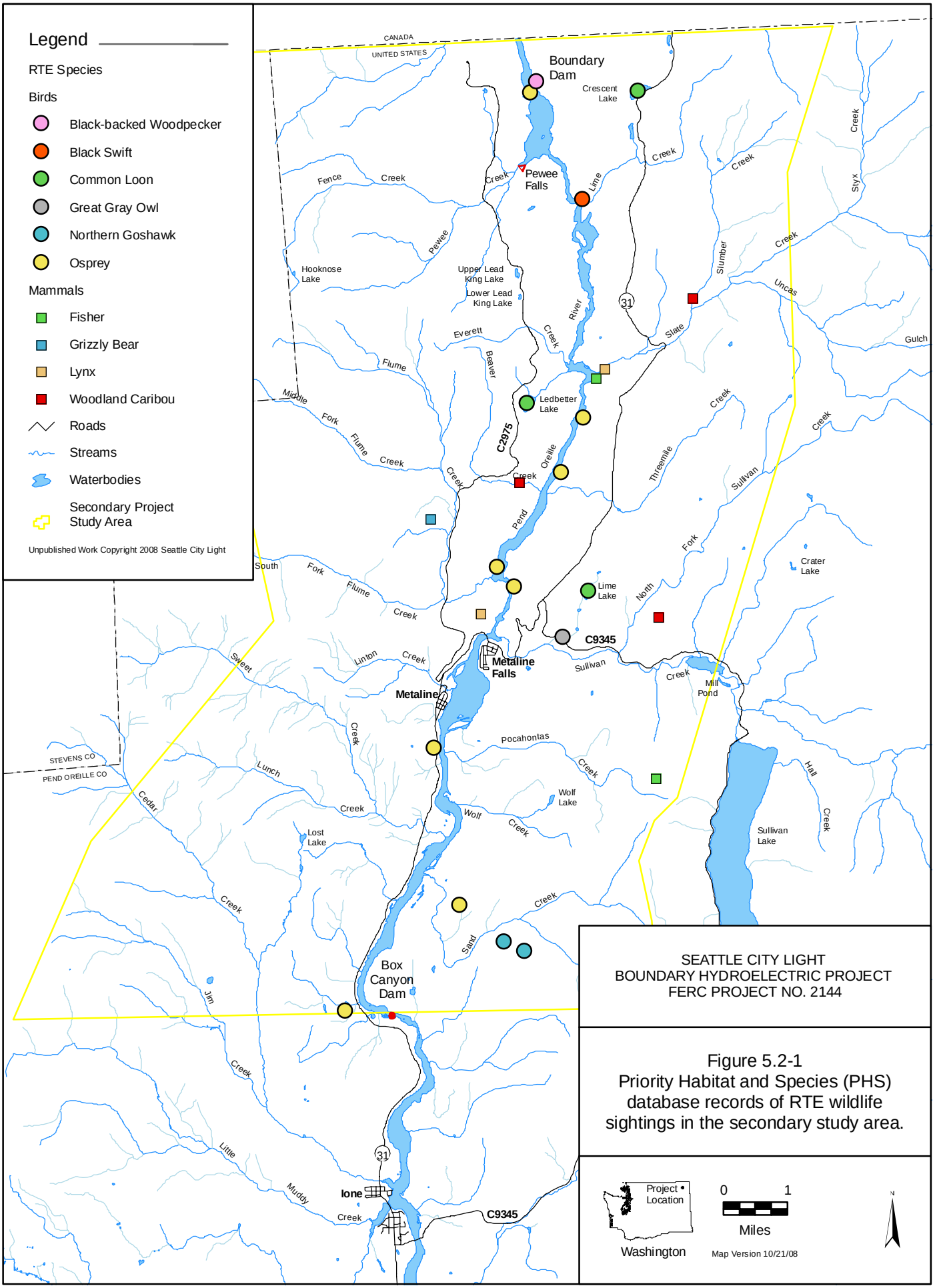


Figure 5.2-1
Priority Habitat and Species (PHS) database records of RTE wildlife sightings in the secondary study area.

- ***Flammulated owl***. Flammulated owls are uncommon to fairly common residents of the ponderosa pine zone of eastern Washington (Wahl et al. 2005). Although Wahl et al. (2005) state that this species occurs in the Selkirk Mountains, neither their distribution map nor that of Smith et al. (1997) show this owl inhabiting the Selkirks. Flammulated owls are generally found in open, late-successional ponderosa pine stands (Hayward and Verner 1994) with numerous large pine snags for nesting and roosting. Remnant ponderosa pine stands occur along the southern edges of the reservoir, but the trees are too young to be preferred by this species.

- ***Great gray owl***. Although there is a single record of possible breeding by great gray owls in Pend Oreille County, virtually all of the Washington nest records are from Okanogan and Ferry counties, with breeding potentially occurring in the Blue Mountains (Smith et al. 1997). Hayward and Verner (1994) listed this species as "not present" on the CNF. In general, great gray owls breed in mature conifer forests in association with extensive meadows, usually at elevations higher (>2,800 feet) than the study area (Hayward and Verner 1994).

- ***Boreal owl.*** The boreal owl is an uncommon resident of the subalpine conifer forests of the Selkirk Mountains (Smith et al. 1997). In 1985, Whelton (1989) detected at least 23 individuals in the Engleman spruce, lodgepole pine, and subalpine fir forests of Ferry, Stevens, and Pend Oreille counties, while Smith et al. (1997) reported two possible breeding records for Pend Oreille County. It is likely that the Project area is below the elevational range of this species (>4,000 feet; Hayward and Verner 1994), although vagrants have been found at lower elevations (Wahl et al. 2005).

- ***Black tern.*** Black terns are locally common breeders in Okanogan County and the Potholes region of the central Columbia Basin (Smith et al. 1997). They also breed in the river valleys of northeastern Washington (Smith et al. 1997; Wahl et al. 2005), and Reese and Hall (1991) found a few black terns breeding in backwater sloughs at Box Canyon Reservoir. These terns typically breed among the emergent vegetation of sloughs and marshes (Wahl et al. 2005), a habitat type well represented along Box Canyon reservoir but largely missing from the Project study area.

- ***Three-toed woodpecker.*** Three-toed woodpeckers are a high-elevation species that feed on wood-boring beetles in subalpine forests (Wahl et al. 2005). There are no records of this species in the vicinity of the Project and the elevational range of the study area is too low to provide habitat for the three-toed woodpecker.

- ***White-headed woodpecker***. White-headed woodpeckers are locally common inhabitants of the late-successional ponderosa pine forests of eastern Washington (Smith et al. 1997; Wahl et al. 2005). They are so strongly pine-obligate that they are not found in mixed conifer habitats, which might explain why there are no records for Pend Oreille County (Smith et al. 1997).

- ***Loggerhead shrike***. The loggerhead shrike is a shrub-steppe species found in lower elevations of the Columbia Basin (Stepniewski 1999; Wahl et al. 2005). There are no breeding records for Pend Oreille County, apparently due to a lack of habitat (Smith et al. 1997).

- ***American marten.*** Although the Selkirk Mountains are thought to support high numbers of American martens (Johnson and Cassidy 1997), this species is generally found above 5,500 feet elevation (Buskirk and Zielinski 1997), well above the elevational range of the study area. Preferred habitats are subalpine forests greater than 100 years of age (Johnson and Cassidy 1997), which are absent in the Project vicinity. The study area may be used by dispersing animals; although martens tend to avoid water, the reservoir might serve as a movement corridor during periods of freeze-over.

- ***Fisher.*** Lewis and Stinson (1998) concluded that although small numbers of fisher are regularly observed in Washington State, the state no longer supports a viable breeding population. Still, many of the most recent records come from northern Pend Oreille County. Lewis and Stinson (1998) cited 15 records for northern Pend Oreille County between 1977 and 1996 (although none are from the Project area). Although fisher are considered more of a mid-elevational forest species, avoiding areas of deep winter snow pack, most records from eastern Washington occur at elevations above 3,000 feet (Lewis and Stinson 1998). The Project area probably does not provide habitat for resident fisher (although dispersing animals may move through).

- ***Wolverine***. Historical records showed that wolverines once occurred throughout the northern Cascades and the mountainous regions of northeastern Washington, although in low numbers (Johnson 1977). Currently, wolverines in Washington are thought to be limited to high elevations in the north central portion of the state. This species dens in snow caves and its distribution appears highly correlated with snow cover that persists long into the spring (April to mid-May) (Aubry et al. 2007). The low elevation of the study area and the absence of recent sightings in northeastern Washington precluded any expectations of observing wolverines in the study area.

- ***Canada lynx.*** Canada lynx inhabit subalpine forests of the North Cascades and northeastern Washington (Stinson 2001). In Pend Oreille County they occur at lower elevations than elsewhere in the state, but still at elevations (>3,500 feet) well above those found in the study area. For this reason, lynx are unlikely to permanently inhabit the conifer forests in the Project area. Lynx are known to undergo long-distance dispersals in search of better suited habitat, especially during declines of snowshoe hare (*Lepus americanus*), their preferred prey (Ward and Krebs 1985). Apps (2000) indicated that lynx will cross rivers when dispersing.

- ***Woodland caribou***. A small population of woodland (mountain) caribou inhabits the subalpine regions of the Selkirk Mountains of Washington, Idaho, and British Columbia. Caribou move to higher elevations in the winter when snow falls to gain better access to the tree lichens they depend on. However, recent surveys by Wakkinen and Johnson (2006) indicate that the population, while stable, remains small at less than 50 animals. This survey found only a single caribou (a male) in the Washington portion of their range, and it in the extreme northeastern corner of the state. Given the restricted range of this species and its very low population, woodland caribou are not expected to occur in the study area, although they have occasionally strayed into the area in the past (SCL 2006).

Four RTE species—common loon, eared grebe, western grebe, and Vaux's swift—use the study area during migration (eared grebe and Vaux's swift), or are occasional spring and summer visitors (common loon and western grebe). Potential habitat for these species is summarized below.

- ***Common loon***. Breeding by common loons has not been confirmed for Pend Oreille County (Richardson et al. 2000) although there are breeding season records (May-August), and Smith et al. (1997) considered them a "probable" nester at Sullivan Lake. Common loons prefer quiet lakes with emergent vegetation for nesting, characteristics not found on Boundary Reservoir. Outside of the breeding season, common loons are observed foraging in lakes, rivers, and reservoirs.

- ***Eared grebe***. Eared grebes are a fairly common breeder in east-central Washington but there are no breeding records for Pend Oreille County (Smith et al. 1997; Wahl et al. 2005). This species is considered a widespread migrant in eastern Washington (Wahl et al. 2005) and is observed on many lakes and reservoirs in the spring and fall.

- ***Western grebe***. Western grebes breed on stable lakes with emergent vegetation needed for constructing and anchoring their floating nests (Smith et al. 1997). They are locally a common breeder in the Columbia Basin (Wahl et al. 2005) but there are no breeding records for Pend Oreille County (Smith et al. 1997). Like many other waterbirds, western grebes are relatively widespread outside of the breeding season.

- ***Vaux's swift***. Vaux's swifts are a relatively common breeder in the late-seral conifer forests of Washington (Bull and Collins 1993; Wahl et al. 2005) and are dependent on large hollow trees for roosting (Wahl et al. 2005). This species migrates in large flocks and can be observed in a variety of habitats in the spring and fall.

The study area appears to provide potential habitat for 24 RTE species known to occur or possibly occurring in the study area. Each of these species is discussed below.

- ***Western toad.*** Western toads breed in ponds and shallow lake margins (Corkran and Thoms 1996), but spend 90 percent of their time in terrestrial forests and meadows, often in association with burrows of the yellow-bellied marmot (*Marmota*

flaviventris) and other rodents (Bartelt and Peterson 1994; Bull 2006). No breeding habitat for western toads was identified in the study area, although potential summer terrestrial habitat is found at the Forebay campground.

- ***Columbia spotted frog.*** The highly aquatic Columbia spotted frog breeds in permanent, shallow water bodies and is never found far from water (Leonard et al. 1993). Dispersal and non-breeding habitat for this species occurs in the seeps and small streams below Boundary Dam. Two small ponds in the tailrace area, just outside of the primary study area (on SCL land) provide lentic breeding habitat.

- ***Great blue heron.*** Great blue herons forage in shallow aquatic habitats and nest in elevated structures (e.g., trees, tall shrubs, channel markers) located close to foraging habitat (Butler 1992). In Oregon and Washington, they commonly nest in tall (greater than 69 feet) black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) trees (Henny and Bethers 1971). All shallow water habitats along the Boundary reservoir and tailrace shorelines provide suitable foraging habitat, while the mature black cottonwood stands at the BWP and Sullivan Creek provide suitable nesting habitat.

- ***Turkey vulture.*** Turkey vultures are summer residents of the lower elevation open forest habitats throughout most of Washington (Wahl et al. 2005). Conifer forests interspersed with rocky outcrops and cliffs have been described as ideal turkey vulture habitat (Smith et al. 1997). The entire study area provides foraging habitat for these wide-ranging birds, while Washington Rock and the rock faces in the Canyon Reach and the area near Boundary Dam provide potential nesting habitat.

- ***Osprey.*** Having dramatically recovered from the effects of widespread DDT use in the 1950s and 1960s (Henny 1977), osprey now breed throughout Washington State wherever sizable fish populations and suitable nest structures coincide (Wahl et al. 2005). Ospreys are especially common along the Pend Oreille River. Reese and Hall (1991) found 50 nests along the 55-mile Box Canyon Reservoir, and 4 active territories were identified along Boundary Reservoir in 2005 (SCL 2006). Both the reservoir and tailrace reaches of the study area provide suitable foraging habitat for osprey, and breeding can occur wherever suitable natural (snags) or artificial (e.g., power poles, electrical towers) nest structures can be found.

- ***Golden eagle.*** Although the cliff and open forest habitats of the study area meet the habitat requirements for golden eagles in Washington state (Wahl et al. 2005), there are few records of this species in Pend Oreille County (Smith et al. 1997). It is unknown whether this represents a species rarity or a lack of survey coverage. Nevertheless, there are anecdotal records for the study area. Washington Rock, the rock faces in the Canyon Reach, and the area near Boundary Dam provide potential nesting habitat for golden eagles. The open conifer forests provide foraging habitat (Wahl et al. 2005).

- ***Bald eagle.*** Like the osprey, the bald eagle has recovered dramatically after experiencing major declines in the 1940s, 1950s, and 1960s, much of it attributed to productivity effects from DDT (Grier 1982). Today, bald eagles can be found nesting along the major river systems of northeastern Washington where suitable large cottonwood or ponderosa pine nest trees can be found. The entire reservoir provides suitable foraging habitat. The large cottonwoods (upper reservoir) and legacy ponderosa pine trees (lower reservoir) within one mile of the reservoir (distance within which most Pacific Northwest nests occur from a shoreline [Anthony and Isaacs 1989]) represent suitable nest sites.

- ***Northern goshawk.*** Northern goshawks are found in mature conifer forests throughout the state (Smith et al. 1997), although they often use lowlands in the winter in response to prey moving to lower elevations. Nearly all of the conifer forests in the study area are only about 80 years old because of a catastrophic wildfire in 1926 (Borysewicz 2008) and probably provide, at best, marginal breeding habitat. The exception is in the lower Slate Creek drainage where mature trees can still be found (few of which actually occur in the study area). The PHS database (WDFW) includes two mid-1990s nesting records in the secondary study area, both in the upper reaches of Sand Creek (Figure 5.2-1).

- ***Merlin.*** Merlins are small forest falcons that, according to Smith et al. (1997), are rare breeders in the higher elevation forests of northeastern Washington. However, Wahl et al. (2005) provided records of merlins in the riparian corridors of eastern Washington, including the Pend Oreille River, and Reese and Hall (1991) found merlins migrating through the Box Canyon study area. Thus, both the conifer and cottonwood stands in the study area have the potential to provide breeding habitat for this small falcon; additionally, the reservoir potentially serves as a migration corridor.

- ***American peregrine falcon.*** The cliff-nesting peregrine falcon was virtually extirpated from Washington State by the mid-1970s, due largely to DDT-induced eggshell thinning (Cade et al. 1988; Wahl et al. 2005). By the 1990s, the state populations began to recover, often from augmentation with captive-bred birds (Allen 1991), with 72 breeding pairs recorded in 2001 (Hayes and Buchanan 2002). Most of these territories were in western Washington; none were recorded in Pend Oreille County. However, Washington Rock (on the edge of the study area across from Metaline Falls), portions of the Canyon Reach, and cliffs across from the Boundary Dam powerhouse provide suitable cliff-nesting habitat for peregrine falcons. Passerines (especially swifts and swallows) and waterfowl that inhabit the study area represent suitable prey for this species.

- ***Barred owl.*** This eastern forest owl first expanded into Washington State in the 1960s from British Columbia via Pend Oreille County, and is now common throughout the hardwood and conifer forests of the state (Wahl et al. 2005). Reese and Hall (1991) recorded resident barred owls in the Box Canyon Reservoir. The

mixed conifer and black cottonwood forests in the study area provide potential habitat for this species.

- ***Lewis' woodpecker.*** Lewis' woodpeckers are often found in the woody riparian (especially cottonwood) habitats along river corridors through the ponderosa pine zones of eastern Washington. Possible breeding (birds observed in appropriate habitat during the breeding season) has been documented along the Pend Oreille River south of the study area. However, neither Smith et al. (1997) nor Wahl et al. (2005) recognize Lewis' woodpecker habitat as extending north to the Boundary Reservoir, and Reese and Hall (1991) did not detect them along the Box Canyon Reservoir. Still, the cottonwood stands in the BWP and along Sullivan Creek represent potentially suitable habitat for this species.

- ***Black-backed woodpecker.*** The black-backed woodpecker inhabits mid- and high-elevation conifer forests, especially stands that are recently (5 to 6 years) burned or infested with bark beetles, resulting in very localized distributions (Wahl et al. 2005). Most studies of this species in the Pacific Northwest have focused on areas much higher in elevation than the study area and there is little information on the lower elevational limit for this species. The Washington State Gap Analysis database (Smith et al. 1997) includes a single breeding season record of a black-backed woodpecker within the study area (Figure 5.2-1), suggesting that suitable habitat conditions for this species may occur at localized sites (e.g., insect-kill snag patches).

- ***Pileated woodpecker.*** This large woodpecker occurs in mid- and late-seral conifer forests where enough large decadent live trees and snags are present to provide suitable foraging, nesting, and roosting habitat (Bull and Jackson 1995; Aubry and Raley 1996). The mixed conifer forests of the study area, although relatively young (approximately 80 years), appear to provide enough of the habitat requisites to support a local pileated woodpecker population.

- ***Black swift.*** Black swifts are one of the least understood breeding birds in Washington, which may account for the paucity of records east of the Cascade Mountains (Smith et al. 1997; Wahl et al. 2005). They are localized breeders on steep cliffs and behind waterfalls (Smith et al. 1997), both of which are relatively common features in the study area. Examples of cliffs include Washington Rock, several locations along the Canyon Reach, and the area immediately below Boundary Dam. Waterfalls are found at the mouths of Pewee and Threemile creeks, and where several smaller unnamed streams empty into the lower reservoir. There is a 2001 PHS record of a nest (with nestlings) behind a waterfall at the northern mouth of Lime Creek (Figure 5.2-1).

