Exhibit 6

Boundary Hydroelectric Project (FERC No. 2144)

Aquatic Invasive Species Control and Prevention Plan

Seattle City Light

March 2010

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List of Acronyms and Abbreviations

AISCPP	Aquatic Invasive Species Control and Prevention Plan
ANSC	Washington State Aquatic Nuisance Species Management Plan
ANSTF	U.S. Federal Aquatic Nuisance Species Task Force
Ecology	Washington Department of Ecology
GPS	Global Positioning System
I&E	Interpretation and education
FERC	Federal Energy Regulatory Commission
PAD	Pre-Application Document
Project	Boundary Hydroelectric Project
PRM	project river mile
SCL	Seattle City Light
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WNWCB	Washington State Noxious Weed Control Board

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Aquatic Invasive Species Control and Prevention Plan Boundary Hydroelectric Project (FERC No. 2144)

1 INTRODUCTION

This document describes Seattle City Light's (SCL) proposed Aquatic Invasive Species Control and Prevention Plan (AISCPP) for the Boundary Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) No. 2144. The AISCPP will direct the implementation of measures undertaken to suppress the abundance and control the spread of introduced invasive aquatic submerged macrophytes (mainly Eurasian watermilfoil) at targeted sites in the Project area. This AISCPP also describes how SCL will implement a monitoring and prevention program for zebra and quagga mussels, New Zealand mudsnails, and any other newly listed aquatic nuisance species that are identified by the State of Washington. The Washington Department of Ecology (Ecology) recognizes the need to develop long-term management measures for the aforementioned aquatic nuisance species in the region (RCW 77.08.010, 77.60.130[1]), including the Project area. This AISCPP describes the interpretation and education (I&E) program that SCL will undertake in consultation with the Water Quality Workgroup (WQWG) and Fish and Aquatics Workgroup (FAWG) to educate the public on practices that reduce the risk of dispersing invasive aquatic species.

2 BACKGROUND

On April 12, 2005, SCL met with Ecology at its Spokane offices to discuss issues related to Section 401 water quality certification of the Project (Item 81, Appendix 6-1 of SCL's Pre-Application Document [PAD] [SCL 2006]). During this pre-relicensing consultation meeting, Ecology identified Eurasian watermilfoil (*Myriophyllum spicatum)*, currently found in the Project area, and zebra mussels (*Dreissena polymorpha)*, which have the potential to be introduced to the State of Washington, as the two invasive species of concern for the Project area. Ecology specifically identified boat ramps and the dam structure as two locations where zebra mussels could become an issue if they were to be introduced.

The quagga mussel (*D. rostriformis bugensis*), a species similar to the zebra mussel, and the New Zealand mudsnail (*Potamopyrgus antipodarum*) are also invasive species of concern in the State of Washington; like zebra mussels, neither of these mollusk species has been found in the Project area to date. Curly pondweed (*Potamogeton crispus*), an introduced aquatic macrophyte species of concern to resource agencies, is present in the Project area and will respond to measures implemented primarily for the suppression of Eurasian watermilfoil. Over the course of the new Project license, additional invasive species of concern may be identified in the State of Washington. SCL will work with the WQWG and FAWG to determine appropriate monitoring, control, and prevention measures for any such species, as necessary.

2.1. Aquatic Invasive Species of Concern

2.1.1. Eurasian Watermilfoil

Eurasian watermilfoil (referred to henceforth as milfoil), an aquatic plant native to Europe, Asia, and North Africa, was first collected from a pond in the District of Columbia during the fall of 1942. By 1985, it had been found in 33 states, the District of Columbia, and the Canadian provinces of British Columbia, Ontario, and Quebec (Ecology 2007). Milfoil was first documented in the State of Washington in 1965, and in spite of efforts to stop its spread, it dispersed through the Okanogan Lakes and into the Okanogan and Columbia rivers in 1974 (Duke 2001).

Milfoil is highly adaptable, tolerating a variety of environmental conditions. It is a rooted plant that grows in water depths from 1 to 10 meters (3 - 33 feet), can survive under ice, and can grow under a wide range of temperatures (Ecology 2007). Milfoil exhibits an annual growth pattern, with shoots beginning to proliferate rapidly as water temperatures approach 15 ˚C (59 ˚F) in the spring. When plants near the surface, shoots branch out, often forming a dense canopy (Ecology 2007). Plants flower at the surface and die back to root crowns in the fall, which sprout again in the following spring. Vegetative reproduction is the primary means of milfoil dispersal; during the growing season the plant undergoes fragmentation, and these fragments have the potential to develop into new plants (Ecology 2007). Milfoil can adversely impact aquatic ecosystems by outcompeting native submerged aquatic macrophytes and when abundant can affect aquatic habitat and water quality. It can also impact power generation by clogging intake structures and can interfere with recreational activities.

Milfoil is classified as a class B noxious weed by the Washington State Noxious Weed Control Board (WNWCB 2007), and is designated for control in Pend Oreille County. Class B noxious weeds are introduced species of limited distribution in Washington State. Milfoil is also identified as a nuisance species in the Washington State Aquatic Nuisance Species Management Plan (ANSC 2001).

2.1.2. Curly Pondweed

Curly pondweed, a native of Eurasia, is thought to have been first introduced into the United States in the mid 1800s (Stuckey 1979). Prior to 1900, the species occurred only in the northeastern United States, but by 1930 it had spread west of the Great Lakes. Since that time it has spread across much of the United States, presumably dispersed by migrating waterfowl, intentional planting for waterfowl and wildlife habitat, and incidental introduction in water used to transport fish and fish eggs (Stuckey 1979).

Curly pondweed life history is unusual in that it flowers, fruits, and produces turions (a scaly shoot developed from an underground bud) in late spring and early summer, and then shortly after that the plants begin to decay. The turions germinate in late summer or fall and produce small overwintering plants that can survive under the ice in lakes and reservoirs (Stuckey et al. 1978). When water begins warming in spring the plants begin to grow. Dense colonies of curly pondweed can restrict access to docks and other facilities and can adversely affect angling and other forms of recreation.

2.1.3. Zebra and Quagga Mussels

Zebra and quagga mussels are freshwater, bivalve mollusks that are native to Eurasia. Both species were introduced into the Great Lakes in ballast water discharged from transoceanic ships. Zebra mussels were first found in North America in the mid-1980s, and quagga mussels were first found in 1989 (USFWS 2007). The two species are closely related, with subtle morphological differences. The North American distribution of these species has been concentrated in the Great Lakes region, although zebra mussel distribution extends into the southern and mid-western states. Despite measures to prevent their westward expansion, quagga mussels have been found in Lake Mead and other reservoirs serving southern California. Currently, zebra and quagga mussels are not found in Washington (Benson 2009a, 2009b) (Figure 2.1-1).