- ***Blue grouse.*** This large grouse is a fairly common inhabitant of the montane forests of Washington (Wahl et al. 2005), including the forests in the vicinity of the Project

study area. Blue grouse are commonly seen on the Sullivan Lake Ranger District and are expected to occur on the higher slopes of the Canyon Reach (Borysewicz 2008).

- ***Western bluebird.*** Although not as common as in lower elevation forests elsewhere in eastern Washington, western bluebirds have been documented in northern Pend Oreille County. This species typically nests in suitable cavities in snags (Wahl et al. 2005). The very successful response of western bluebirds to artificial nest-box programs suggests that lack of nesting structures is the primary limiting factor in otherwise suitable habitat. Although suitable nest cavities are present in the study area conifer forests, they are not plentiful.

- ***Long-eared myotis and long-legged myotis.*** Long-eared and long-legged myotis typically roost under loose conifer bark (Nagorsen and Brigham 1993; Vonhof and Gwilliam 2000) and forage on moths and other terrestrial flying insects (Nagorsen and Brigham 1993). The extensive mixed conifer and ponderosa pine forests in the study area provide suitable roosting and foraging habitat for both of these bats.

- ***Western small-footed myotis.*** Western small-footed myotis are associated with cliffs and rock outcroppings where they roost in caves and mine adits and forage over the edges of rocky bluffs (Nagorsen and Brigham 1993). The rocky habitats of the study area provide suitable habitat for this rock bat.

- ***Townsend's big-eared bat.*** Mine adits and natural caves in the study area provide roosting habitat for Townsend's big-eared bats and the mixed conifer forest provides foraging habitat (Nagorsen and Brigham 1993). Moths are an important component of their diet, and these bats hunt for them within forest openings and along open cliffs and rock outcroppings (Nagorsen and Brigham 1993; Dobkin et al. 1995).

- ***Beaver.*** Beavers occur throughout eastern Washington anywhere there is permanent water adjacent to adequate and suitable woody vegetation (Hill 1982). The reservoir and tailrace reaches of the study area provide travel and escape habitat and the scrub/shrub riparian stands provide foraging habitat. Steep mud banks and small caves near the water in rock cliffs represent denning habitat. Food supplies in the lower reservoir may be more limited due to a scarcity of riparian forage plants, but enough Sitka alder (*Alnus viridis*) stands are present to support beaver populations.

- ***Gray wolf.*** The far-ranging gray wolf utilizes a wide variety of habitats but appears to be most strongly associated with remote areas with low human presence and available prey, primarily large ungulates (Fritts et al. 1995). In the study area, nearly all conifer and riparian vegetative associations provide potential habitat for wolves.

- ***Grizzly bear.*** Like wolves, grizzly bears use a wide variety of habitats, but are especially sensitive to human presence (Craighead and Mitchell 1982). All of the

conifer and riparian vegetation types north of Metaline Falls probably provide suitable habitat for grizzly bears. However, the scarcity of key forage species, particularly berries (e.g., *Vaccinium* spp.) (Craighead et al. 1982), may limit their use of the study area forest habitats if other food sources are not readily available.

5.3. RTE Wildlife Surveys and Habitat Assessment

5.3.1. RTE Wildlife Surveys

Of the 43 RTE species identified as potentially occurring in the study area, 20 species (including 4 bat species) were documented during surveys (Table 5.3-1; Figure 5.3-1). An additional 5 species are suspected to use the study area based on very recent records, unconfirmed local sightings, tracks, or scat (Table 5.3-2). Each of the 25 species known or suspected to occur in the study area is discussed in detail below. Appendix 1 provides a list of all wildlife species, including non-RTE species, recorded during the course of this study and other wildlife-related studies. Figure 5.3-2 displays the location of potential habitats surveyed for amphibians and where amphibians were found.

Table 5.3-1. Rare, threatened, and endangered species observed in the study area during the 2007 and 2008 surveys.

Common Name	General Location Information
Amphibians (2)	
western toad	One individual observed at the Boundary forebay campground.
Columbia spotted frog	Ten individuals observed downstream of Boundary Dam on both the west and east banks of the river.
Birds (12)	
common loon	Recorded five times (5 individuals); in the Boundary forebay, Canyon Reach, and upper reservoir near Metaline.
eared grebe	Recorded nine times (138 individuals); nearly all in the Boundary forebay or just upstream from the Metaline Falls bridge.
western grebe	Recorded six times (13 individuals) near Metaline.
great blue heron	Thirty-one observations (41 individuals) throughout the study area.
Vaux's swift	Small group observed foraging over Sullivan Creek.
turkey vulture	Thirty-six observations (77 individuals) throughout the study area.
osprey	Sixty-six observations throughout the study area; common.
bald eagle	More than one hundred observations throughout the study area; ubiquitous.
northern goshawk	Observed near Selkirk High School and Slate Creek.
American peregrine falcon	An active territory occurs on Washington Rock.
merlin	Single merlin observed perched at the top of a cottonwood tree at the BWP.
pileated woodpecker	Observed four times; Canyon Reach, the BWP, Box Canyon Motel, and near Pend Oreille mine.
Mammals (6)	
long-legged myotis	Acoustically detected at the Box Canyon tailrace.
long-eared myotis	Acoustically detected at the Box Canyon tailrace.
western small-footed myotis	Acoustically detected at the Box Canyon tailrace.

Table 5.3-1, continued…

Common Name	General Location Information
Townsend's big-eared bat	Observed roosting in two mine adits and a cave. Also visually and acoustically detected near Washington Mine.
beaver	Commonly seen throughout the study area.
Canada lynx	Observed swimming across the reservoir in the Canyon Reach.

Note:
BWP – Boundary Wildlife Preserve

Table 5.3-2. Rare, threatened, and endangered wildlife species that may occur in the Project study area, but were not positively detected in 2007 or 2008.

Common Name	Detection Information
Birds (3)	
golden eagle	Unconfirmed reports; may be confused with immature bald eagles.
black swift	Recent unconfirmed reports from local birders and past records from the PHS database (WDFW).
blue grouse	Scat found, USFS confirmation that this species occurs in Project vicinity.
Mammals (2)	
gray wolf	Unconfirmed sightings and reports of tracks and howling in the study area.
grizzly bear	Recent reports from or near the secondary study area.

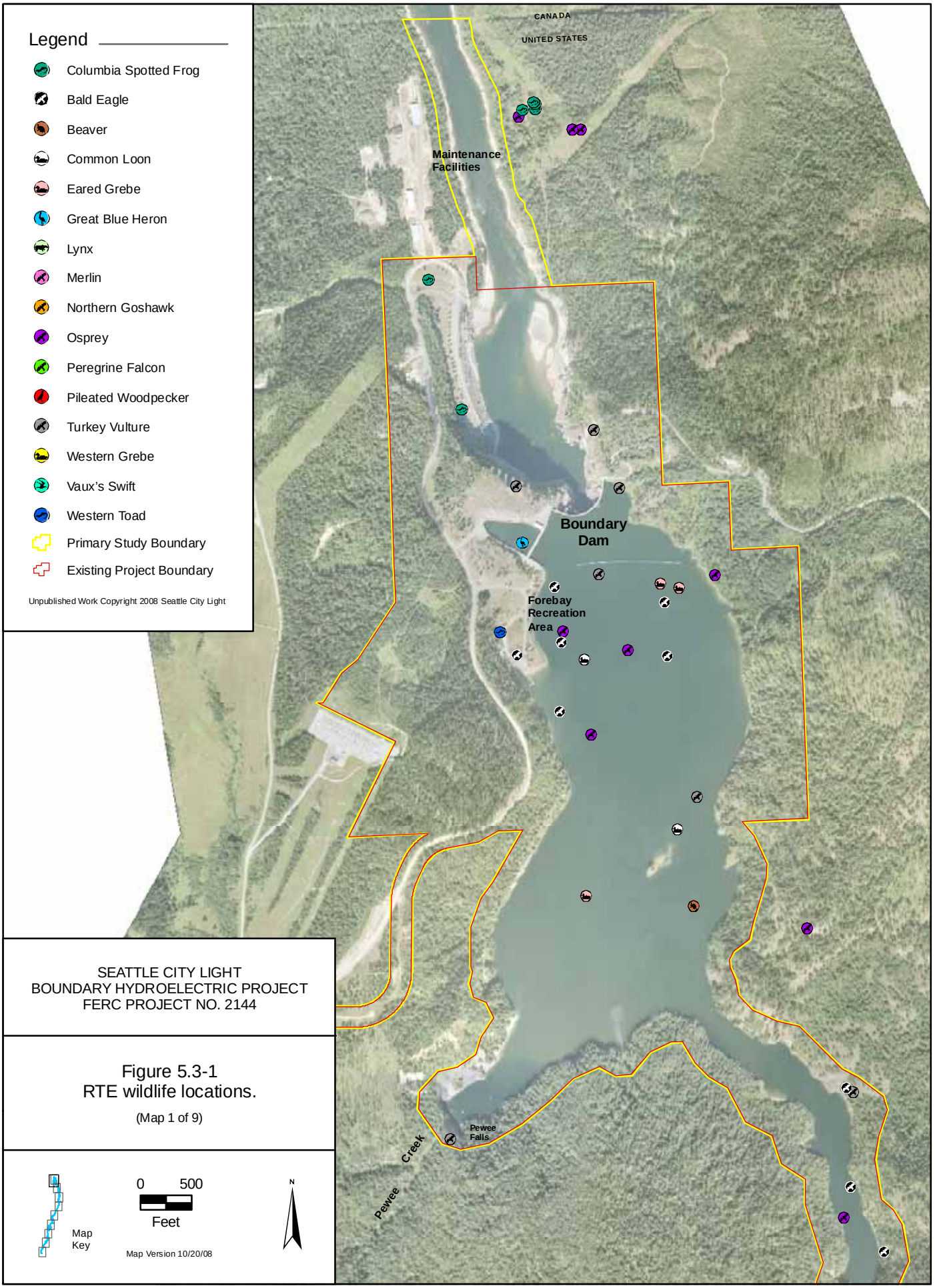


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Figure 5.3-1
RTE wildlife locations.

(Map 1 of 9)

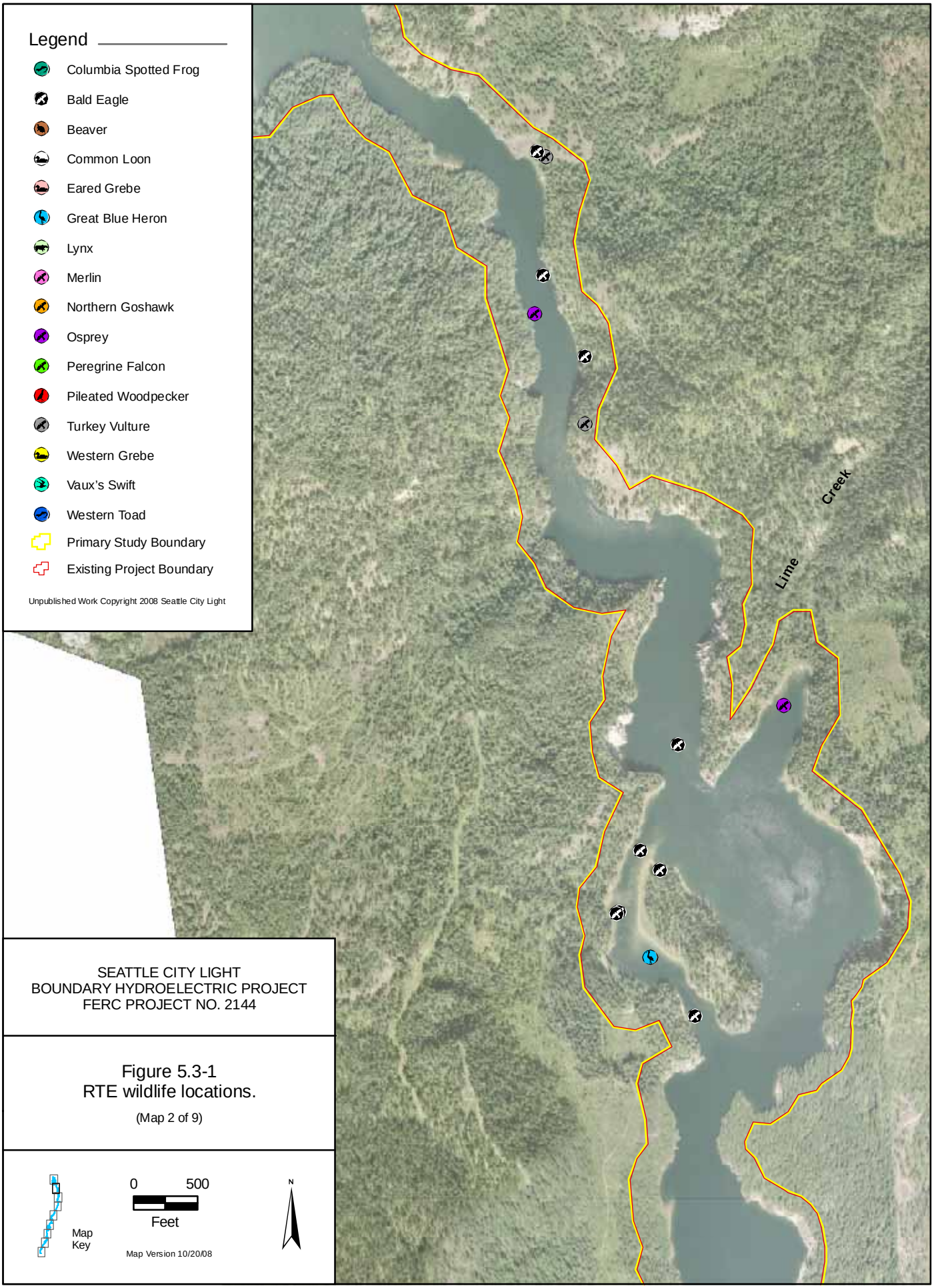
Legend
Columbia Spotted Frog
Bald Eagle
Beaver
Common Loon
Eared Grebe
Great Blue Heron
Lynx
Merlin
Northern Goshawk
Osprey
Peregrine Falcon
Pileated Woodpecker
Turkey Vulture
Western Grebe
Vaux's Swift
Western Toad
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
Lime
Creek
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Figure 5.3-1
RTE wildlife locations.
(Map 2 of 9)
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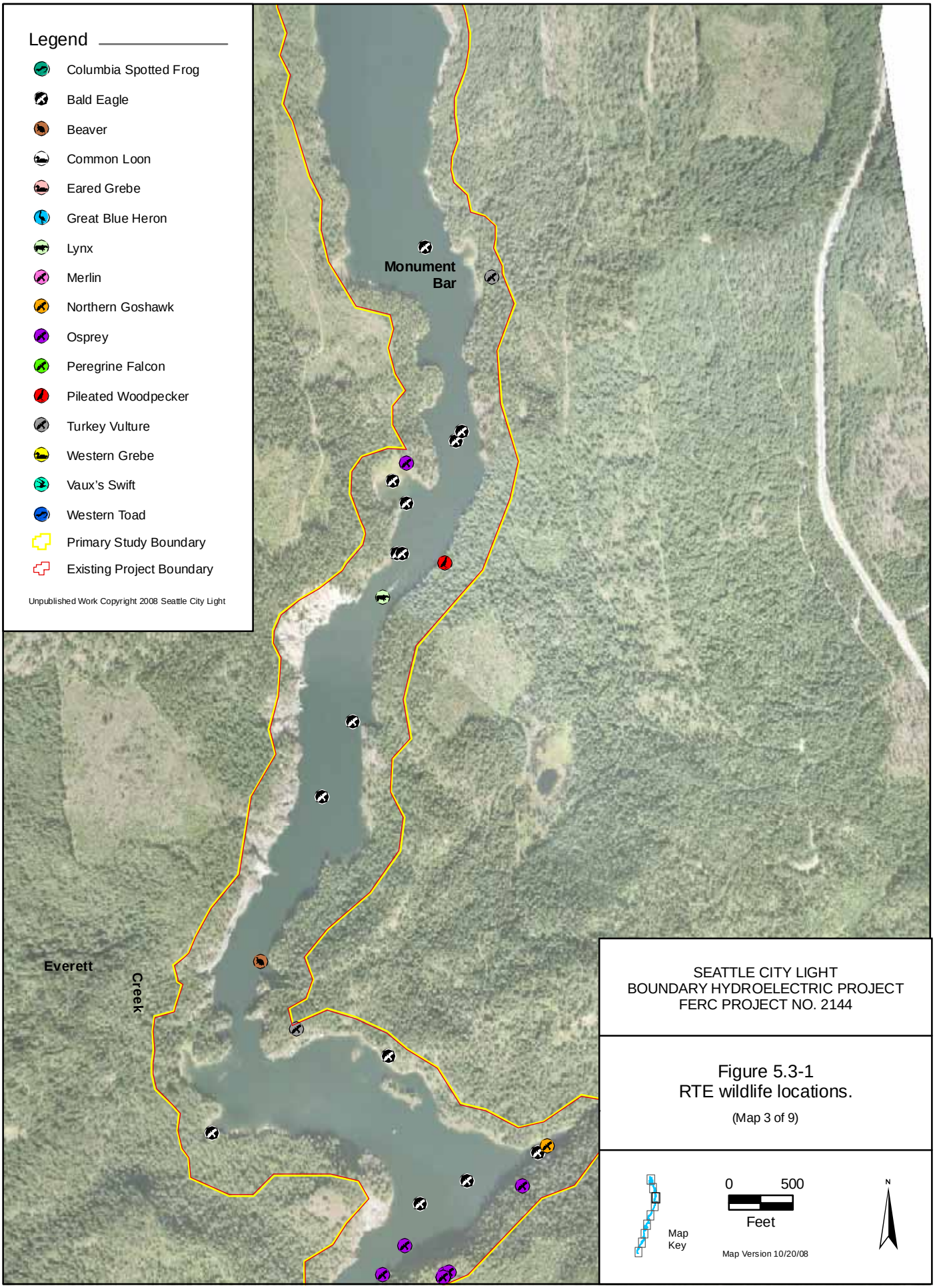

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Figure 5.3-1
RTE wildlife locations.

(Map 3 of 9)

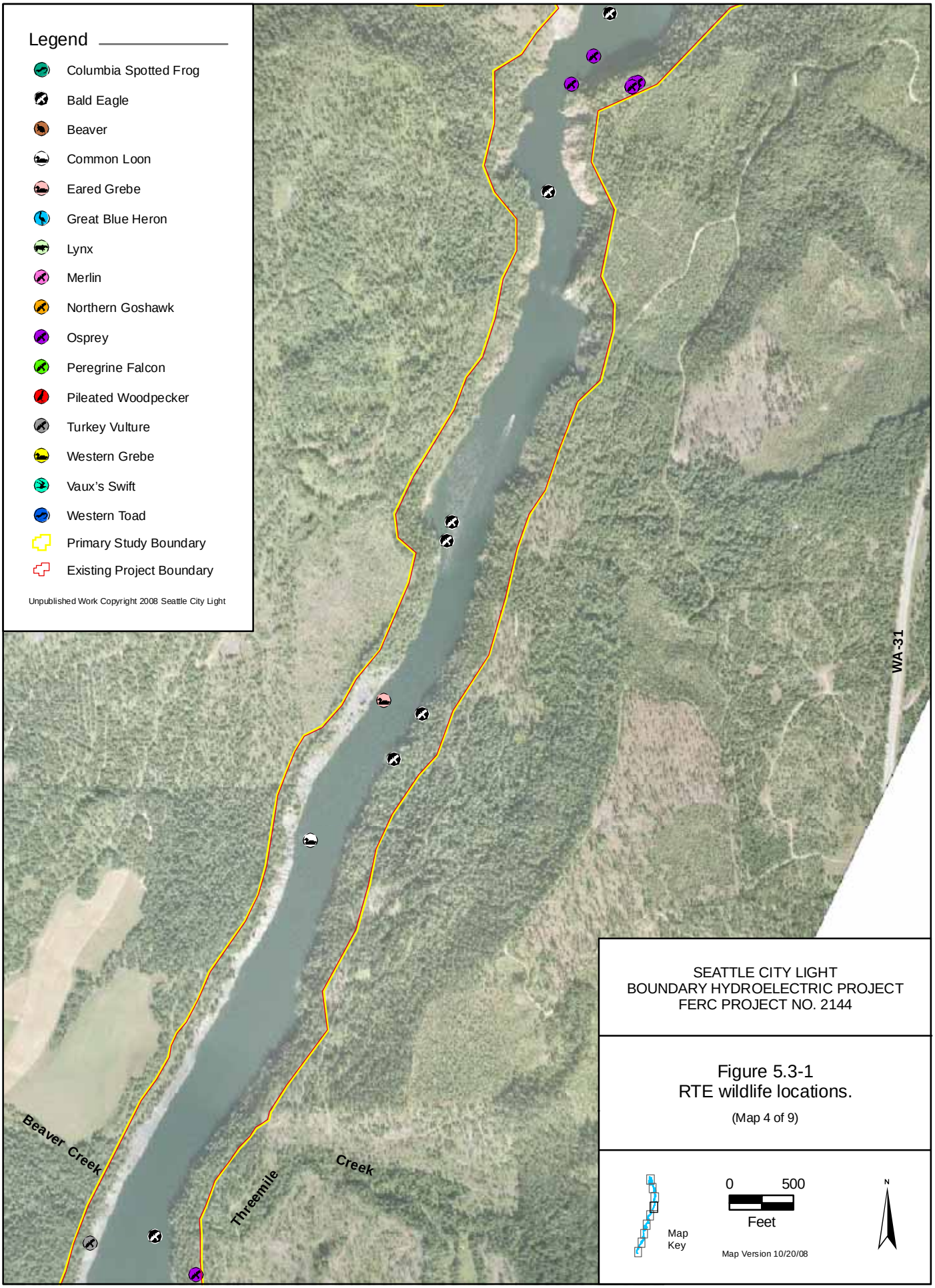

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Figure 5.3-1
RTE wildlife locations.

(Map 4 of 9)

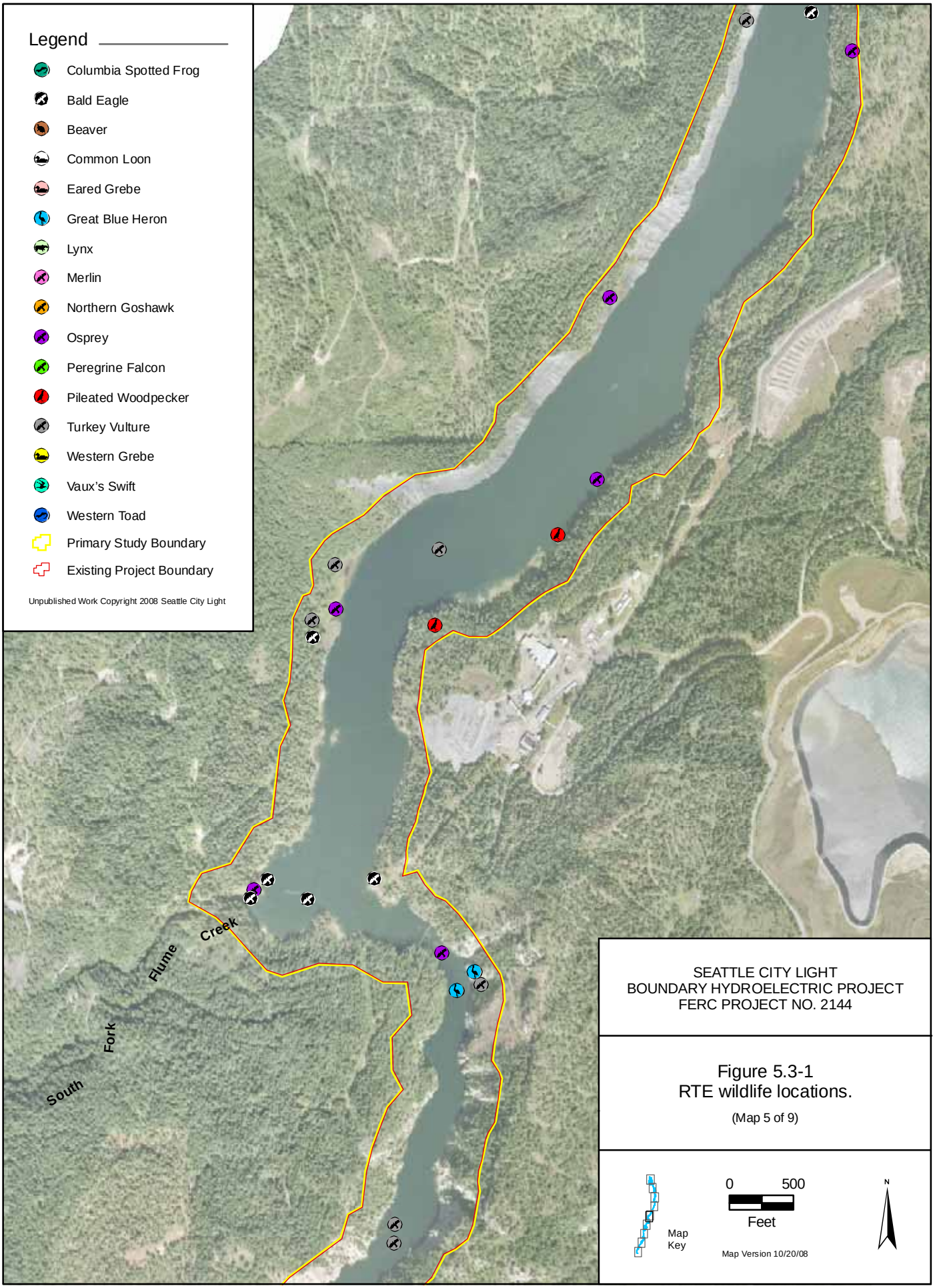
Legend
Columbia Spotted Frog
Bald Eagle
Beaver
Common Loon
Eared Grebe
Great Blue Heron
Lynx
Merlin
Northern Goshawk
Osprey
Peregrine Falcon
Pileated Woodpecker
Turkey Vulture
Western Grebe
Vaux's Swift
Western Toad
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
South Fork Flume Creek
SEATTLE CITY LIGHT
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Figure 5.3-1
RTE wildlife locations.
(Map 5 of 9)
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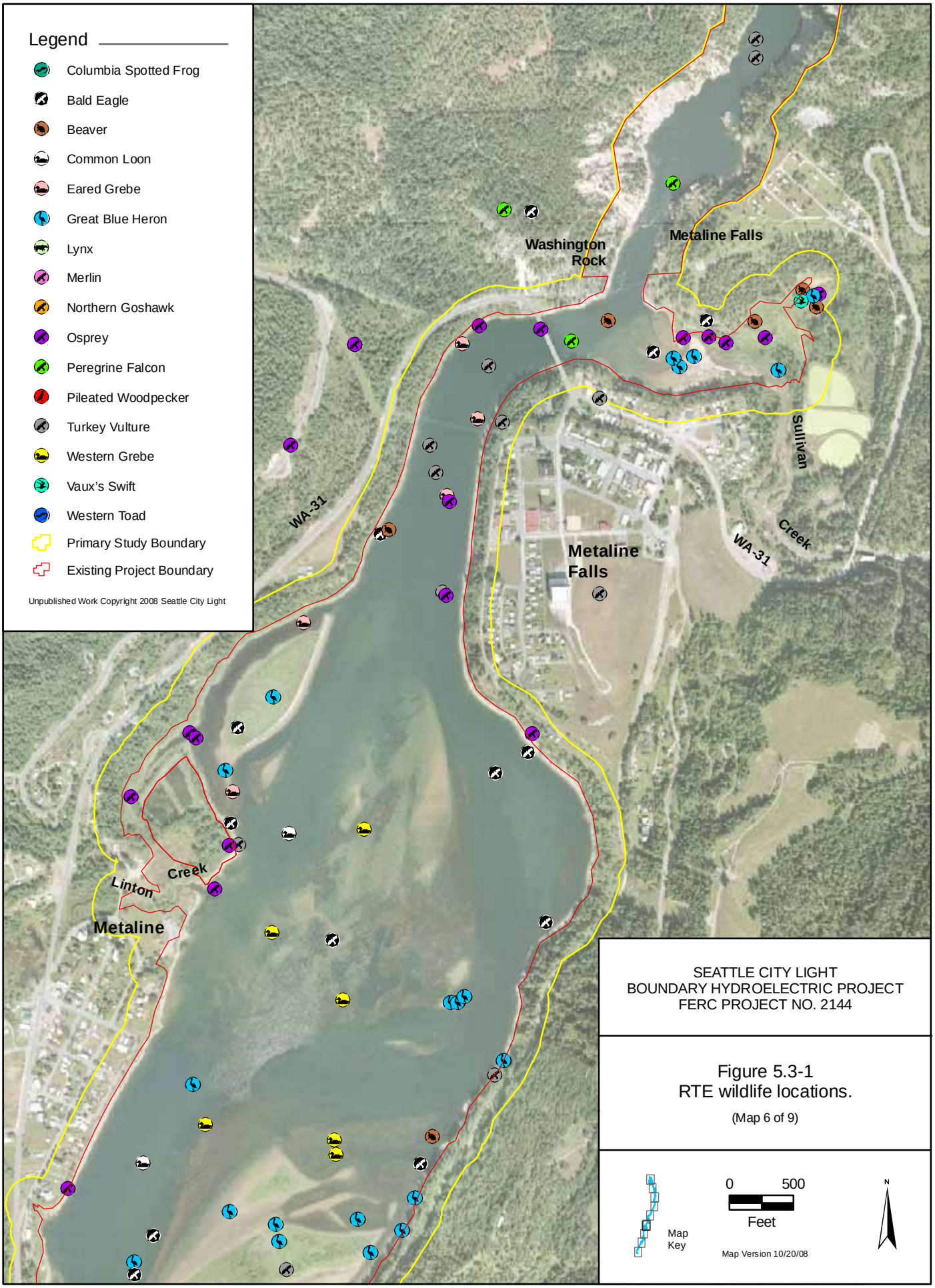

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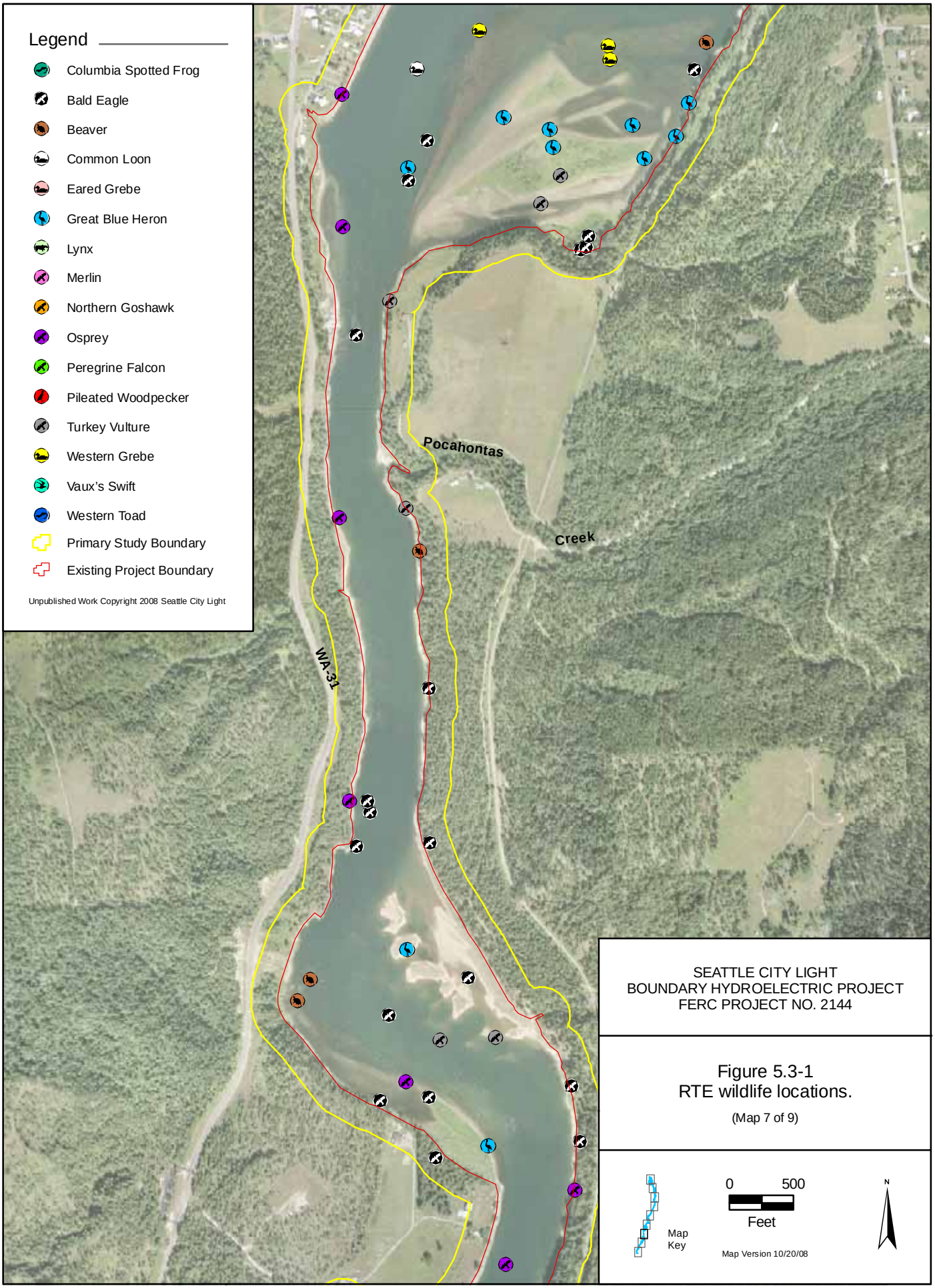
Figure 5.3-1
RTE wildlife locations.