Zebra and quagga mussels can spawn throughout the year if conditions are favorable, but peak spawning generally occurs in spring and fall. Fecundity is high, with a few individuals having the ability to produce millions of gametes (USFWS 2007). After fertilization, microscopic larvae, called veligers, develop, and these planktonic larvae are transported by currents for three to four weeks until settling on suitable substrate. Adults generally attach to hard surfaces (although quagga mussels can live in soft sediments) but can detach and move if conditions become unfavorable. Both species tolerate a wide range of water temperatures (1-30 ˚C; 32-86 ˚F) and low water velocities (< 2 meters/second; 6.5 feet/second) (USFWS 2007). Zebra mussels are typically found just below the water's surface to depths of about 12 meters (≈ 40 feet), and quagga mussels can live at greater depths if oxygen is available (USFWS 2007).

Zebra and quagga mussels may be introduced through several pathways, including transport into the system attached to recreational boats, or simply drift from upstream areas. Once introduced, both zebra and quagga mussels can clog water intake structures such as pipes and screens, thereby interfering with hydropower generation and water treatment. Recreation facilities, such as docks, breakwaters, and buoys, are also susceptible to colonization (USGS 2007).

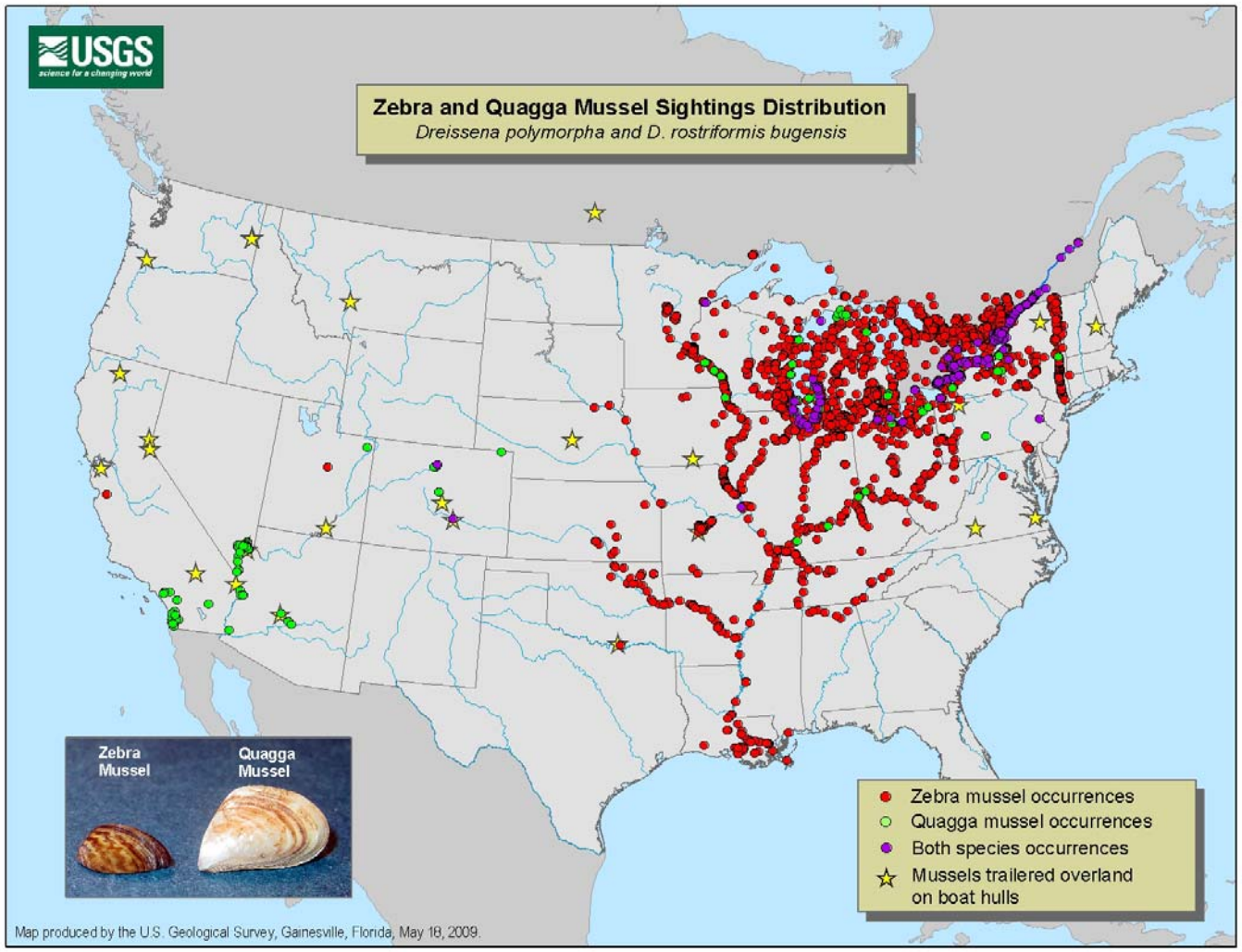


Figure 2.1-1. Current (May 2009) distributions of zebra and quagga mussels in the continental United States (Benson 2009a, 2009b).

2.1.4. New Zealand Mudsnail

New Zealand mudsnails are small (3 - 6 millimeter [≈ ⅛ inch]) snails with brown or black cone-shaped shells with five whorls. This snail reproduces quickly and can occur in densities up to 500,000/square meter (ANSTF 2009). Resource agencies are concerned about proliferation of the mudsnail in western streams, where their presence could adversely affect macroinvertebrates that provide food for native trout (ANSTF 2009).

New Zealand mudsnails were first found in the Snake River, Idaho in 1987, and in 1994 were found in the Madison River near Yellowstone National Park (ANSTF 2009). Subsequent investigations documented the rapid spread of this exotic species to the Firehole and lower Gibbon rivers. The New Zealand mudsnail is currently distributed widely throughout the western United States, with documented occurrences in the Columbia River and in Kalispell Creek, a tributary to Priest Lake (Benson 2009c).