(Map 6 of 9)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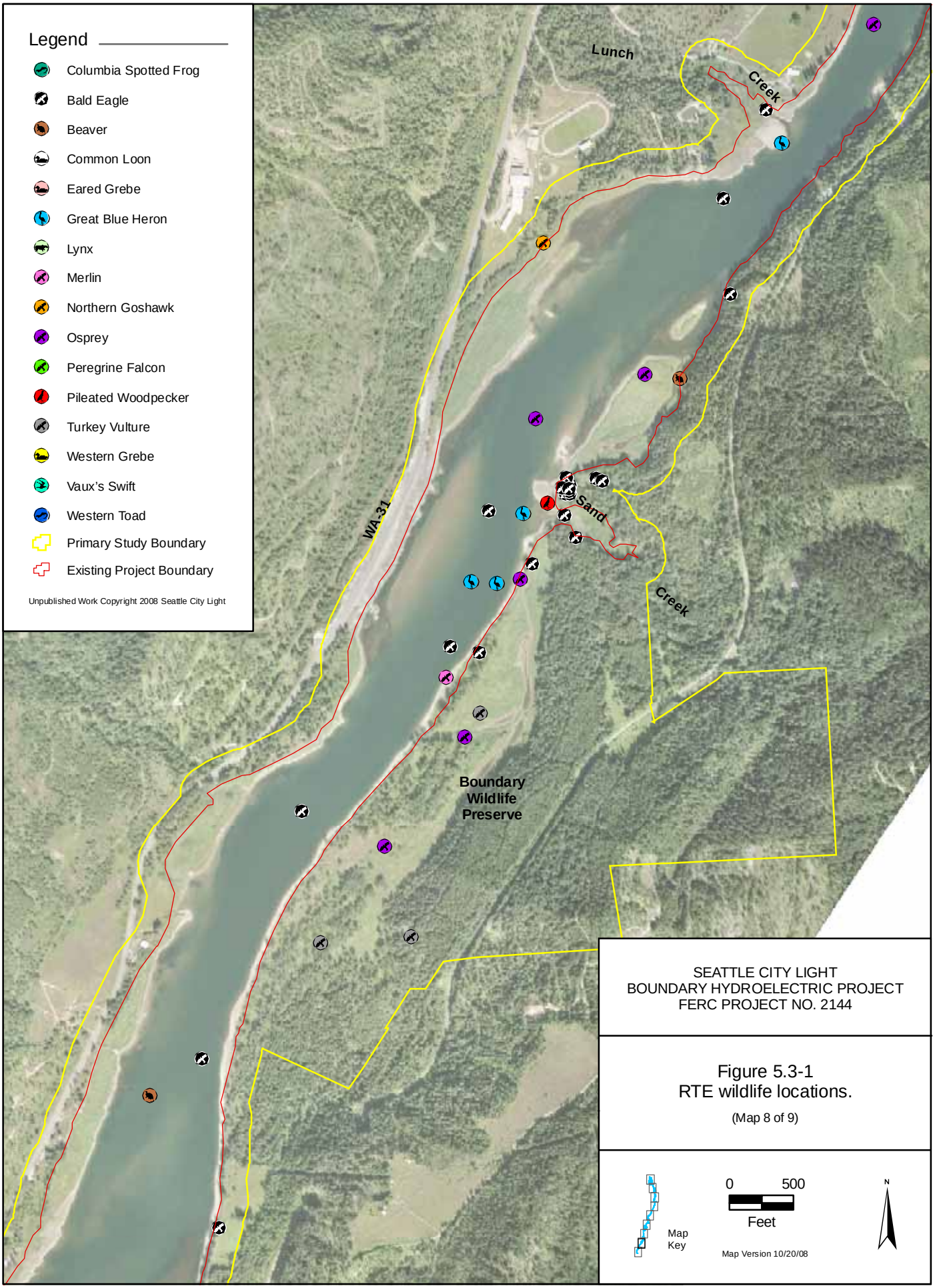
Bald Eagle
Beaver
Common Loon
Eared Grebe
Great Blue Heron
Lynx
Merlin
Northern Goshawk
Osprey
Peregrine Falcon
Pileated Woodpecker
Turkey Vulture
Western Grebe
Vaux's Swift
Western Toad
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
Pocahontas
Creek
WA-31
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-1
RTE wildlife locations.
(Map 7 of 9)
Map
Key
0
500
Feet
Map Version 10/20/08
N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Bald Eagle
Beaver
Common Loon
Eared Grebe
Great Blue Heron
Lynx
Merlin
Northern Goshawk
Osprey
Peregrine Falcon
Pileated Woodpecker
Turkey Vulture
Western Grebe
Vaux's Swift
Western Toad
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
Lunch
Creek
WA-31
Sand
Creek
Boundary
Wildlife
Preserve
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
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RTE wildlife locations.
(Map 8 of 9)
Map
Key
0
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Feet
Map Version 10/20/08
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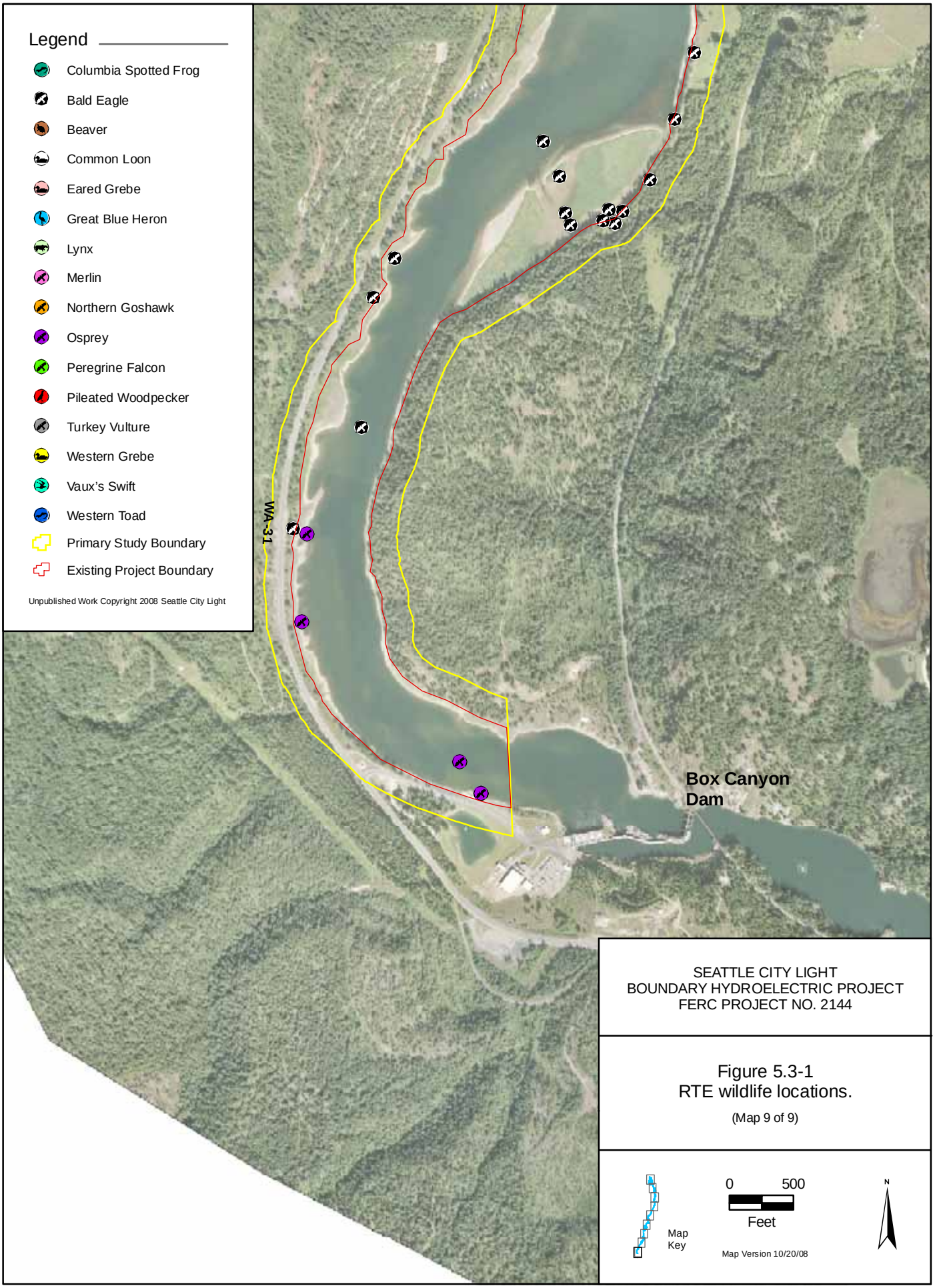
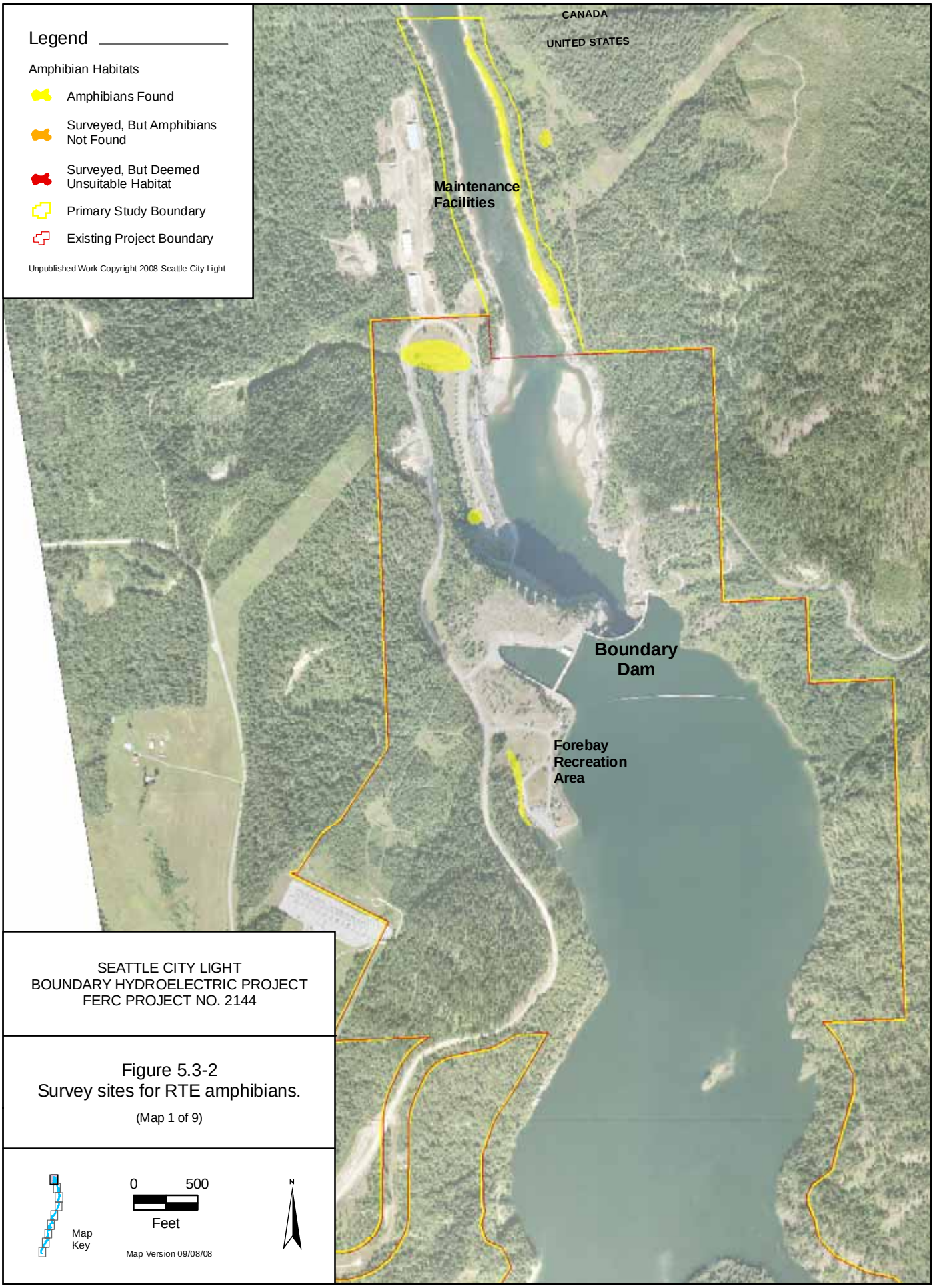


SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144

Figure 5.3-1
RTE wildlife locations.

(Map 9 of 9)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Amphibians Found
Surveyed, But Amphibians Not Found
Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
CANADA
UNITED STATES
Maintenance Facilities
Boundary Dam
Forebay Recreation Area
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-2
Survey sites for RTE amphibians.
(Map 1 of 9)
Map Key
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500
Feet
Map Version 09/08/08
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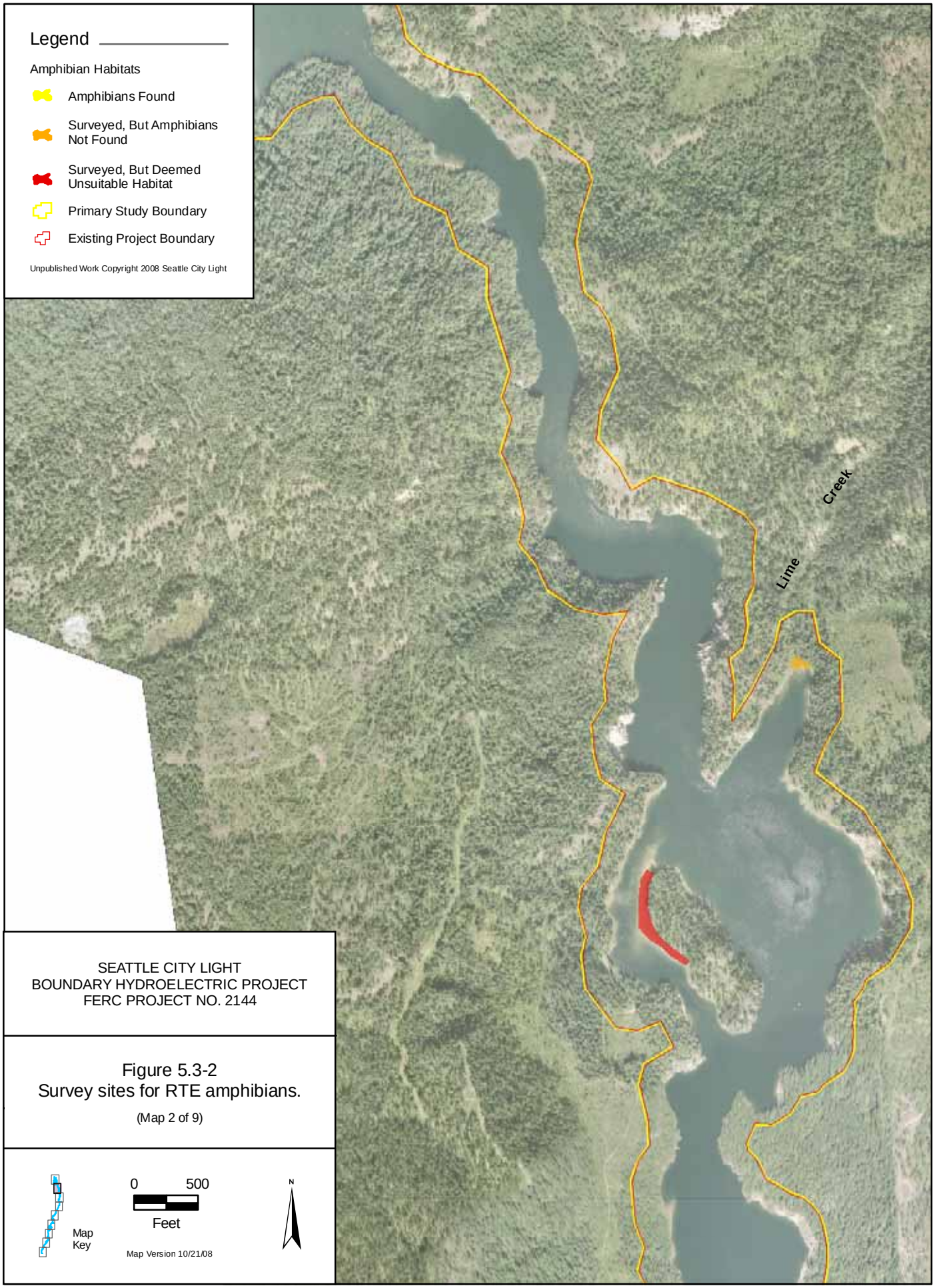
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Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
Lime
Creek
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
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Survey sites for RTE amphibians.
(Map 2 of 9)
Map Key
0
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Feet
Map Version 10/21/08
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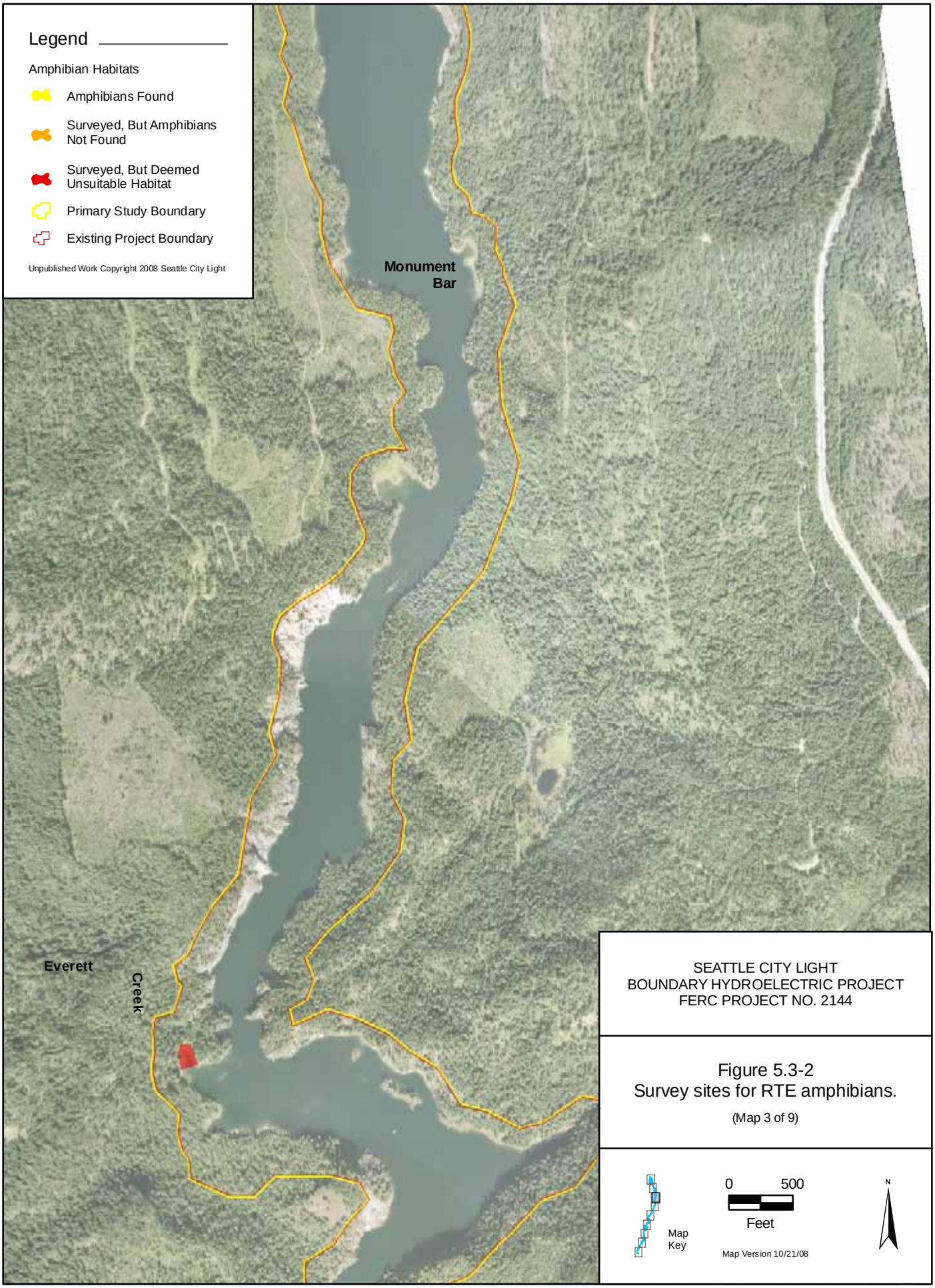
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Amphibians Found
Surveyed, But Amphibians Not Found
Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
Monument Bar
Everett
Creek
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-2
Survey sites for RTE amphibians.
(Map 3 of 9)
Map Key
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Feet
Map Version 10/21/08
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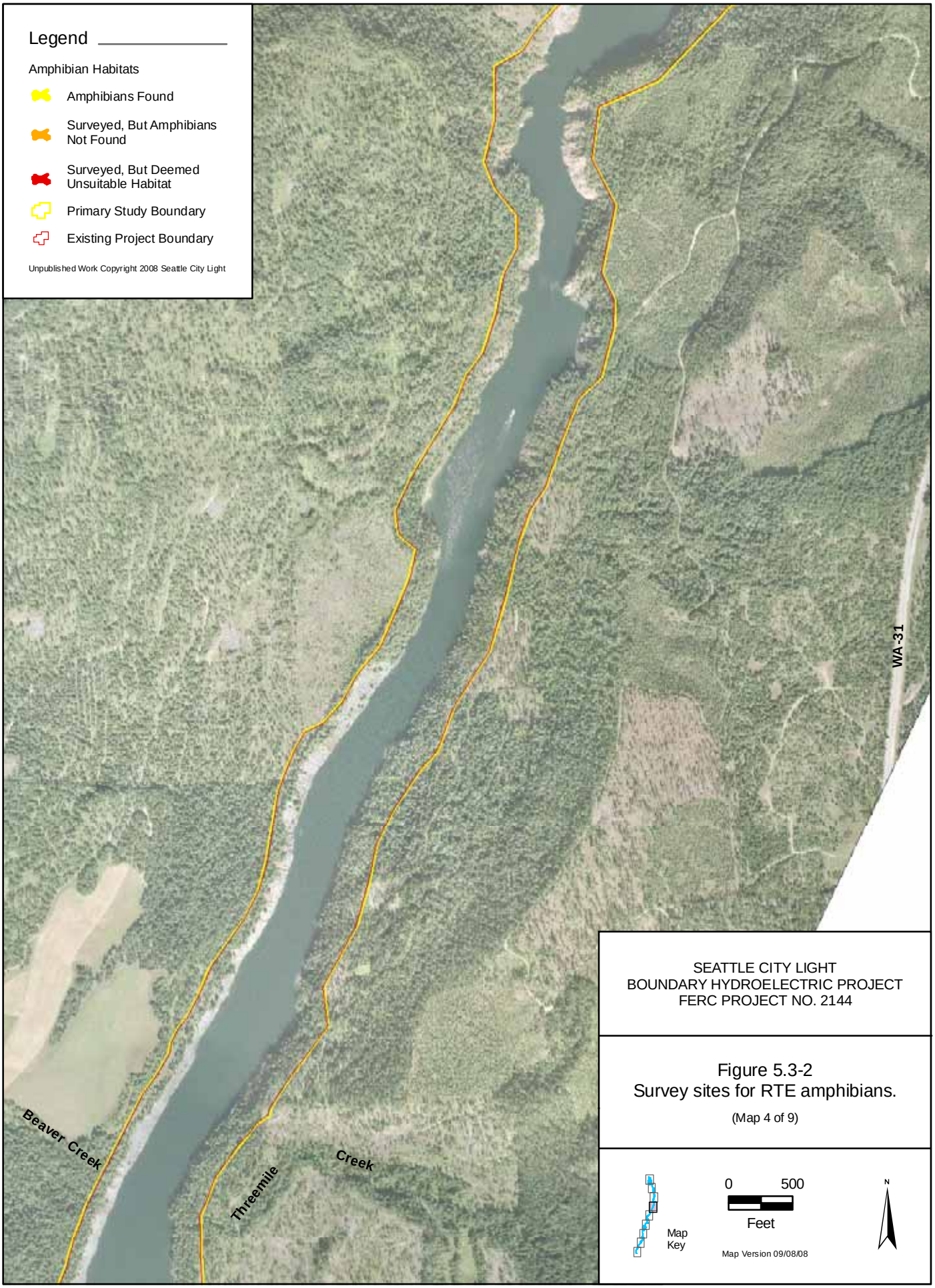
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Amphibians Found
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Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
WA-31
Beaver Creek
Threemile
Creek
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-2
Survey sites for RTE amphibians.
(Map 4 of 9)
Map Key
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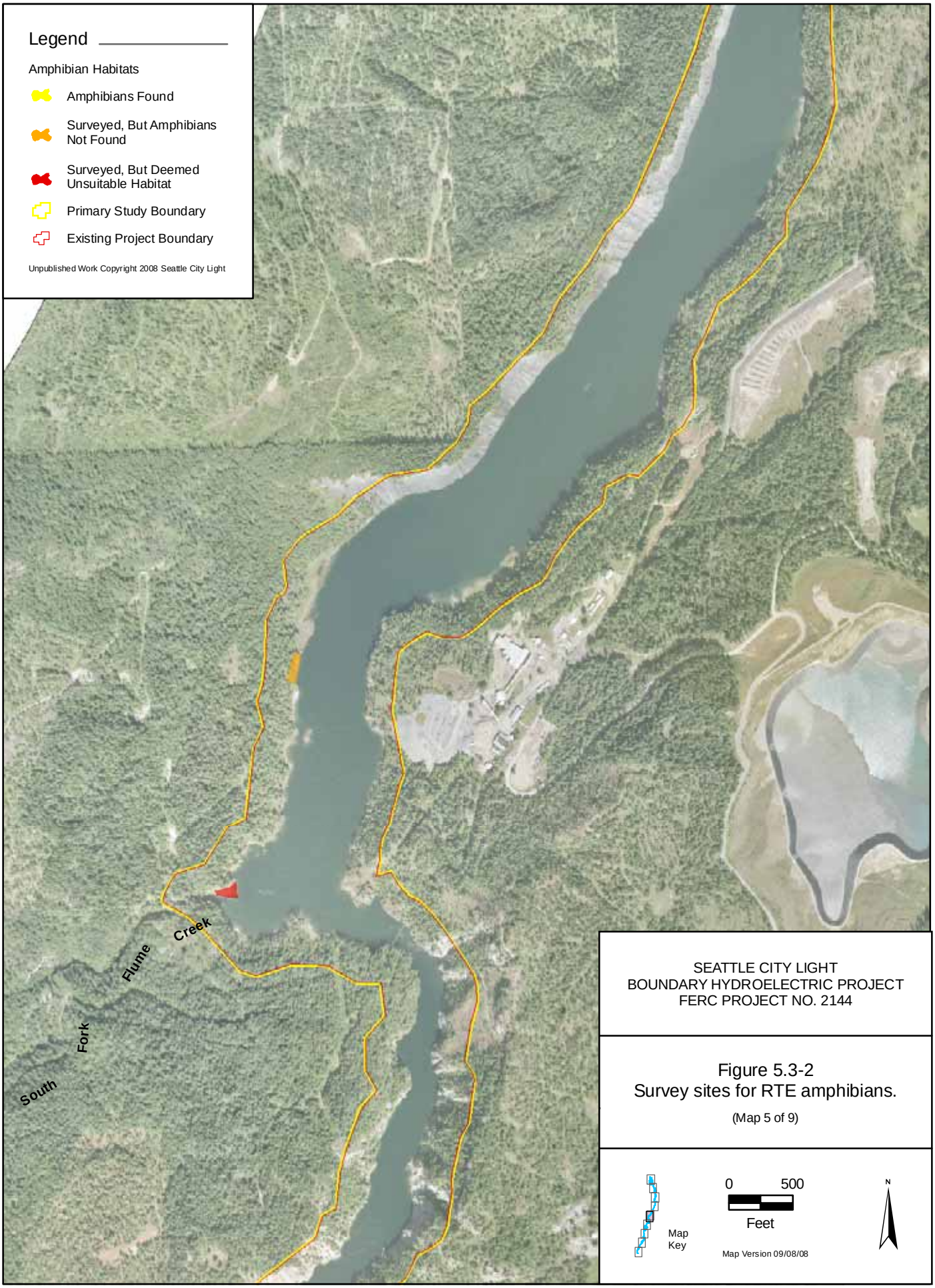
500
Feet
Map Version 09/08/08
N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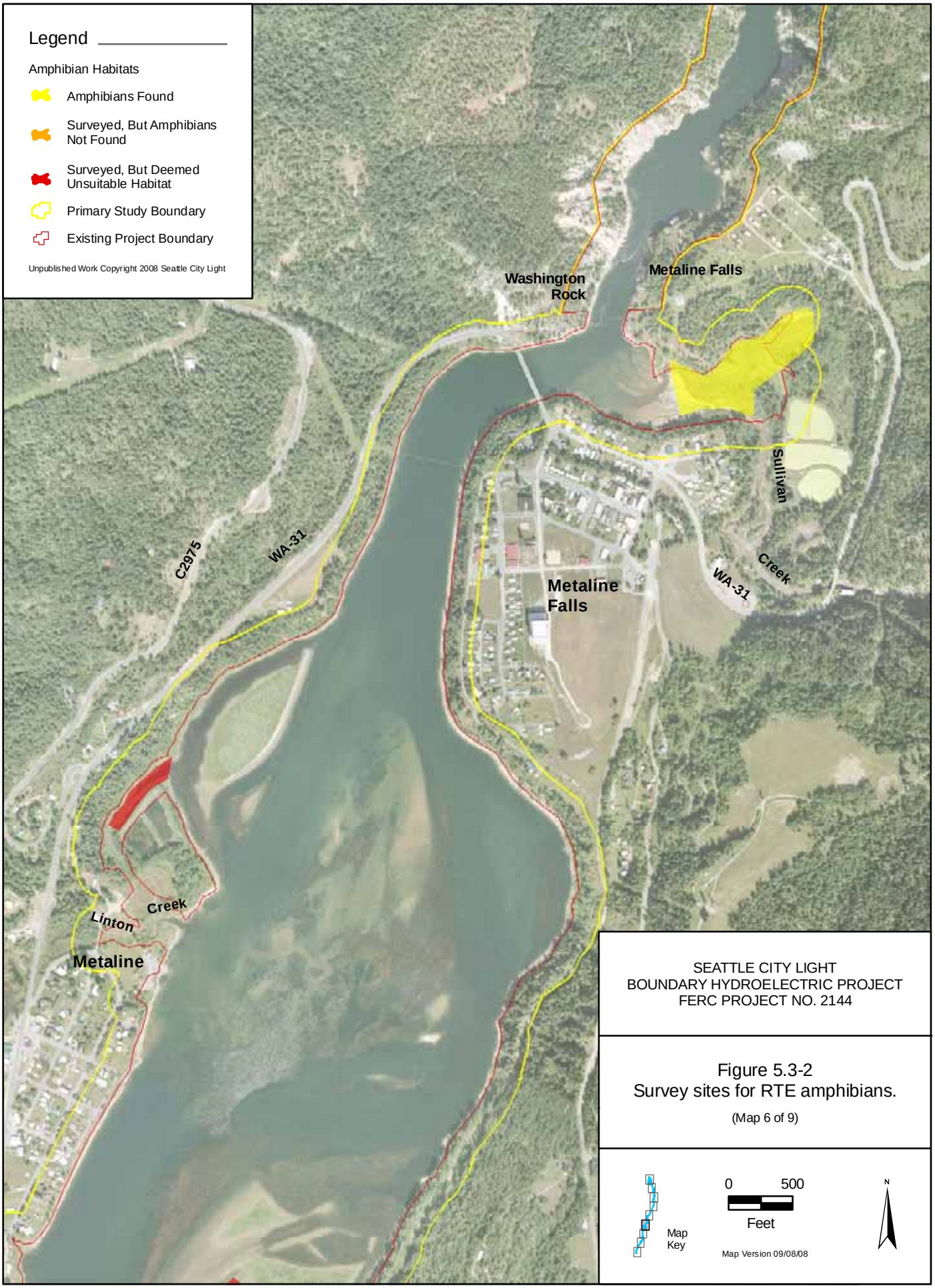
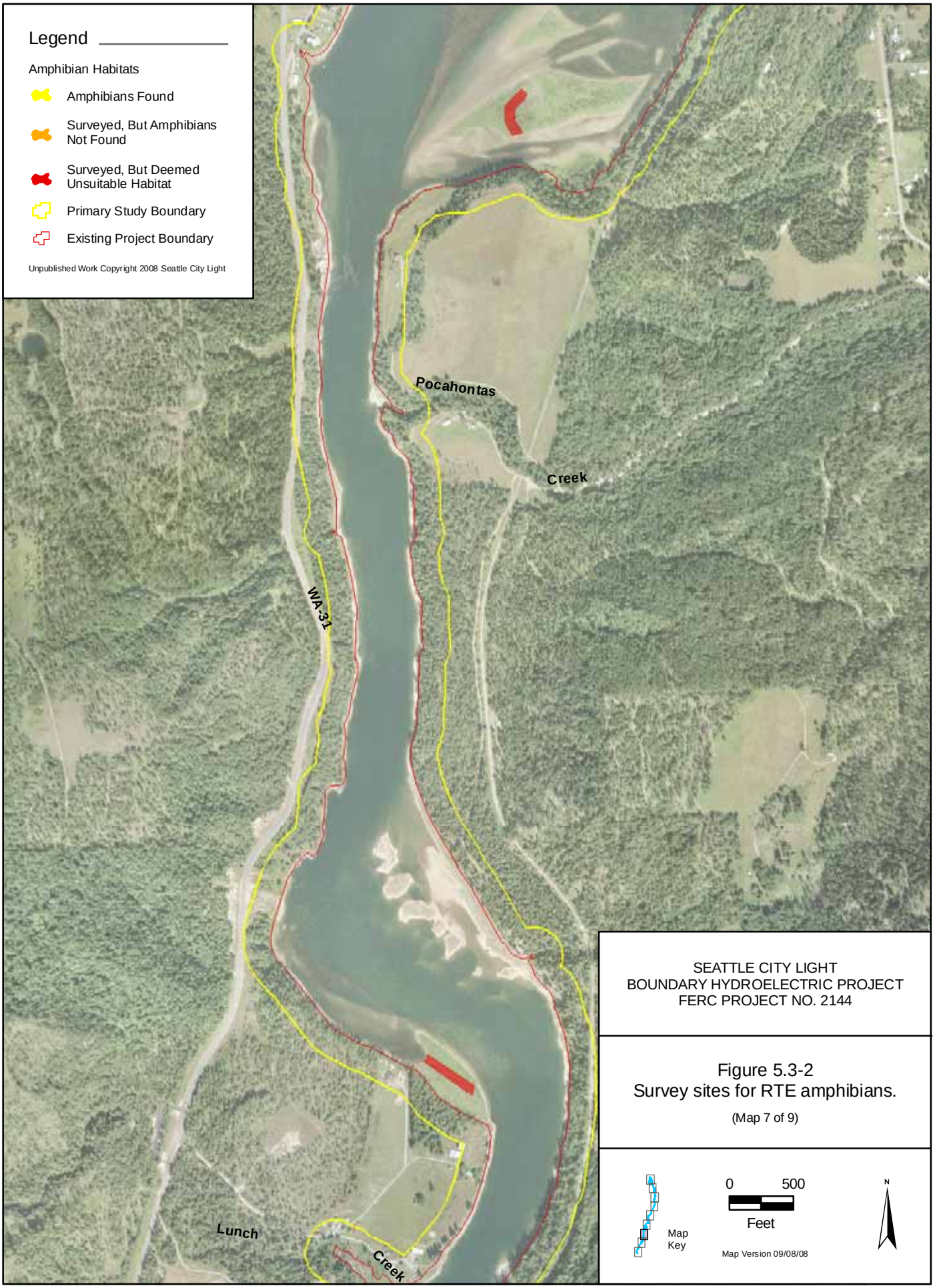
Amphibians Found
Surveyed, But Amphibians Not Found
Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
South Fork Flume Creek
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-2
Survey sites for RTE amphibians.
(Map 5 of 9)
Map Key
0 500
Feet
Map Version 09/08/08
N



SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144

Figure 5.3-2
Survey sites for RTE amphibians.

(Map 6 of 9)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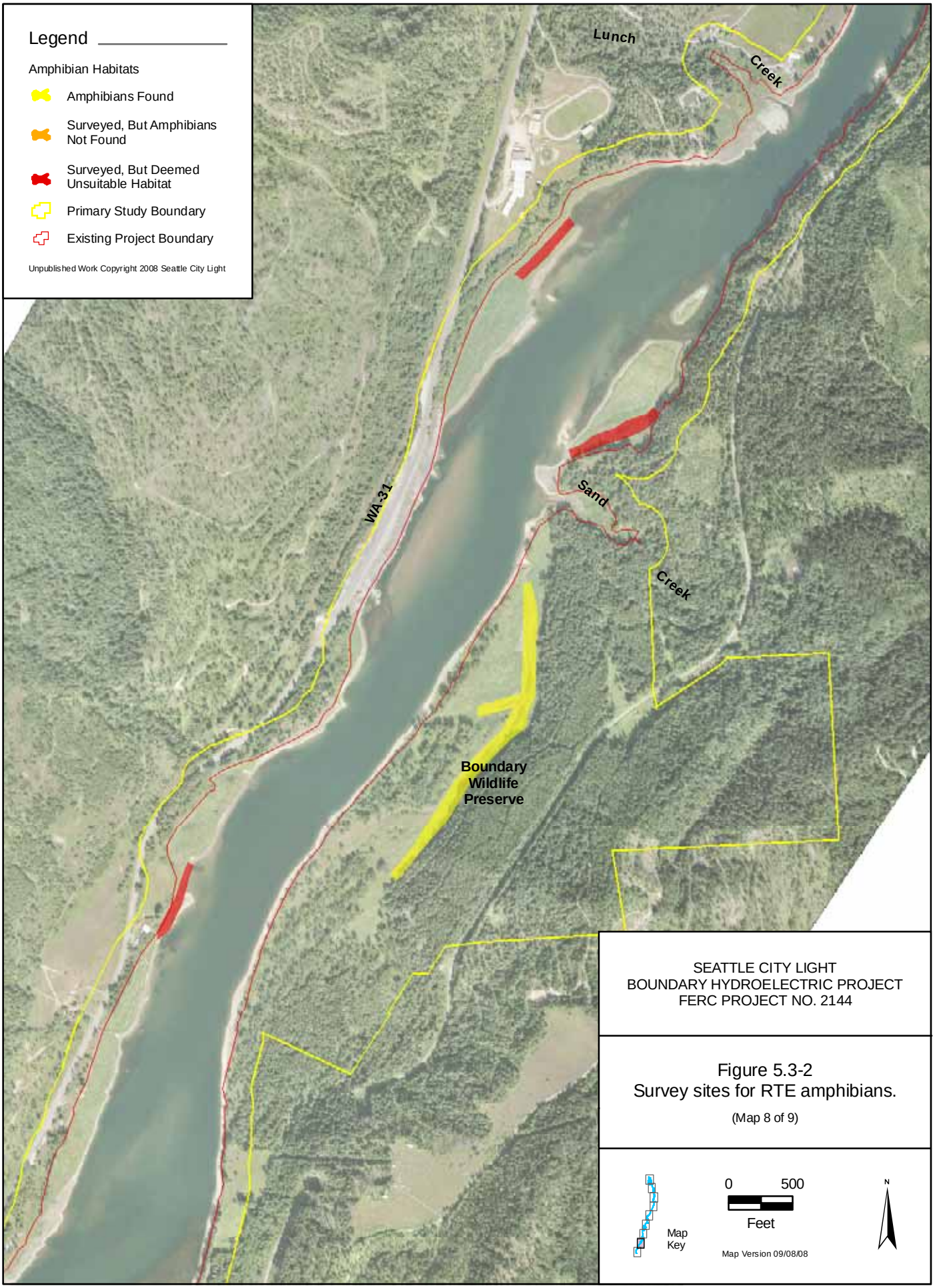
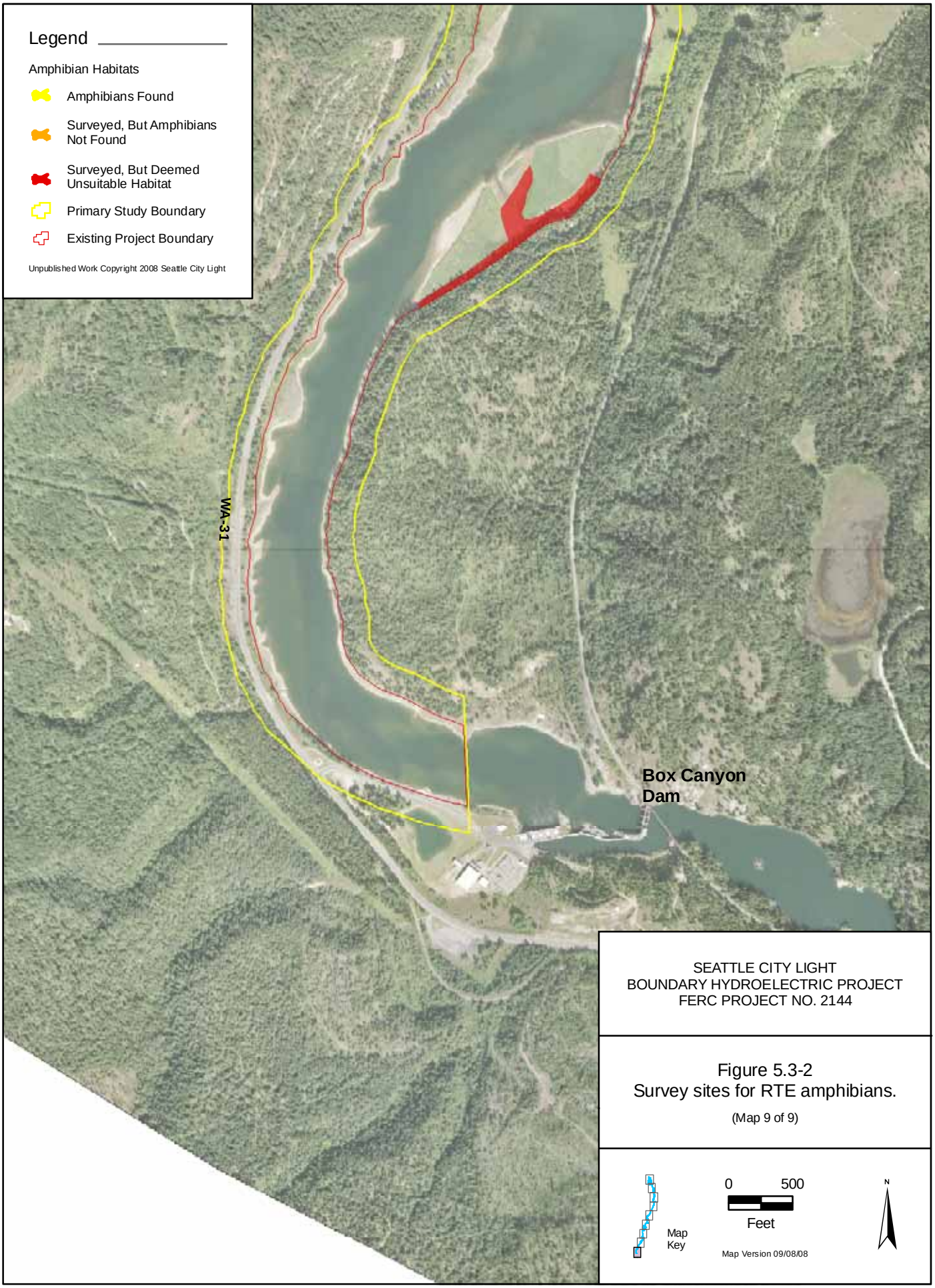
Amphibian Habitats
Amphibians Found
Surveyed, But Amphibians Not Found
Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
Pocahontas
Creek
WA-31
Lunch
Creek
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-2
Survey sites for RTE amphibians.
(Map 7 of 9)
Map Key
0
500
Feet
Map Version 09/08/08
N