New Zealand mudsnails are able to withstand desiccation, a wide range of temperatures, and are small enough to be inadvertently transported to aquatic systems where they have not yet been introduced (ANSTF 2009). The mudsnail tolerates siltation and thrives in disturbed watersheds. It occurs among macrophytes and prefers the littoral zones of lakes or slow streams but can tolerate high-flow environments. Mudsnails have been found at depths ranging from 4 to 45 meters (13 to 148 feet).

There is concern about this species' ability to disperse because of its asexual reproduction and ability to tolerate harsh conditions. Because mudsnails reproduce asexually, a single individual is capable of populating an aquatic system once introduced (ANSTF 2009). The New Zealand mudsnail has no natural predators or parasites in the United States, which has contributed to its successful dispersal. Control of this species depends on vigilant cleaning of boats and other equipment to avoid its introduction into unaffected areas (ANSTF 2009).

2.2. Submerged Macrophyte Surveys in the Project Area

Mapping surveys of submerged aquatic macrophytes in the Project area were conducted in August 2007, i.e., during the period of peak macrophyte growth (Mainstem Aquatic Habitat Modeling [SCL 2009a]). The entire shoreline from Box Canyon tailrace to Boundary Dam was surveyed for the presence of macrophytes. A Global Positioning System (GPS) point was taken every 1,000 meters (3,281 feet) or when macrophytes were encountered. When macrophytes were present, GPS points were taken at the boundaries of the macrophyte beds and every 100 meters (≈ 325 feet) along the outside of the beds. A sufficient number of points were recorded to clearly define the limits of each bed. At each GPS point within the beds, species present and their respective percent cover were recorded. If dewatered and dry macrophytes were encountered, the species identification and their respective percent cover were estimated.

For the purpose of conducting relicensing studies in 2007 and 2008, the Project area was divided into the following reaches. Results of macrophyte surveys are reported below for each of these reaches.

- The Tailrace Reach, which extends from Boundary Dam downstream to the US-Canada border, is characterized by deep pools (> 75 feet) in the spillway and turbine afterbays but is generally less than 30 feet deep elsewhere. Downstream of the spillway and afterbay pools, the tailrace is relatively swift, with cobble and boulder substrates.

- The Forebay Reach, which extends from Boundary Dam upstream to the lower end of Z-Canyon, is wide and deep, with steep-walled banks, and water depths to approximately 260 feet. There is little shallow littoral habitat in this area.

- The Canyon Reach, which extends from the downstream end of Z-Canyon to Metaline Falls, is predominantly narrow with steep rock walls. A few large embayments and backwater channels provide localized shallow habitats, and areas of rock outcroppings provide habitat complexity. Depths in this reach are typically 80 to 100 feet.

- The Upper Reservoir Reach, which extends from Metaline Falls to Box Canyon Dam, is relatively wide and shallow, with a combination of silt, sand, and hard substrates, and water depths typically ranging from 10 to 25 feet.

Submerged macrophyte species found in the Project area are listed in Table 2.2-1. Eurasian watermilfoil and coontail (*Ceratophyllum demersum)* were the dominant macrophyte species, although curly pondweed appeared to be invading areas of established milfoil beds, displacing both milfoil and coontail in some areas.

Table 2.2-1. Macrophyte species in Boundary Reservoir during 2007 surveys.

Scientific Name	Common Name	Status
Myriophyllum sibericum	northern milfoil	Native
Myriophyllum spicatum	Eurasian watermilfoil	Non-native
Ceratophyllum demersum	coontail	Native
Elodea canadensis	common waterweed	Native
Potamogeton crispus	curly pondweed	Non-native
Potamogeton pectinatus	sago pondweed	Native
Potamogeton vaginatus	sheathing pondweed	Native
Potamogeton richardsonii	Richardson's pondweed	Native
Potamogeton zosteriformis	flat-stem pondweed	Native
Ranunculus aquatilis	white water buttercup	Native

In 2007, 33 macrophyte beds existed in the Upper Reservoir Reach, 27 in the Canyon Reach, 12 in the Forebay Reach, and zero in the Tailrace Reach (Table 2.2-2). Macrophyte beds covered 20.7 acres in the Canyon and Forebay reaches and 202.5 acres in the Upper Reservoir Reach.

Aerial photographs showing the extent, density, and species composition of macrophyte beds in Boundary Reservoir, based on 2007 surveys, are provided in Appendix 1.

Table 2.2-2. Number and size of macrophyte beds in the Project area during 2007.

Reservoir Zone	Number of Macrophyte Beds	Macrophyte Bed Size Range (acres)	Total Macrophyte Area (acres)
Upper Reservoir Reach	33	0.02-61.7	202.5
Canyon Reach	27	0.001-7.9	12.3
Forebay Reach	12	0.001-8.4	8.4
Tailrace Reach	0	0	0
		Total	**223.2**

3 MACROPHYTE SUPPRESSION

During Project relicensing, concerns regarding the spread of invasive aquatic macrophytes inside and outside the Project area were raised by relicensing participants. SCL will implement a targeted suppression program, with the goal of reducing potential adverse effects associated with invasive aquatic macrophytes, Eurasian watermilfoil in particular. The objectives of the program are to: 1) reduce the risk of fish stranding and trapping and/or the potential for macrophyte interference with recreational boating at four target locations where thick macrophyte cover likely increases stranding and trapping rates and macrophytes come into contact with boats, 2) reduce potential macrophyte interference with recreational boating at the Boundary Forebay and Metaline Waterfront Park boat ramps, as needed, and 3) suppress the abundance of invasive aquatic macrophytes at up to three additional locations (for a maximum total area of 50,000 square feet) in the Project area where they are likely to increase fish stranding and trapping or interfere with recreational boating, as determined appropriate by the WQWG and FAWG following license issuance. During the term of the license, the WQWG and FAWG may also choose to discontinue suppression at the seven locations referenced in number 1 and 3 above, in favor of other similarly-sized locations, if deemed appropriate by the WQWG and FAWG following license issuance. Reducing the extent of contact between boats and invasive aquatic macrophytes will reduce the risk of dispersing these macrophytes, both within and outside of the Project area.

SCL identified bottom barriers as the best treatment method to address the objectives identified above. The locations of bottom barrier deployment discussed below were identified based on relicensing studies and the objectives described above. Exact locations of bottom barrier placement may be adjusted following verification mapping and consultation with the WQWG and FAWG after issuance of the new Project license (see sections 3.1 and 3.6).