Legend
Amphibian Habitats
Amphibians Found
Surveyed, But Amphibians Not Found
Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
Lunch
Creek
WA-31
Sand
Creek
Boundary Wildlife Preserve
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-2
Survey sites for RTE amphibians.
(Map 8 of 9)
Map Key
0
500
Feet
Map Version 09/08/08
N


Legend
Amphibian Habitats
Amphibians Found
Surveyed, But Amphibians Not Found
Surveyed, But Deemed Unsuitable Habitat
Primary Study Boundary
Existing Project Boundary
Unpublished Work Copyright 2008 Seattle City Light
WA-31
Box Canyon Dam
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-2
Survey sites for RTE amphibians.
(Map 9 of 9)
Map Key
0
500
Feet
Map Version 09/08/08
N

- ***Western toad.*** A single large western toad was found near the restroom building at the Forebay Recreation Area on July 26, 2007. These semi-terrestrial amphibians may be attracted to the area by the large number of yellow-bellied marmot burrows at the campsite, which provide toads with shelter and sites for overwintering (Bull 2006).

- ***Columbia spotted frog.*** Spotted frogs were found at three small streams running through the Tailrace Recreation Area on the west side of the river below Boundary Dam (Figure 5.3-1, Map 1). This species was also observed at one of two small ponds on the east side of the tailrace (just outside of the study area, on SCL property), immediately upslope of the river (where they were incidentally recorded in 2006). No spotted frogs were observed within the reservoir or adjacent waters.

- ***Common loon.*** Single common loons were recorded using the reservoir on five different occasions. Individual loons were observed in the Boundary forebay (Figure 5.3-1, Map 1) in late April 2007 and in the reservoir near Metaline in late May 2007 (Figure 5.3-1, Map 6). The bird recorded in May was seen capturing a fish then immediately leaving the reservoir. It is possible that this bird was breeding at a location outside of the study area (e.g., Sullivan Lake) and coming to the reservoir to forage. In April 2008, single loons were observed in both the Boundary forebay the Canyon Reach, and near Metaline (Figure 5.3-1, Maps 1, 4, and 6).

- ***Eared grebe***. Eared grebes were recorded 8 times (137 individuals), all during the months of April and May, confirming their spring migrant status. Large groups were observed on April 20, 2007 (61 individuals; Metaline); April 22, 2008 (36; Boundary forebay); and April 26, 2008 (22; Boundary forebay).

- ***Western grebe***. Western grebes were observed in low numbers (one to four) in the reservoir near Metaline in April, June, July, September, and October. Summer birds were often paired, but no evidence of breeding was observed.

- ***Great blue heron***. Great blue herons are addressed in greater detail in the Study 15 final report (SCL 2009c). In general, they were observed (27 records, 35 individuals) in all seasons, but nearly 75 percent were documented mid-July to mid-October, and are possibly non-breeders and young-of-the-year dispersing from the heron rookery located upstream near Cusick (Reese and Hall 1991). There was no evidence of heron breeding in the study area.

- ***Turkey vulture.*** Seventy-six individual vultures in 36 groups were recorded during 2007 and 2008. Although soaring vultures were found throughout the study area, they were most commonly observed near Metaline Falls (Figure 5.3-1, Map 6) and Boundary Dam (Figure 5.3-1, Map 1) where they used the cliff faces as thermal lifts. Turkey vultures were also noted foraging (presumably on fish carcasses) on the exposed gravel islands near Metaline during the September 2007 reservoir drawdown.

It is possible that vultures nest in the cliffs along the Canyon Reach, Washington Rock, and possibly the rock face below Vista House, but no breeding was confirmed.

- ***Osprey***. Four osprey nests were identified in 2007 and 2008, but they all were outside of the study area. Although it was difficult to see into three of the nests, all appeared to have successfully fledged at least one young in both 2007 and 2008. Nest locations included a lattice transmission tower below Boundary Dam (east side of the river; Figure 5.3-1, Map 1); the ridge east of the junction of the Canyon Reach with the Boundary forebay; upslope of the mouth of Slate Creek (Figure 5.3-1, Map 3); and immediately across the reservoir from the town of Metaline Falls on the edge of a powerline right-of-way (Figure 5.3-1, Map 6). Osprey activity in the Box Canyon Dam tailrace suggests that this area is part of the foraging territory for nesting along Box Canyon Reservoir. Ospreys were commonly seen along Boundary Reservoir during the spring and summer, with peak counts in mid-June. By August, the number of osprey observations began to decrease and they were gone from the study area by October.

- ***Golden eagle***. Although there were no confirmed sightings of golden eagles during this study, they were reported near Boundary Dam in 2005 (SCL 2006) and along Box Canyon Reservoir (Reese and Hall 1991). An incidental observation in 2007 of a golden eagle downstream of Metaline Falls was reported by a fisheries survey crew. Still, the presence of this species cannot be confirmed, especially since juvenile bald eagles, which are often mistaken for golden eagles, can be found year-round in the study area. An abandoned eagle nest was discovered in 2007 on a steep slope above Metaline Falls on the backside of Washington Rock (Figure 5.3-1, Map 6); this nest, situated at the top of a flat-topped ponderosa pine tree, may be an old golden eagle nest.

- ***Bald eagle.*** There were three active bald eagle territories in the study area in 2005—across the reservoir from the Box Canyon Resort, near Sand Creek, and on Everett Island—with only the latter confirmed to fledge eaglets (2) (SCL 2006) (Table 5.3-3). In 2007, four eagle nesting territories were occupied in the study area, but only the three territories upstream of Metaline Falls (Metaline; Sand Creek; and Box Canyon, Figure 5.3-1, Maps 6, 8, and 9) were active, collectively producing at least five fledglings (it was not certain whether the Metaline territory fledged one or two eaglets). The Everett Island nesting territory (Figure 5.3-1, Map 2) was occupied at various times by two adults and two juveniles. Although the nest tree was used as a roost by these eagles, no evidence of breeding was observed at this site. In 2008, the same three territories in the upper reservoir were occupied. The Sand Creek pair failed to nest, whereas the Metaline and Box Canyon nests fledged two eaglets each. Eagles were documented on several occasions along the lower reservoir on what appeared to be two territories (near Everett Island and Slate Creek) but active nests could not be found. It is possible that nesting occurred outside of the primary study area.

Table 5.3-3. Bald eagle territories in the Project area, and occupancy and eaglets fledged by year, 1989–2008.

Year	Bald Eagle Territory			
	Everett Island	**Metaline**	**Sand Creek**	**Box Canyon**
1989	--	Unknown	1	--
1990	--	Unknown	2	--
1991	--	Unknown	2	--
1992	--	Unknown	2	--
1993	--	Unknown	2	--
1994	--	Unknown	3	--
1995	--	Unknown	3	--
1996	--	Unknown	Active, Unknown	--
1997	--	Unknown	Active, Unknown	--
1998	--	Unknown	2	--
1999	2	Unknown	Active, Unknown	--
2000	Unknown	Unknown	Unknown	2
2001	Unknown	Unknown	Unknown	Unknown
2002	Unknown	Unknown	Unknown	Unknown
2003	Unknown	Unknown	Unknown	Unknown
2004	Unknown	Unknown	Unknown	Unknown
2005	2	Unknown	Active, Unknown	Unknown
2006	Unknown	Unknown	Unknown	Unknown
2007	Occupied	1	2	2
2008	Occupied	2	Occupied	2

- ***Northern goshawk.*** There was one observation of a goshawk in November 2008 at the mouth of Slate Creek (Figure 5.3-1, Map 3), a site with remnant stands of mature conifer forest. Another sighting occurred in June 2007 along the edge of a mixed conifer forest belt near Selkirk High School (Figure 5.3-1, Map 8). Based on the available habitat, goshawks are uncommon residents in the Project vicinity, although the study area may provide some wintering habitat.

- ***Merlin.*** A single merlin was observed in July 2008 feeding on a small bird while perched at the top of a cottonwood tree along the shoreline of the BWP (Figure 5.3-1, Map 8).

- ***American peregrine falcon.*** The first peregrine falcon sighting in the study area was recorded in April 2007 just below Metaline Falls. In August 2007, two interacting falcons were observed circling over the reservoir north of the town of Metaline (Figure 5.3-1, Map 6). In 2008, a pair was recorded several times from April to July on Washington Rock in association with a crevice presumed to be a possible nest site (although no juveniles have been observed to date). The crevice is located outside of the study area, but the pair have been observed foraging over the reservoir and

shorelines. Follow-up surveys by the BLM and WDFW are planned during the 2009 breeding season.

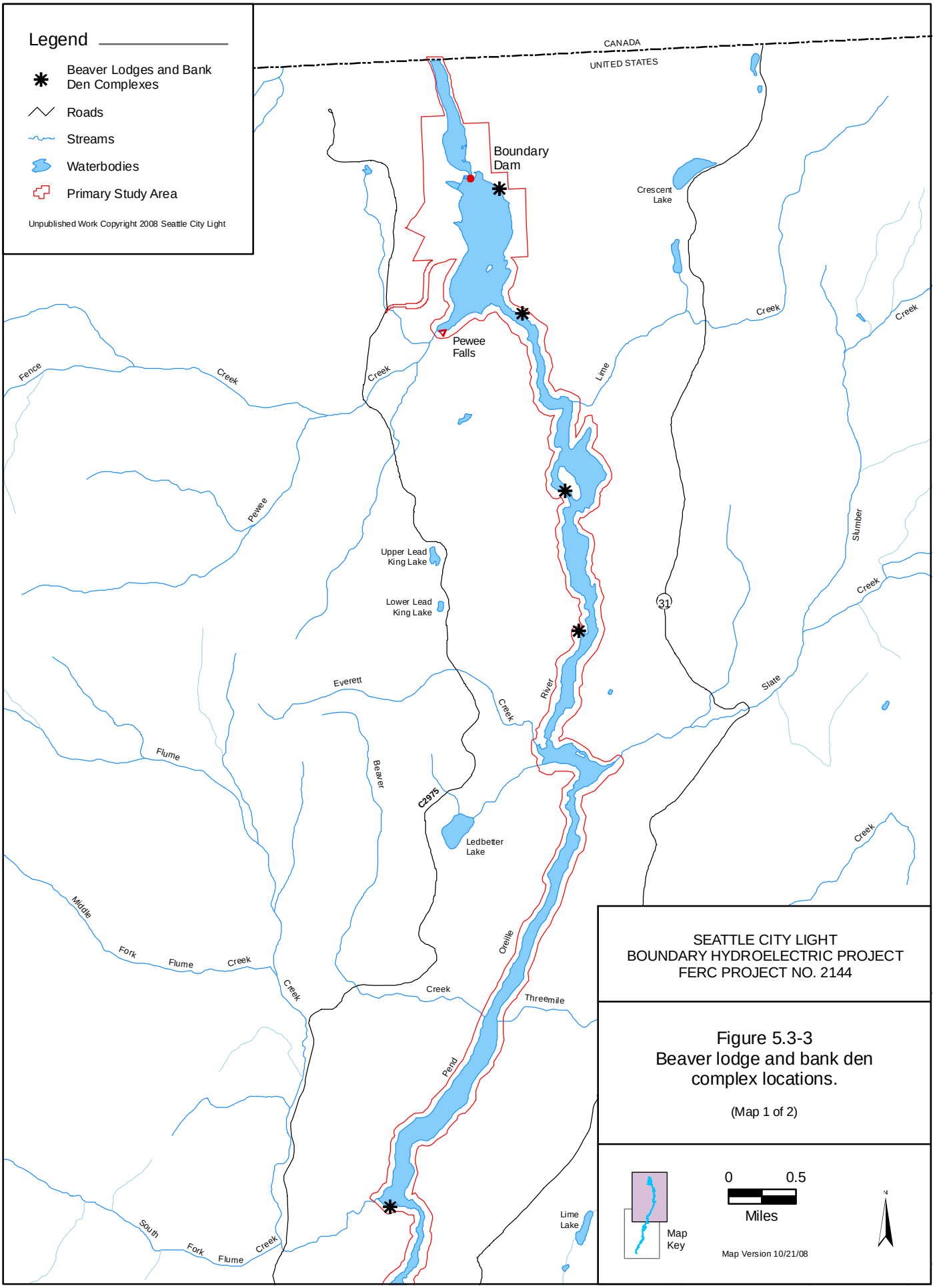
- ***Pileated woodpecker.*** Pileated woodpeckers were observed four times flying across the reservoir (Figure 5.3-1, Maps 3, 5, and 8). In addition, a single pileated woodpecker was observed in September in the forested habitat near the Box Canyon Motel, just outside of the study area. These sightings, plus observations of several old nest cavities and foraging holes (especially near Slate Creek), suggest that although pileated woodpeckers may not be abundant, they do occur throughout the study area.

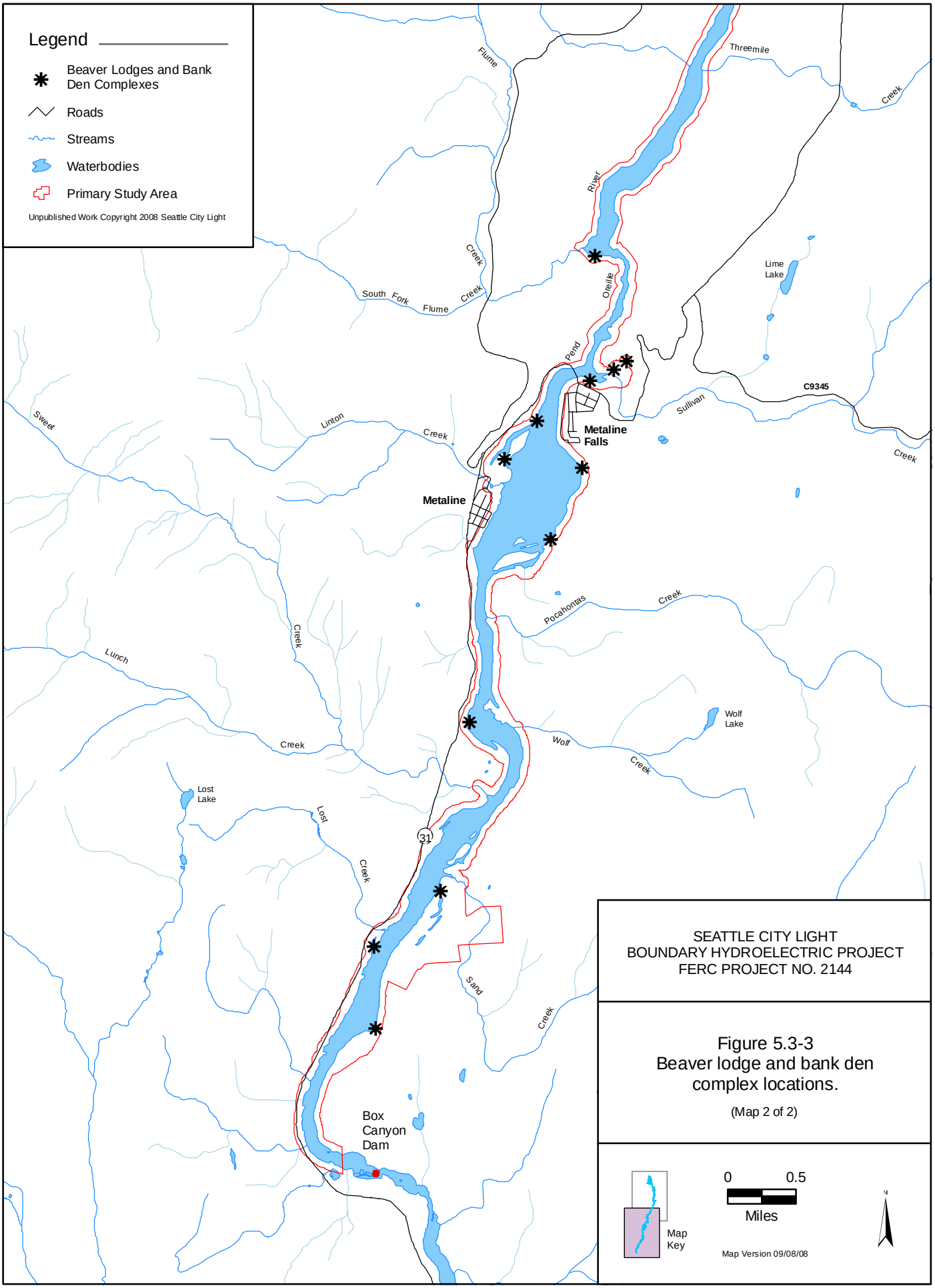
- ***Vaux's swift***. Several Vaux's swifts were observed foraging over Sullivan Creek in mid-May 2008 (Figure 5.3-1, Map 6). It is assumed these birds were migrants since mid-May is the spring migration peak for this species (Wahl et al. 2005), and the older forests that provide habitat for the Vaux's swift are generally lacking in the study area.

- ***Long-eared myotis, long-legged myotis, and western small-footed myotis.*** These three species were all acoustically recorded near the Box Canyon Dam tailrace. See Study 20 (SCL 2009a) for details.

- ***Townsend's big-eared bat***. This species was observed roosting in two mines and one cave in the study area and was recorded both visually and acoustically near Washington Mine. See Study 20 (SCL 2009a) for details.