The plan outlined below describes: (1) verification mapping to confirm that conditions at the treatment locations identified in Section 3.2 have not changed significantly by the time the plan is implemented, and if there have been changes, to guide adjustments to the treatment locations; (2) the proposed locations of bottom barrier installation and approximate areal extent to be treated; (3) the expected interval of barrier reinstallation; (4) methods and materials to be used;

(5) assessment of effectiveness, (6) adaptive management, and (7) an implementation schedule. Although the locations of bottom barrier installations are identified in this plan, specific treatment locations will need to be verified in consultation with the WQWG and FAWG, based on verification mapping, following license issuance. Waiting until after license issuance to confirm the exact locations of barrier placement is necessary because the species composition and distribution of macrophyte beds could change between the writing of this AISCPP and the time that macrophyte suppression is first implemented.

Bottom barriers kill aquatic macrophytes by compressing them and reducing or blocking their supply of light. Installation of a bottom barrier immediately creates an area of open water. In most instances, the barriers can be easily installed by hand–either by wading or diving–around boat launches, recreation areas, or other small-scale, targeted locations. When properly installed, bottom barriers can eliminate up to 100 percent of the aquatic macrophytes in the area covered.

There are, however, some drawbacks associated with the use of bottom barriers. Because they reduce available habitat by covering the substrate, they are only suitable for localized macrophyte control, and for safety and performance reasons they must be regularly inspected and maintained. Without regular maintenance, aquatic macrophytes can colonize the upper surface of bottom barriers. Fishing gear, propeller backwash, and boat anchors can damage or dislodge bottom barriers, and improperly anchored barriers can create safety hazards for boaters and swimmers. Anchoring bottom barriers can be challenging in deep water with soft substrate. Depending on their placement, barriers can interfere with fish spawning, benthic productivity, and productivity of epibenthic invertebrates living on the leaves of macrophytes. By opening up lanes into macrophyte beds, bottom barriers can increase feeding opportunities by sportfish on prey species, which can be either desirable or undesirable, depending on the species interactions in question.

Finally, the method is not species-specific, because the barrier covers all plants, whether native or introduced, in the area of installation. However, areas dominated by native macrophytes can be avoided when placing the barriers.

3.1. Verification Mapping

In the second year following issuance of the new Project license, SCL will undertake mapping to verify or revise the macrophyte distribution, abundance, and species composition information obtained during mapping conducted in 2007 as part of relicensing studies (see Appendix 1 of this AISCPP for maps of macrophyte distribution). Following the mapping exercise, SCL will confirm or revise the specific locations of bottom barrier deployment in consultation with the WQWG and FAWG. The general locations identified below for bottom barrier installation are not expected to change significantly, although given the dynamic nature of macrophyte growth and species composition, slight changes may need to be made.

3.2. Macrophyte Suppression Locations

SCL will install bottom barriers to reduce the risk of macrophyte-related fish stranding and trapping, benefit recreational use by creating boat lanes free of macrophytes, and reduce boat contact with invasive macrophytes to lower the risk of their dispersal to other locations within

and outside the Project area. In some locations in the reservoir, submerged macrophytes have been shown to reduce the ability of fish to escape from stranding and trapping areas by blocking routes of egress during periods of declining water surface elevation (see the Mainstem Aquatic Habitat Modeling Final Report, SCL 2009a).

3.2.1. Bottom Barrier Locations

Bottom barriers will be installed at the following four locations where milfoil is abundant:

- Everett Island side channel (Project river mile [PRM] 19.4) - A bottom barrier will be placed to maintain a lane from the informal recreation site upstream (south) through the middle of the side channel to reduce the risk of fish stranding and trapping during reservoir drawdown, to reduce contact between boats and invasive macrophytes and thereby lower the potential for milfoil dispersal, and to improve boat transit in and out of the side channel. The bottom barrier will be placed to create and maintain a 30-foot wide swath extending about 650 feet (19,500 square feet) to the mainstem channel to a depth of up to 1,974 feet NAVD 88[1] (Figure 3.2-1). The Everett Island side channel has a high ridge in the middle, and if high flows were to dislodge the barrier, it would likely wash downstream and catch on this ridge, thereby reducing the risk of it moving downstream and interfering with the dam or forebay intake facilities. The open channel provided by the barrier is also expected to improve angler access to fish habitat in this area.
- Metaline Pool, across from the Town of Metaline (PRM 28.7) - A bottom barrier will be placed to reduce boat contact with macrophytes where a dense macrophyte bed is located adjacent to a region of open channel (Figure 3.2-2). This area was identified by the field crews that conducted relicensing studies as a location where boats commonly come in contact with macrophytes. The exact location of the barrier within the location identified in Figure 3.2-2, or at an alternative location, will be determined in consultation with the WQWG and FAWG following license issuance (estimated area = 200 x 100 feet = 20,000 square feet). When the exact placement location is determined, the potential for the barrier to become dislodged will be assessed before deploying the barrier in an area so near the thalweg. Appropriate measures will be applied to ensure that the barrier remains in place.
- Fish Stranding and Trapping Region 9 (PRM 28.8) - A bottom barrier will be placed in a location beginning just downstream of the midpoint of the side channel, adjacent to the shoreline and extending downstream (north) through the channel thalweg to reduce the risk of fish trapping during reservoir drawdown. The barrier will be placed in a 20-foot wide swath covering about 700 linear feet (14,000 square feet) on the downstream side of side channel where velocities during high flow conditions would be low (Figure 3.2-3). Not only will the open area created by the bottom barrier provide egress for fish potentially stranded or trapped in this area, it will reduce the risk of injury and mortality from potential oxygen depletion in trapping pools with dense macrophytes. The open channel provided by the barrier is also expected to improve angler access to fish habitat in this area.

[1] Elevation values are in datum NAVD 88 unless otherwise noted.

- Fish Stranding and Trapping Region 11 (PRM 30.3) - To reduce the risk of fish trapping during reservoir drawdown, a bottom barrier will be placed beginning at the south shoreline to create a 20-foot wide swath that will extend about 400 feet (8,000 square feet) through the middle of the trapping pool and end at the upper end of the narrow channel that drains the trapping pool (Figure 3.2-4). In addition to providing egress for fish potentially stranded or trapped in this area, it will reduce the risk of injury and mortality from potential oxygen depletion in trapping pools with dense macrophytes. The open channel provided by the barrier is also expected to improve angler access to fish habitat.