- ***Beaver.*** Beaver are ubiquitous in the study area, inhabiting all segments of the river reaches. There are at least 16 beaver lodges or bank den complexes in the study area supporting approximately 80 beavers if all lodges and dens were active (Denney 1952; Breck et al. 2001). Figure 5.3-3 shows the locations of these lodge/den complexes.


Legend
Beaver Lodges and Bank Den Complexes
Roads
Streams
Waterbodies
Primary Study Area
Unpublished Work Copyright 2008 Seattle City Light
CANADA
UNITED STATES
Boundary Dam
Crescent Lake
Pewee Falls
Fence Creek
Creek
Lime Creek
Creek
Pewee
Upper Lead King Lake
Lower Lead King Lake
31
Slumber Creek
Everett Creek
River
Slate Creek
Flume
Beaver
C2975
Ledbetter Lake
Creek
Middle Fork Flume Creek
Creek
Creek
Threemile
Pend Oreille
South Fork Flume Creek
Lime Lake
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-3
Beaver lodge and bank den complex locations.
(Map 1 of 2)
Map Key
0
0.5
Miles
Map Version 10/21/08
N



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FERC PROJECT NO. 2144

Figure 5.3-3
Beaver lodge and bank den complex locations.

(Map 2 of 2)

- ***Gray wolf***. Gray wolves are expanding into Washington State, with the first resident pack since the 1930s confirmed in the Okanogan Highlands in July 2008 (WDFW 2008d). WDFW has been monitoring small numbers of wolves in the LeClerc Creek area south of the study area, although individual wolves have been sighted throughout the Sullivan Lake Ranger District (Borysewicz 2008). Three unconfirmed reports of wolves in or near the study area were received during the course of the RTE Wildlife Study. Fisheries biologists working on the reservoir reported two large canids swimming the river near Deadman's Eddy in 2007. A fisheries crew working in the Boundary tailrace, familiar with wolves, reported howling wolves near the British Columbia-U.S. border in 2008. Also in spring 2008, a fisheries crew working at night noticed fresh wolf-like tracks in the mud along the shoreline across the river from Box Canyon Motel. A follow-up survey the next morning determined that the size and shape were consistent with wolf tracks, but it is very difficult to rule out large dogs. Given the proximity of source populations in Idaho and Canada, wolf packs are expected to establish in northeastern Washington, and use of Project vicinity habitats by this species is likely to increase.

- ***Grizzly bear*.** There are recent records of grizzly bear sightings from both sides of the reservoir (outside of the study area) and near Sullivan Creek (Borysewicz 2008). Also, a local resident reported that grizzly bears are often seen in the spring foraging in the meadows on both sides of Boundary Reservoir south of Metaline Falls in the secondary study area (Luhr 2008). Radiotelemetry from 2003 indicated that a grizzly bear may have used Slate Creek as a travel corridor before crossing the reservoir (Borysewicz 2008).

- ***Canada lynx*.** A lynx crossing the Boundary reservoir in the Canyon Reach (Figure 5.3-1, Map 3) on May 11, 2008 was photographed by a fisheries study crew. The animal probably represented an adult moving between the Salmo-Priest wilderness and Abercrombie Mountain.

5.3.2. RTE Wildlife High-Quality Habitat Assessment

A number of locations/habitat types were identified in the study area that provide high-quality habitat based on the observed use by RTE wildlife in 2007 and 2008:

- Boundary Reservoir
- Mature black cottonwood stands
- Sullivan Creek wetlands
- Rock cliffs
- Older age-class conifer trees and snags

Each location/habitat type is described below.

5.3.2.1. Boundary Reservoir

The primary high-quality habitat features of the study area are the reservoir and its associated shoreline. The entire reservoir provides foraging habitat for common loons, eared grebes, western grebes, great blue herons, osprey, bald eagles, and potentially peregrine falcons; it is also the primary habitat for beaver. More specifically, the reservoir between the Metaline Falls bridge and the town of Metaline (Figure 5.3-1, Map 6), is heavily used by all of the above species, plus a wide variety of other waterfowl and waterbirds. This area offers several features important to wildlife including bathymetric diversity with a sinuous deep-water channel adjacent to shallow rocky areas, and patches of aquatic macrophytes that provide habitat for fish and aquatic invertebrates (important for eared grebes). Overall, this area provides foraging habitat for both piscivorous and herbivorous waterfowl and waterbirds and protected resting or loafing areas. Beaver, muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), hundreds of bats, and at least 34 species of waterbirds and waterfowl were recorded here in 2007 and 2008. The Boundary forebay in many ways is similar to the Metaline pool and is used by common loons, great blue herons, bald eagles, osprey, and beaver, but not at the diversity and levels found at the Metaline pool.

5.3.2.2. Black Cottonwood Stands

Over 48 acres of mature black cottonwood trees occur in the study area, nearly all of it upstream of Metaline Falls (Study 16, Inventory of Riparian Trees and Shrubs Final Report [SCL 2009f]). Most of this acreage is found at the BWP and along the lower portion of Sullivan Creek (see the riparian maps in the Study 16 final report). Smaller patches of cottonwood occur at the mouth of Sand Creek, near Box Canyon, and across from Metaline. Five of the six extant bald eagle nests (includes unoccupied nests) in the primary study area are in large cottonwood trees. A merlin was sighted at the top of a large cottonwood tree at the BWP, and the stands of mature trees at the BWP provide potential habitat for barred owls, accipiters, and many species of passerine birds. The large cottonwood snags represent potential habitat for Lewis' woodpeckers and are currently used for nesting by non-RTE woodpeckers, as well as wood ducks (*Aix sponsa)* and tree swallows (*Tachycineta bicolor*). Stands of smaller cottonwood trees provide forage and denning materials for beaver.

5.3.2.3. Sullivan Creek Wetlands

The Sullivan Creek wetlands are characterized by a pond, a series of beaver dams, and cottonwood and willow-dominated riparian stands (see the riparian and wetland maps in the Study 16 final report [SCL 2009f]). It is one of the most ecologically rich sites in the study area. RTE wildlife species observed at this site include great blue heron, turkey vulture, osprey, Vaux's swift, bald eagle, peregrine falcon, and beaver. Potential habitat for barred owls and Lewis' woodpeckers can also be found here. Important non-RTE wildlife recorded at this site include river otter (*Lutra canadensis*), wood duck, and several species of avian neotropical migrants.

5.3.2.4. Rock Cliffs

Rock cliff habitat can be found immediately below Boundary Dam, in the Canyon Reach, and at Washington Rock (just outside of the study area). Cliffs are important because they are a relatively limited habitat feature and provide nesting habitat for RTE raptors such as peregrine falcons, golden eagles, and turkey vultures. Associated caves and crevices provide roosting habitat for Townsend's big-eared bats and other RTE bat species.

5.3.2.5. Older-age Class Conifer Trees and Snags

Most of the conifer forests in the study area burned in 1925 and are therefore only about 80 years old. No high-quality old-growth stands are present, although there are a few mature western larch (*Larix occidentalis*) found scattered between the maintenance facilities north of Boundary Dam and the river, and a few large legacy ponderosa pine trees along the reservoir shoreline edge and on isolated ridgetops. Some mature conifer stands can be found in Slate Creek, but most of the mature trees are outside of the study area. Snags suitable for nesting by woodpeckers are found throughout the study area, many of which are residual from past fires. However, large snags are not abundant and no high density patches of snags were identified. Pileated woodpecker nest cavities were found in both ponderosa pine and western larch snags but nearly all of these snags were below the 33 inches diameter at breast height average size reported from northeastern Oregon (Bull 1987; Bull et al. 1992).

5.3.3. Potential Crossings and Barriers

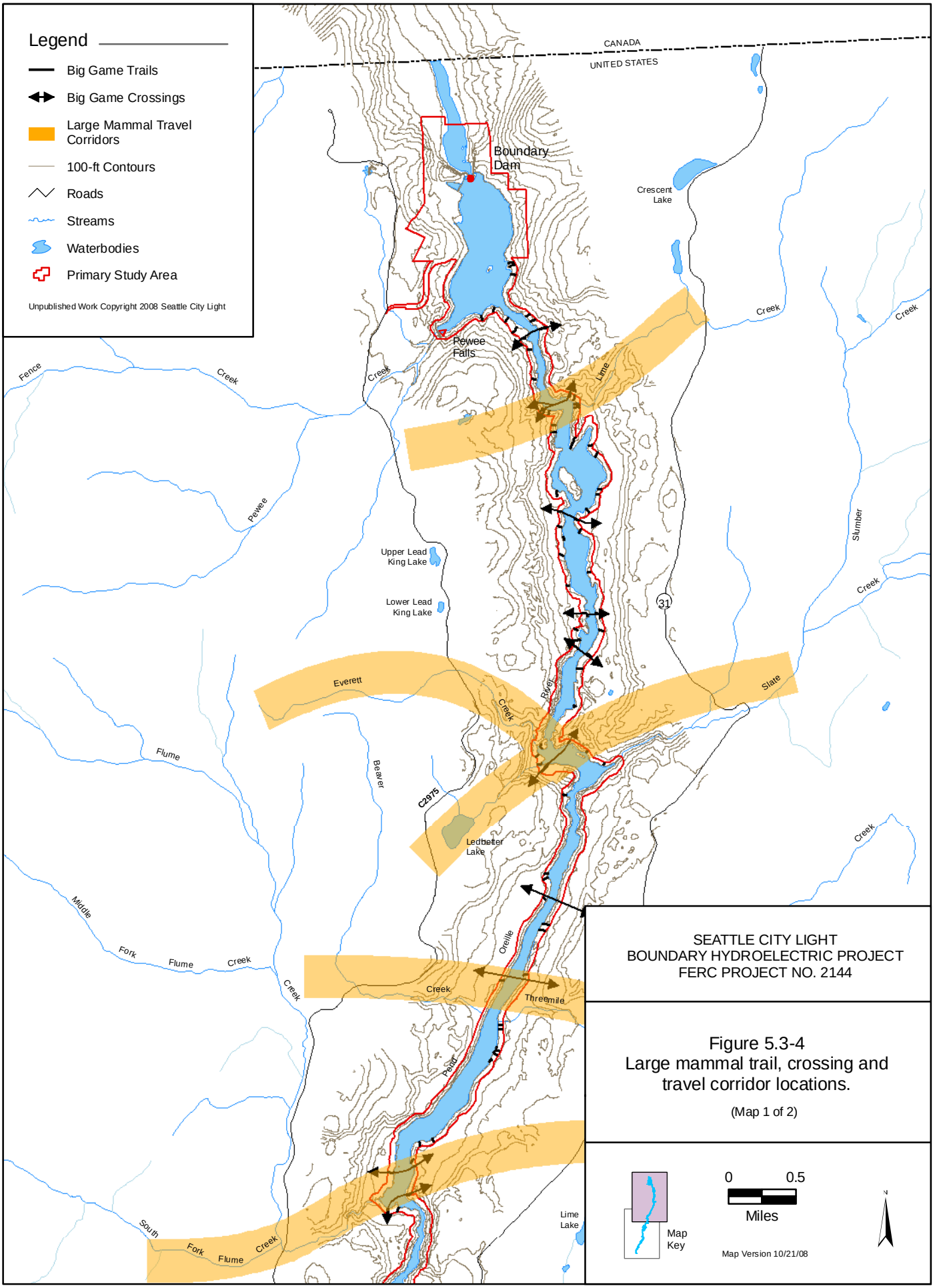
Waterbodies, including streams, rivers and lakes, represent obstacles to unrestricted wildlife movement across the landscape. In addition, topographic features (such as cliffs) can also influence wildlife movement. In undisturbed landscapes, these features are part of the "natural matrix" (Meffe et al. 1997) and represent barriers to the movement of some species but not others. Water is not a barrier to most avian species, and big game species readily cross large rivers by swimming, or on foot under favorable conditions, such as seasonal low flows or ice during the winter. Wolves often use topographic features, such as rivers and long lakes, as territory boundaries, crossing only during dispersal (Mech and Boitani 2003).

Boundary Reservoir does not represent a barrier to the movement of large RTE mammals; however, the slope and composition of the shoreline, as well as water currents in the reservoir, influence where these species can cross. This may affect the movement patterns of gray wolves and grizzly bears, particularly those animals using the area between Boundary Dam and Metaline Falls, an area which provides the isolation that these secretive species prefer.

Whether some crossing locations are favored by wolves and bears because of terrain or river current, or whether movement across the reservoir is diffuse, is currently unknown. A task conducted for Study 19 (SCL 2009b) recorded established game trails, indicating where big game routinely access or cross the reservoir or travel along the shorelines. These sites would also be expected to provide crossing opportunities for large RTE mammals. The locations of trails along the reservoir shoreline, as well as potential crossing sites, are provided in Figure 5.3-4. Downstream of Metaline Falls to Boundary Dam,, big game trails can be found virtually anywhere the topography allows easy access to the reservoir edge, although some trails were

noted in rather precarious locations. A total of 74 trails and 10 crossing sites (approximately 1 crossing per river mile) were identified for this reach (Figure 5.3-4). Although there are locations with steep rocky terrain where reservoir access is impeded, including cliffs, the incidental observations of lynx and dog-like animals swimming across the reservoir indicate that suitable crossing sites exist and are being used. Conversely, along the upper reservoir, the topography is gentler and there are few established game trails. Big game appear to be moving more diffusely through the study area above Metaline Falls. RTE wildlife requiring more isolated conditions are less likely to use this area because of higher human presence and roads, but their movement through the landscape is not likely limited by the lack of opportunities to cross the reservoir.

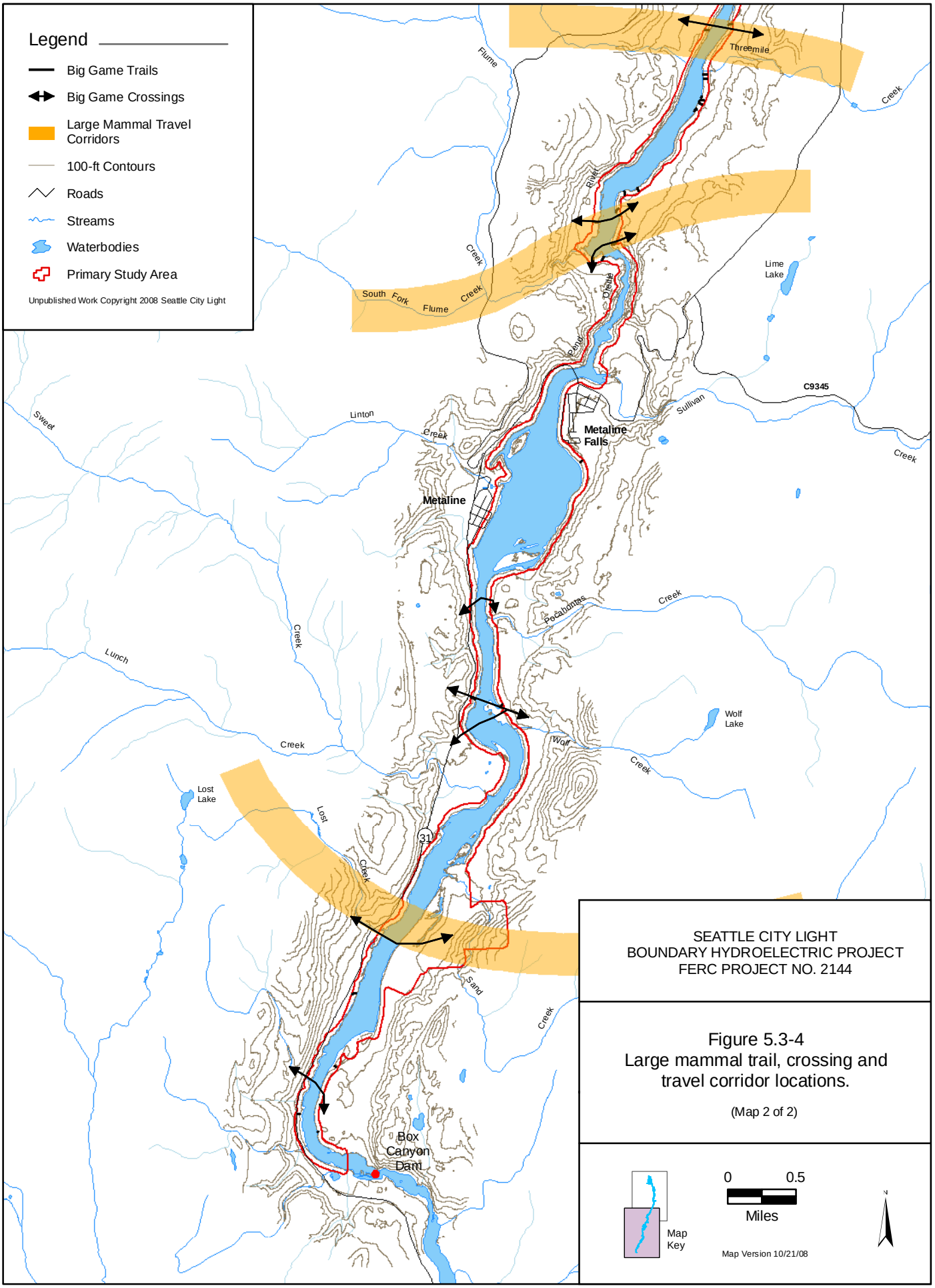
While potential crossings are a measure of the permeability of the primary study area, potential travel corridors indicate the value of the secondary study area to dispersing RTE large mammals. Figure 5.3-4 indicates where potential travel corridors bisect the secondary study area. Slate Creek in particular has been identified as important dispersal habitat for large carnivores and ungulates.



SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144

Figure 5.3-4
Large mammal trail, crossing and travel corridor locations.

(Map 1 of 2)


Legend
Big Game Trails
Big Game Crossings
Large Mammal Travel Corridors
100-ft Contours
Roads
Streams
Waterbodies
Primary Study Area
Unpublished Work Copyright 2008 Seattle City Light
Threemile
Flume
Creek
Rinker
South Fork Flume Creek
Lime Lake
Ollette
Renfro
C9345
Sullivan
Linton
Sweet
Metaline Falls
Metaline
Pocahontas
Lunch
Wolf Lake
Wolf
Lost Lake
Lost
31
Sand
Box Canyon Dam
SEATTLE CITY LIGHT
BOUNDARY HYDROELECTRIC PROJECT
FERC PROJECT NO. 2144
Figure 5.3-4
Large mammal trail, crossing and travel corridor locations.
(Map 2 of 2)
Map Key
0
0.5
Miles
Map Version 10/21/08

5.4. Effects Assessment

The following effects assessment considers both Project effects and non-Project effects on RTE wildlife. Project effects include ongoing Project operations and maintenance, water surface elevation fluctuations, and Project-related recreation. Non-Project factors that can affect RTE wildlife include flood flows, mining, timber harvest, recreation, and grazing.

5.4.1. Project Effects

Operation of the Project results in daily water surface elevation fluctuations in the reservoir and tailrace. Water surface elevation fluctuations can influence vegetative communities that provide food and cover for RTE wildlife, impact aquatic macroinvertebrate populations that provide food for some RTE wildlife (e.g., bats), and disrupt the movement of RTE wildlife by eroding crossing locations. In addition, human activities associated with Project maintenance and access (roads) can disrupt wildlife behavior and habitat use. Finally, the Project provides recreational opportunities which in turn can lead to human disturbance of RTE wildlife during critical life stages. Each type of potential effect is discussed below.