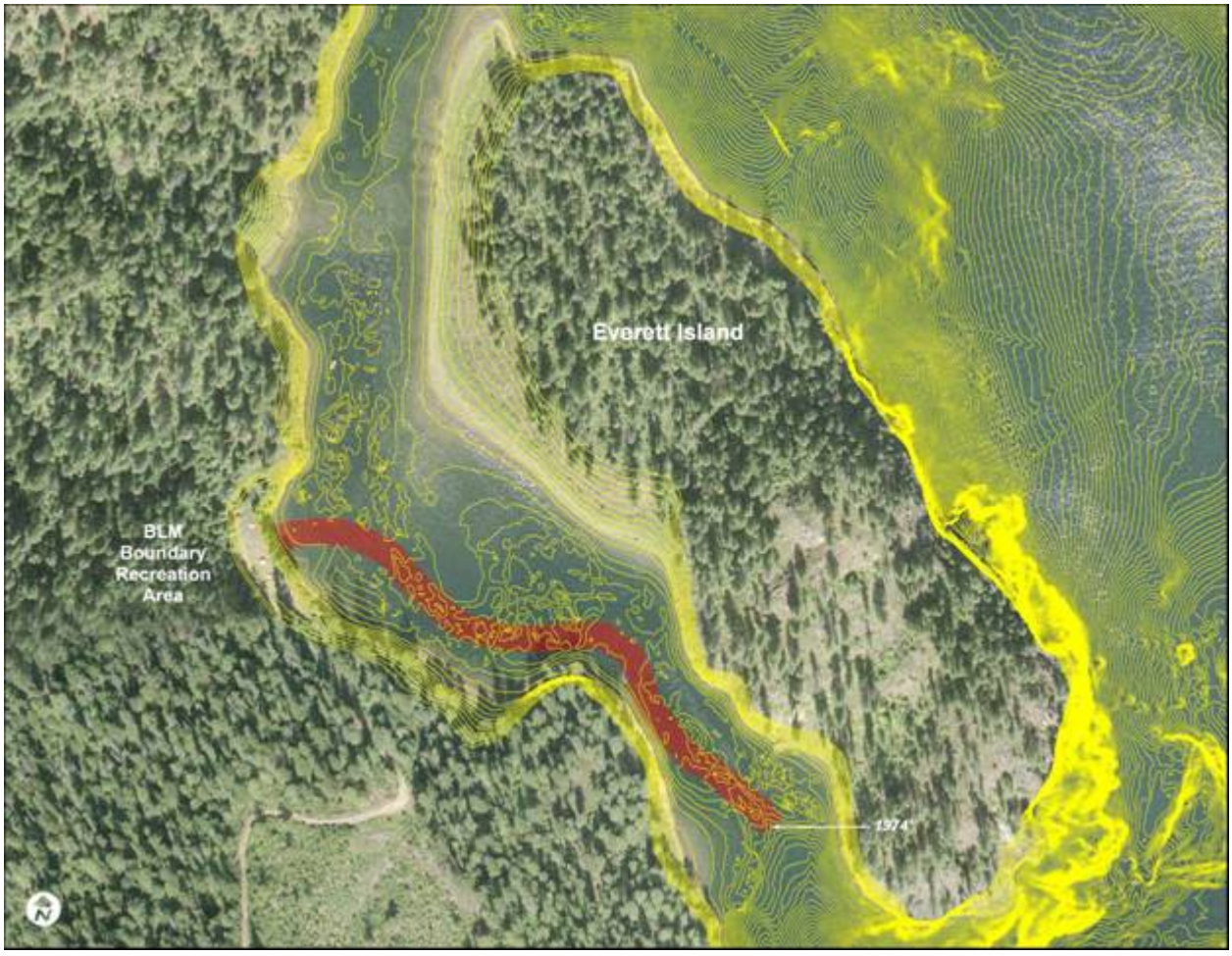


Figure 3.2-1. Proposed location of macrophyte bottom barrier in the Everett Island side channel (PRM 19.4). Area shown in red indicates the proposed location of the bottom barrier.

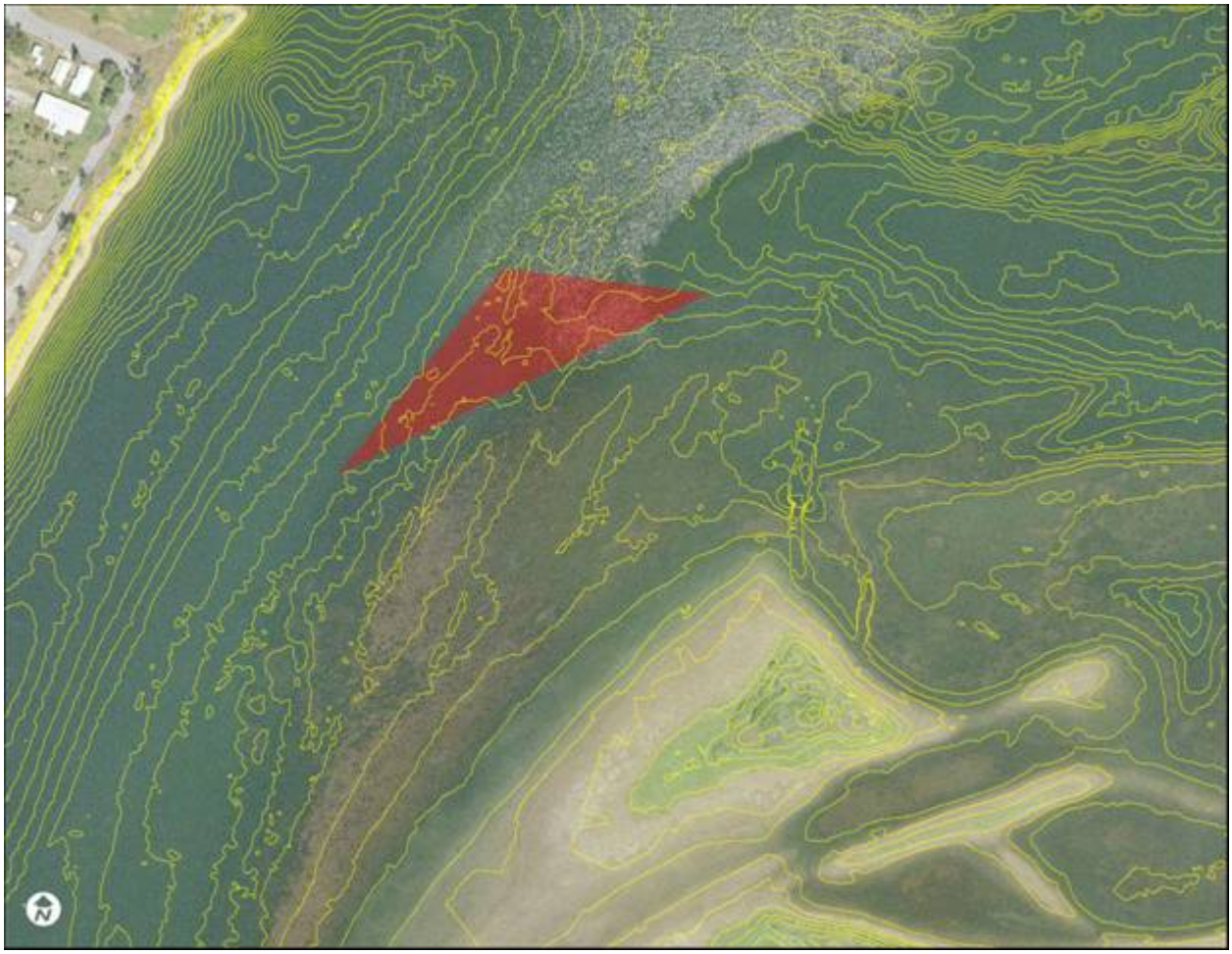


Figure 3.2-2. Proposed location of macrophyte bottom barrier in the Metaline Pool, across from the Town of Metaline (PRM 28.7). Area shown in red indicates the location within which bottom barrier could be installed.

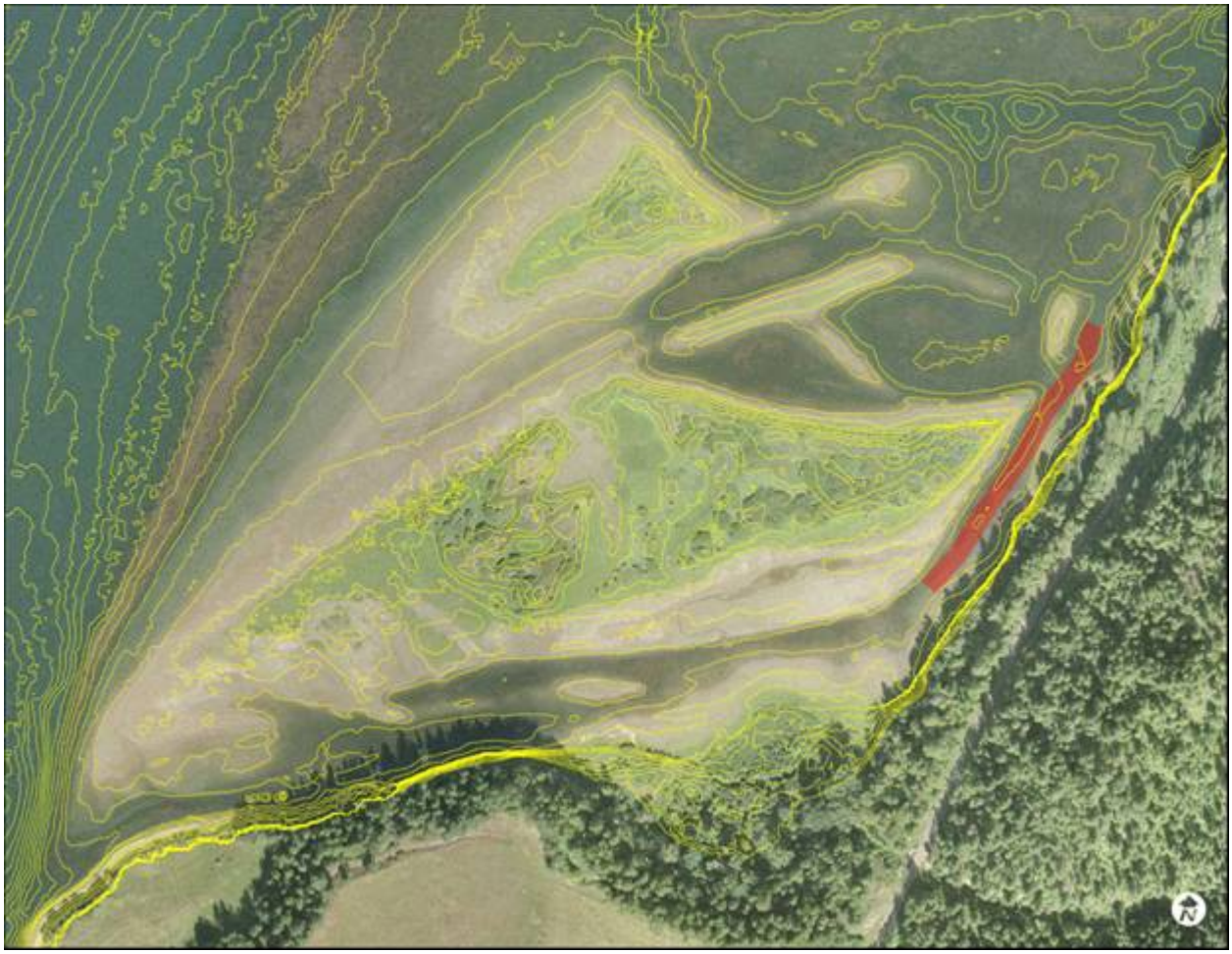


Figure 3.2-3. Proposed location of macrophyte bottom barrier Fish Stranding and Trapping Region 9 (PRM 28.8). Area shown in red indicates the proposed location of the bottom barrier.

Figure 3.2-4. Proposed location of macrophyte bottom barrier Fish Stranding and Trapping Region 11 (PRM 30.3). Area shown in red indicates the proposed location of the bottom barrier.

3.2.2. Boat Ramp Macrophyte Control Locations

In addition to the sites identified in Section 3.2.1, SCL will evaluate whether macrophyte suppression is needed at the Forebay Recreation Area and/or the Metaline Waterfront Park boat launches following proposed modifications to these areas, as outlined in SCL's Recreation Resources Management Plan (RRMP). In the third year following the completion of boat launch modifications at these sites, SCL will conduct annual surveys from a boat to monitor site conditions and, in consultation with the WQWG and FAWG, and subject to agreement by Ecology, determine whether macrophytes have reestablished to a degree requiring implementation of suppression measures. The approximate areas to be surveyed (and treated, as necessary) in the Forebay Recreation Area and the Metaline Waterfront Park boat launches are identified in Figures 3.2-5 and 3.2-6. Reestablishment of any non-native invasive macrophytes will trigger implementation of suppression measures as described in Section 3.6. If suppression measures are necessary at the Metaline Waterfront Park boat launch, bottom barriers will be used. Because of the risk of a dislodged bottom barrier becoming impinged on the forebay trashrack or being entrained into the power plant unit intakes, bottom barriers will not be installed at the Forebay Recreation Area. Measures to be considered for use in the Forebay Recreation Area include hand pulling or mechanical harvest and removal.