5.4.1.1. Daily Water Surface Elevations Fluctuations

As discussed in studies 1 (SCL 2009d) and 16 (SCL 2009f), daily fluctuations in water surface elevations can result in:

- Re-working and movement of soil in the reservoir fluctuation zone, preventing the establishment of native vegetation in this area;
- Loss of shoreline vegetation due to slumping and undercutting; and
- The creation of steep, eroded banks.

Study 16 concluded that, in the lower reservoir, water surface level fluctuations have the potential to limit the establishment of woody riparian vegetation in the fluctuation zone except in sheltered areas such as coves or creek inlets where fine sediment substrates persist. Daily water surface elevation fluctuations have therefore influenced the amount of riparian habitat available for wildlife along the lower reservoir. Along the upper reservoir, water surface elevation fluctuations have less influence on the establishment of riparian vegetation as the limiting factor appears to be seasonal high flows that prevent seedling establishment. Further, none of the RTE wildlife species observed or potentially occurring along either the upper or lower reservoir are dependent on riparian habitat. Due to the lack of dependence on these habitat types, the reduced availability of riparian habitat in the lower reservoir resulting from fluctuating water surface elevations has not affected RTE wildlife abundance or use of the study area.

While Study 16 showed that erosion is having little effect on *existing* woody riparian stands, Study 1 demonstrated that both Project and non-Project-related erosion is causing some small level of continuing loss of shoreline habitat. Snags and large trees are limited in the study area and the loss of even a few could influence local nest site availability for the pileated woodpecker. Bald eagles in this territory have used at least two other trees in the BWP for nesting in the past, and other suitable nesting trees are available.

Study 19 (SCL 2009b) evaluated game trails and crossing locations along the reservoir to determine if erosion was impeding access to the reservoir. No reservoir crossing sites were observed to be significantly affected by erosion caused by fluctuating water surface elevations. Based on multiple observations of wildlife swimming across the reservoir, it does not appear that daily water surface elevation fluctuations and associated erosion are affecting the movement of RTE mammals.

Daily water surface elevation fluctuations can desiccate backwater habitats for a few hours each day, rendering them unsuitable for use by breeding frogs and toads. However, other factors, such as predatory fish, are also present that would preclude amphibian breeding even if water surface elevations were stable.

Study 20 (SCL 2009a) investigated the potential effects of fluctuating water surface levels on aquatic insects important to foraging bats (see Appendix 8, Benthic Macroinvertebrate Habitat Suitability Index Final Report, in Study 7, Mainstem Aquatic Habitat Modeling Study Final Report [SCL 2009g]). Fluctuating water surface elevations were found to prevent the development of macroinvertebrate populations in rocky substrate within the fluctuation zone; however, this loss was offset by significantly greater populations in rocky substrates at depths just below the fluctuation zone. In soft substrates, macroinvertebrate populations (important to bats) were naturally low at all depths. Study 20 (SCL 2009a) concluded that there were no significant effects from fluctuating water surface elevations on bat prey species.

5.4.1.2. Project Maintenance and Access

Of the more than 1,550 acres of land in the primary study area, Project facilities occupy approximately 29 acres (2 percent), and nearly all of this acreage is confined to the immediate vicinity of Boundary Dam. Of the 6.2 miles of roads in the primary study area, 2.5 miles (40 percent) are Project-related, and of the 118 miles of road in the secondary study area, 9.5 miles (8 percent) are Project-related (see Study 19 [SCL 2009b] and Study 22, Land and Roads Study Revised Final Report [SCL 2009h]). In general, Project facilities and roads and associated human activities have little influence on the overall local landscape and use by most wildlife species. It is possible, however, that use of Project facilities and roads may influence use of the general vicinity by wolves and grizzly bears, two species that are particularly sensitive to human activities.

5.4.1.3. Recreation

Certain types of recreational activities (e.g., motorized boating, off-road vehicle (ORV) use, and shooting guns) in the vicinity of bald eagle nests have the potential to adversely impact breeding behavior and nest success. The USFWS (2007) has developed guidelines for managing disturbance around active bald eagle nests based on the bald eagle nest disturbance studies by Anthony and Isaacs (1989) and others. These guidelines recommend restricting ORVs, loud boats, or camping activity within 330 feet of active bald eagle nests, especially during critical periods.

Three eagle nests in the study area (two in the Sand Creek territory in the BWP and one on Everett Island) were abandoned in areas where boating and ORV use occur. Given that multiple

factors can contribute to nest abandonment, it is unknown whether disturbance from recreational activities was the cause of nest abandonment in the case of these three nests. The Sand Creek territory, for example, has been in existence since 1989, with productivity confirmed in many years (see Table 5.3-3; data are lacking for some years). This territory currently includes three nest sites (one active and two abandoned), all within 330 feet of potential boating and/or ORV activity. The oldest site, last thought to be used in 2004, is in the BWP in a large cottonwood tree within 100 feet of the reservoir. The active nest site in 2005 and 2006, also in the BWP, was further from the reservoir shoreline in a relatively small diameter cottonwood tree that is leaning over a wetland. In 2007, the pair constructed a new nest in a large cottonwood tree at the mouth of Sand Creek, just north of the BWP, and produced at least one young (the nest was attended again in 2008, but the pair apparently did not lay eggs). The Everett Island nest site is within 330 feet of a slough that receives some boat use. This territory has been in existence since 1999, but productivity data are lacking for most years; the nest was productive in 2005 but has been inactive for 2 years.

According to the Seattle Audubon Society (2008), there were more than 550 active bald eagle nests in Washington in 2008. Many productive nesting territories are in urban settings and along lakes and other waterbodies, such as Hood Canal and the San Juan Islands, which are extensively used for recreational boating. Threats to eagles from boat noise or other recreational activities must be therefore be evaluated in the context of the susceptibility of the specific breeding pair to disturbance at different times of the nesting cycle. The most critical periods relative to eagle nest disturbance are the initial nest-building, egg-laying, and incubation periods. In the study area, this period runs from January to April, when there is little boat or camping activity on the reservoir. At the BWP, snowmobile activity may occur during these months and, if it does, may pose a threat to the Sand Creek nest territory (although the nest is over 800 feet north of the BWP).

5.4.2. Non-Project Effects

Potential non-Project effects, such as seasonal high flows and flooding, mining, timber harvest, and grazing, on RTE wildlife are discussed below.

5.4.2.1. Seasonal High Flows

Shoreline vegetation along Boundary Reservoir, particularly upstream of Metaline Falls, can periodically experience prolonged inundation during the spring runoff period. This inundation in the upper reservoir is due to a combination of several factors, including naturally occurring high flow conditions, the influence of the constriction at Metaline Falls on water surface elevations upstream of Metaline Falls, and the influence of Boundary operations. Of these factors, seasonal high flows and the constriction at the falls appear to have the greatest influence on riparian habitat and shoreline conditions upstream of Metaline Falls. The results of Study 2, Analysis of Peak Flood Flow Conditions above Metaline Falls (SCL 2009i) showed that Project operations influenced water surface elevations during the peaks of the 1972, 1974, and 1997 flood events by no more than +1.6 feet at the downstream end of the Upper Reservoir Reach (Box Canyon Dam downstream to Metaline Falls (PRM 34.5 to 26.8) to +1.1 feet at the upstream end of the reach. Using the 1997 flood event as an example, the recorded water surface elevation at USGS gage 12396500 was 2,020 feet NAVD 88 (2,016 feet NGVD 29) and the coincident Boundary forebay

elevation was 1,988 feet NAVD 88 (1,984 feet NGVD 29). This peak stage water surface elevation in the Upper Reservoir Reach was high enough to inundate many riparian stands, including portions of the BWP (Study 16 [SCL 2009f]). However, this flooding did not appear to directly affect or damage the mature riparian forest and shrub habitats used by any of the RTE wildlife species documented in the study area.

Seasonal high flows from Sand Creek could eventually undercut the tree currently used by nesting bald eagles, but this erosion threat is far from imminent.

5.4.2.2. Other Effects

Teck Cominco's Pend Oreille Mine is the only active mine operating in the Project vicinity and activities associated with the operation of the mine are limited to disturbed areas that do not represent habitat for RTE wildlife. Some abandoned mine adits are benefiting RTE bats by providing roosting habitat for Townsend's big-eared bats and other bat species.

Timber harvest has been implicated in the decline of several RTE species including northern goshawks, woodpeckers, cavity-roosting bats, marten, fisher, lynx, and woodland caribou. There is currently no timber harvesting activity in the study area. Riparian, aquatic, and visual resource buffer regulations (e.g., the Inland Native Fish Strategy on federal lands and Pend Oreille County Forest Practices regulations on private lands) would control or limit timber harvest activity within the primary study area. For example, the USFS would not harvest any timber within 300 feet of the Pend Oreille River (a fish-bearing stream) unless a fisheries biologist determined that the action would improve ecological conditions (Borysewicz 2008).

Grazing can lead to conflicts with large carnivores such as gray wolves and grizzly bears, potentially resulting in the lethal control of these predators. However, other than a few livestock that stray into the tailrace area from Canada, there are currently no active livestock allotments in the study area.

6 SUMMARY AND CONCLUSIONS

Of the 43 RTE wildlife species initially identified as potentially occurring in the vicinity of the study area, 20 species were documented during 2007 and 2008 surveys. An additional 5 species may occasionally use the study area based on unconfirmed reports.

Existing or potential habitat was identified in the study area for 24 species, 20 of which were observed. The study area provides habitat for another 4 species only during migration.

Boundary Reservoir and its shorelines provide important habitat for bald eagles, osprey, great blue herons, beavers, migrating common loons, and eared and western grebes. The small streams and seeps below Boundary Dam support a few small populations of Columbia spotted frogs. Several cave features (including natural caves and features associated with mining) are used by bats, including Townsend's big-eared bats. A pair of peregrine falcons has established a territory at Washington Rock. There appear to be enough large conifer snags to support a wide distribution of pileated woodpeckers, and a northern goshawk was recorded at Slate Creek, where there is a patch of late-seral conifer forest remaining. The sighting of a Canada lynx and

Vaux's swifts may be of animals moving through the study area. The large number of marmot burrows at the Forebay Recreation Area may be providing cover and/or overwintering sites for western toads (Bull 2006), but no suitable breeding habitat for this species was documented in the study area.

Unconfirmed reports or evidence of four other RTE species were recorded during this study. Follow-up surveys failed to confirm the presence of black swifts or golden eagles, incidentally reported in the study area. Scat attributed to blue grouse was found just outside of the study area in the Canyon Reach, suggesting these birds are an uncommon resident. Reports were received of sightings, howling, and tracks of gray wolves using the study area. Combined with recent evidence of an establishing wolf population in Pend Oreille County, occasional wolf use of the study area seems plausible. In addition, recent reports indicate occasional or seasonal use by grizzly bears.

A number of cliffs occur along the lower reservoir and the Boundary tailrace that act as barriers to wildlife movement, and the width of the Boundary forebay in general might discourage crossing by large carnivores. Regardless, 10 locations were identified from Metaline Falls to Boundary Dam that are suitable for accessing and crossing the reservoir, and incidental observations of RTE mammals swimming across this portion of the reservoir suggest the reach in general is permeable enough for wildlife movement.

Fifteen species were not expected to occur in the study area due to lack of habitat (e.g., white-headed woodpecker), lack of records in Pend Oreille County (e.g., loggerhead shrike), or because the study area is outside of the distributional or elevational range of the species (e.g., the boreal owl).

Potential Project-related threats to RTE wildlife that were identified include the following:

- Project-related water surface elevation fluctuations and non-Project-related seasonal high flows are causing erosion that is resulting in an ongoing but small loss of habitat along the reservoir and may occasionally remove large trees and snags used by some RTE species.
- The use of Project facilities, roads, and maintenance activities may influence use of those areas by species such as gray wolves and grizzly bears.
- Motorized recreation, OHV use, camping, and shooting guns during critical periods of bald eagle nesting have the potential to adversely affect nesting success. However, the level of these activities occurring during the late-winter and spring critical nesting periods, and whether they pose any real threat to eagle nesting success, are unknown.

Non-Project activities such as timber harvest, mining, and grazing have the potential to affect RTE wildlife species, but these activities are not currently occurring in the study area (with the exception of the occasional cattle grazing in the tailrace area).

7 VARIANCES FROM FERC-APPROVED STUDY PLAN AND PROPOSED MODIFICATIONS

One variance was made to the approved plan for this study. At a meeting on March 4, 2008, the relicensing participants agreed to limit mapping of potential habitat to RTE amphibian species as it became apparent that habitat for the more widespread species could adequately be described in text. Further, concerning the field activities for this study, more data were collected than planned because RTE species were recorded during wildlife surveys targeting other species.

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Appendix 1: List of Species Recorded During Study 18 Surveys and Related Studies

Table A.1-1. All wildlife species recorded during Study 18 and related wildlife surveys.

Common Name	Scientific Name
Birds	
common loon	*Gavia immer*
eared grebe	*Podiceps nigricollis*
red-necked grebe	*Podiceps grisegena*
western grebe	*Aechmophorus occidentalis*
double-crested cormorant	*Phalacrocorax auritus*
American bittern[1]	*Botaurus lentiginosus*
great blue heron	*Ardea herodias*
tundra swan	*Cygnus columbianus*
snow goose	*Chen caerulescens*
Canada goose	*Branta canadensis*
wood duck	*Aix sponsa*
mallard	*Anas platyrhynchos*
gadwall	*Anas strepera*
green-winged teal	*Anas crecca*
American wigeon	*Anas americana*
northern pintail	*Anas acuta*
northern shoveler	*Anas clypeata*
blue-winged teal	*Anas discors*
cinnamon teal	*Anas cyanoptera*
ring-necked duck	*Aythya collaris*
lesser scaup	*Aythya affinis*
common goldeneye	*Bucephala clangula*
bufflehead	*Bucephala albeola*
common merganser	*Mergus merganser*
hooded merganser	*Lophodytes cucullatus*
ruddy duck	*Oxyura jamaicensis*
turkey vulture	*Cathartes aura*
osprey	*Pandion haliaetus*
bald eagle	*Haliaeetus leucocephalus*
sharp-shinned hawk[1]	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperii*
northern goshawk	*Accipiter gentilis*
northern harrier	*Circus cyaneus*
red-tailed hawk	*Buteo jamaicensis*
American kestrel	*Falco sparverius*
merlin	*Falco columbarius*
peregrine falcon	*Falco peregrinus*
ruffed grouse	*Bonasa umbellus*
wild turkey	*Meleagris gallopavo*
American coot	*Fucila americana*

Table A.1-1, continued…

Common Name	Scientific Name
killdeer	*Charadrius vociferous*
lesser yellowlegs	*Tringa flavipes*
spotted sandpiper	*Actitis macularia*
Wilson's snipe	*Gallinago delicata*
California gull	*Larus californicus*
Forster's tern	*Sterna forsteri*
great horned owl	*Bubo virginianus*
common nighthawk	*Chordeiles minor*
Vaux's swift	*Chaetura vauxi*
calliope hummingbird	*Stellula calliope*
rufous hummingbird	*Selasphorus rufus*
belted kingfisher	*Ceryle alcyon*
northern flicker	*Colaptes auratus*
red-naped sapsucker	*Sphyrapicus nuchalis*
pileated woodpecker	*Dryocopus pileatus*
western wood-pewee	*Contopus sordidulus*
willow flycatcher	*Empidonax traillii*
Say's phoebe[1]	*Sayornis saya*
eastern kingbird	*Tyrannus tyrannus*
northern shrike	*Lanius excubitor*
warbling vireo[1]	*Vireo gilvus*
Steller's jay	*Cyanocitta stelleri*
gray jay[1]	*Perisoreus canadensis*
common raven	*Corvus corax*
tree swallow	*Tachycineta bicolor*
violet-green swallow	*Tachycineta thalassina*
bank swallow	*Riparia riparia*
northern rough-winged swallow	*Stelgidopteryx serripennis*
cliff swallow	*Petrochelidon pyrrhonota*
barn swallow	*Hirundo rustica*
black-capped chickadee	*Poecile atricapillus*
chestnut-backed chickadee[1]	*Poecile rufescens*
red-breasted nuthatch	*Sitta canadensis*
winter wren	*Troglodytes troglodytes*
marsh wren	*Cistothorus palustris*
American dipper	*Cinclus mexicanus*
golden-crowned kinglet	*Regulus satrapa*
Swainson's thrush	*Catharus ustulatus*
hermit thrush	*Catharus guttatus*
American robin	*Turdus migratorius*
varied thrush	*Ixoreus naevius*
gray catbird	*Dumetella carolinensis*
European starling	*Sturnus vulgaris*

Table A.1-1, continued…

Common Name	Scientific Name
American pipit	*Anthus rubescens*
cedar waxwing	*Bombycilla cedorum*
yellow-rumped warbler	*Dendroica coronata*
yellow warbler	*Dendroica petechia*
common yellowthroat[1]	*Geothlypis trichas*
American redstart[1]	*Setophaga ruticilla*
chipping sparrow[1]	*Spizella passerine*
fox sparrow	*Passerella iliaca*
savannah sparrow	*Passerculus sandwichensis*
song sparrow	*Melospiza melodia*
dark-eyed junco	*Junco hymalis*
red-winged blackbird	*Agelaius phoeniceus*
Brewer's blackbird	*Euphagus cyanocephalus*
Bullock's oriole	*Icterus bullockii*
pine siskin[1]	*Carduelis pinus*
Mammals	
Yuma myotis	*Myotis yumanensis*
California myotis	*Myotis californicus*
little brown bat	*Myotis lucifugus*
northern long-eared myotis	*Myotis septentrionalis*
long-legged myotis	*Myotis volans*
long-eared myotis	*Myotis evotis*
big brown bat	*Eptesicus fuscus*
silver-haired bat	*Lasionycterus noctivagans*
hoary bat	*Lasiurus cinereus*
Townsend's big-eared bat	*Corynorhinus townsendii*
yellow pine chipmunk	*Eutamis amoenus*
red squirrel	*Tamiasciurus hudsonicus*
yellow-bellied marmot	*Marmota flaviventris*
striped skunk	*Mephitis mephitis*
raccoon (*sign only*)	*Procyon lotor*
beaver	*Castor canadensis*
muskrat	*Ondatra zibethicus*
river otter	*Lutra canadensis*
coyote	*Canis latrans*
black bear	*Ursus americanus*
bobcat[1]	*Lynx rufus*
mountain lion (*sign only*)	*Puma concolor*
mule deer	*Odocoileus hemionus*
white-tailed deer	*Odocoileus virginianus*
elk	*Cervus elaphus*
Amphibians	
western toad	*Bufo boreas*

Table A.1-1, continued…

Common Name	Scientific Name
Pacific tree frog	*Pseudacris regilla*
bullfrog	*Rana catesbeiana*
Columbia spotted frog	*Rana luteiventris*
Reptiles	
painted turtle	*Chrysemys picta*
northern alligator lizard	*Elgaria coerulea*
western terrestrial garter snake[1]	*Thamnophis elegans*
common garter snake	*Thamnophis sirtalis*

Note:
1 Not observed in primary study area.