3.2.3. Additional Potential Macrophyte Control Locations

In addition to the four target locations (Section 3.2.1) and the Boundary Forebay and Metaline Waterfront Park boat ramps (Section 3.2.2), SCL will suppress the abundance of invasive aquatic macrophytes at up to three additional locations (for a maximum total area of 50,000 square feet) in the Project area where they are likely to increase fish stranding and trapping or interfere with recreational boating, as determined appropriate by the WQWG and FAWG following license issuance. During the term of the license, the WQWG and FAWG may also choose to discontinue suppression at any of the seven locations identified in Section 3.2.1 and in this section, in favor of other locations of the same approximate area, if deemed appropriate by the WQWG and FAWG. Macrophyte suppression methods to be applied at the three potential additional locations would consist, at least initially, of bottom barriers.

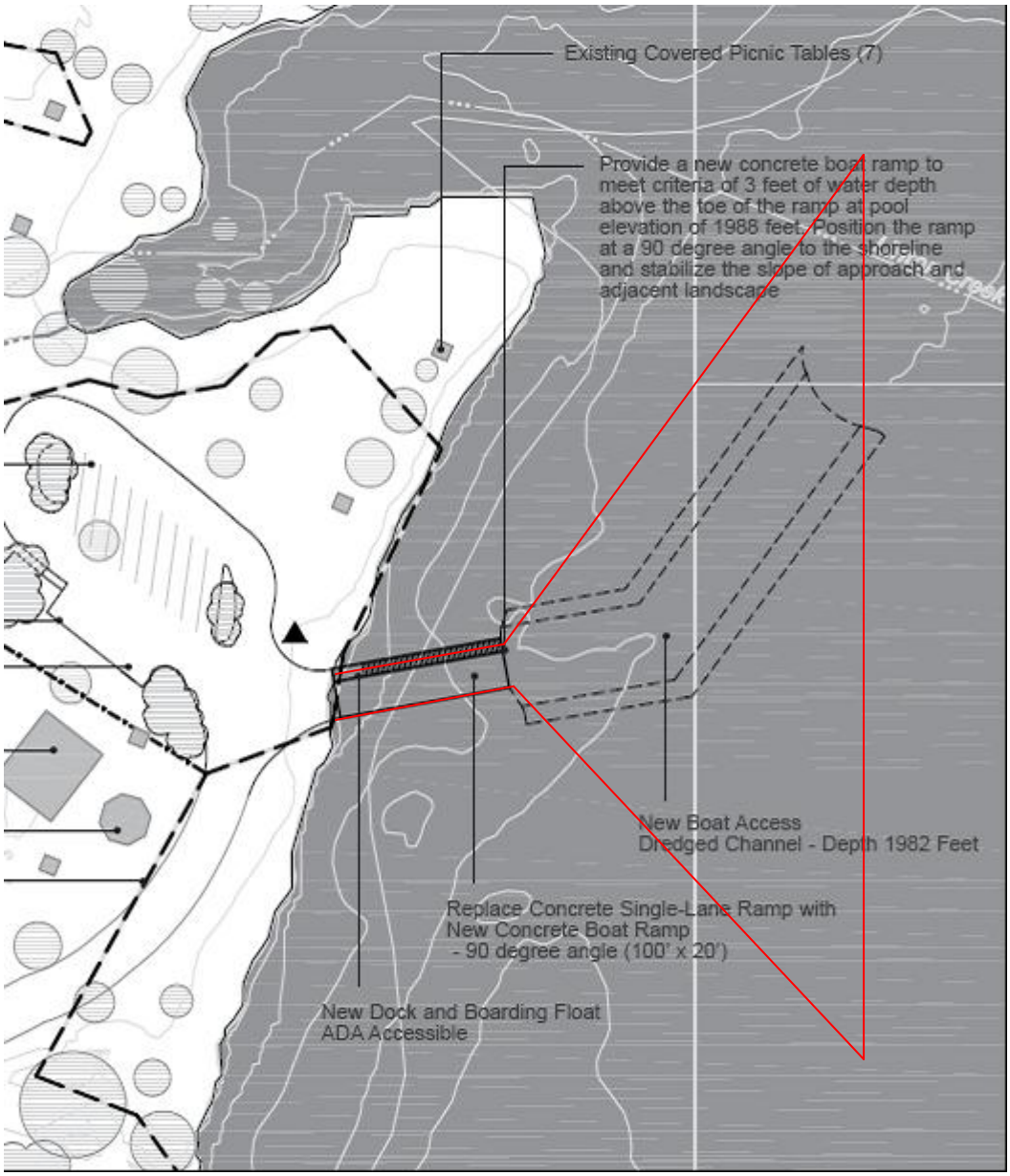


Figure 3.2-5. Proposed milfoil survey and potential treatment location for the Metaline Waterfront Park boat ramp area.

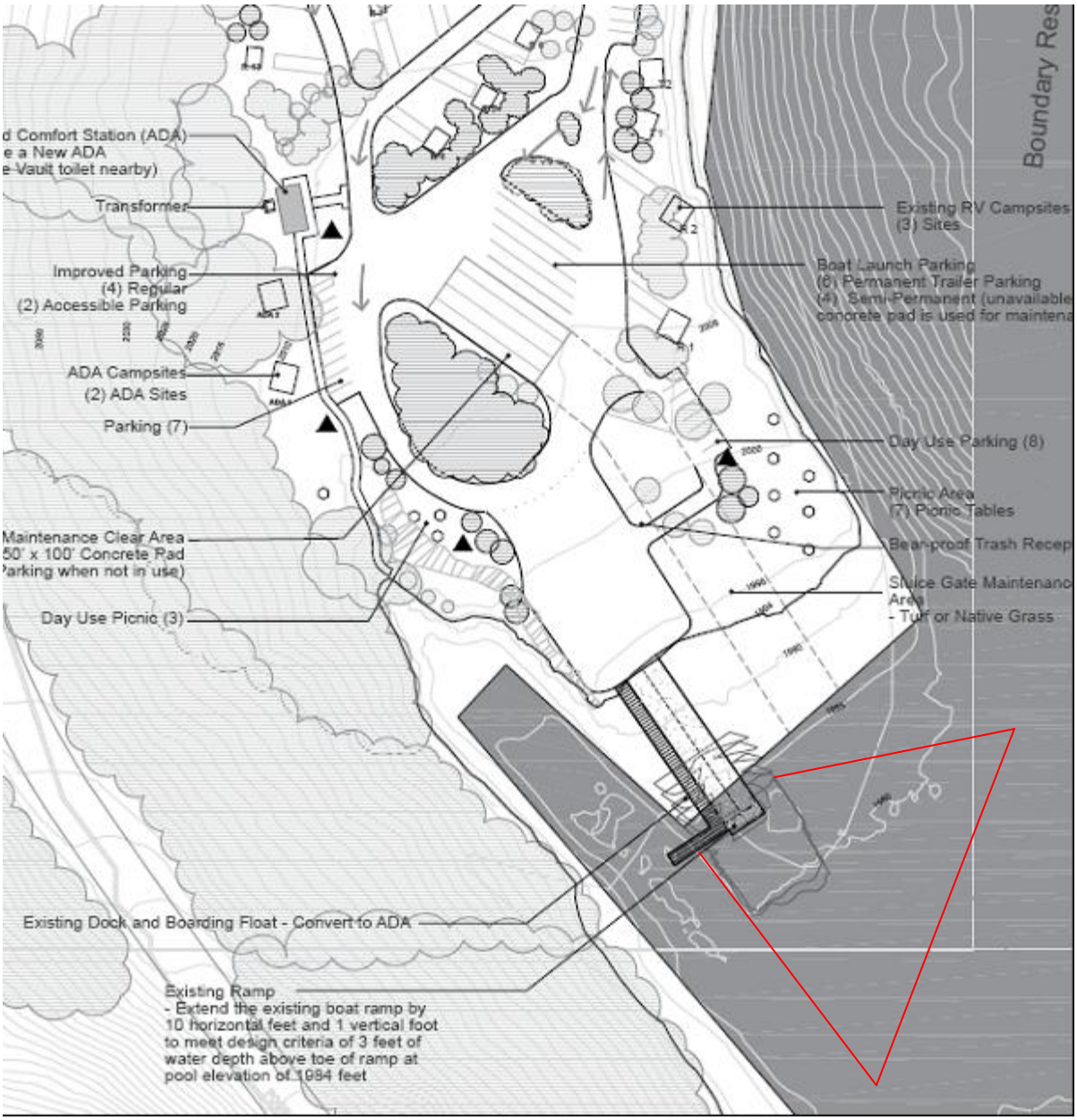


Figure 3.2-6. Proposed milfoil survey and potential treatment location for the Forebay Recreation Area boat ramp.

3.3. Bottom Barrier Material and Deployment Methods

SCL plans to use burlap as the bottom barrier material. Burlap is preferable to commercially available vegetation barrier material, which will not degrade and must be actively removed. Burlap will be effective during the first two years following installation, partially effective in the third and fourth years, and then require replacement after five years (Harry Gibbons, personal communication, June 2009). Bottom barriers will be replaced as soon as feasible if and when monitoring results exceed thresholds identified in Section 3.7. Because burlap is porous, it will allow fluids and gases to escape and rise to the surface, thereby reducing the degree to which gases produced by decomposing macrophytes will accumulate under the barrier and cause it to "balloon" upwards. Burlap is available in 20-foot-wide rolls that can be placed by hand (wading or diving), without the use of equipment.

Bottom barriers will be deployed in identified areas when reservoir levels are drawn down as part of daily operations, either by crews unrolling the material from shore or by divers in areas too deep to allow for shore-based installation. The maximum depth of installation will likely be about 20 feet, although actual depth will be determined by the goal of the placement and site conditions.

It is critical that bottom barriers be anchored securely to the reservoir bottom, because poorly secured barriers not only lose their effectiveness by allowing plant growth to take place, they can also create navigation hazards and be dangerous to swimmers. The barriers will be weighted down with sandbags made of burlap tied with natural fiber twine. Barriers will be oriented to reduce the risk of their being lifted during higher flows and transported downstream. Barriers will be checked monthly to ensure that they remain securely anchored to the reservoir bottom. If observer safety could be compromised due to reservoir or weather conditions, or the reservoir's surface in the area of the barrier is iced over for the entirety of a given month, checking the bottom barrier could be postponed until the following month.

3.4. Timing of Bottom Barrier Installation

Bottom barriers will be installed following spring runoff. The goal will be to install the bottom barriers as soon as possible after runoff, given ambient conditions, to reduce the amount of organic matter decomposition that occurs beneath the barriers. The greater the amount of organic matter breakdown, the more gas is produced under the barriers (King County 2003); the less plant material present prior to barrier installation, the more successful the barrier will be in staying in place (although burlap will allow for the escape of gas, see Section 3.3). Barriers will not be removed but will be allowed to breakdown (See Section 3.3). Barriers will be replaced as soon as feasible if and when monitoring results exceed thresholds identified in Section 3.7.

3.5. Permits

Installation of bottom barriers in the State of Washington requires applicable permit approvals. SCL will file a Joint Aquatic Resources Permits Application (JARPA) prior to installation of bottom barriers.

3.6. Monitoring Macrophyte Response to Control Measures

Verification of barrier effectiveness will begin during the first year that barriers are installed and continue for the duration of the license term. It is anticipated that macrophyte suppression will be nearly complete beneath the bottom barriers. At the four bottom barrier sites identified in Section 3.2.1, the criterion for evaluating success will be a 70 percent reduction in the abundance of macrophytes and appropriate fish passage, assessed by estimating the area of macrophytes on top of or protruding through a barrier. Redeployment of a bottom barrier will be undertaken if submerged aquatic macrophytes cover more than the 30 percent of the surface area of the barrier (either growing on top of or through the barrier), or if macrophyte coverage is less than 30 percent of the surface area of the barrier and macrophytes growing on or through the barrier surface have reached the water surface at any pool elevation and are present in a density that is impeding fish passage.

At boat ramp locations identified in Section 3.2.2, the target for evaluating success will be a 100 percent reduction in the abundance of non-native invasive macrophytes, assessed by estimating the area of macrophytes within the areas identified in Figures 3.2-5 and 3.2-6 adjacent to the boat ramps during annual surveys. Surveys will occur following the establishment of macrophytes (March/April) and the cessation of spring runoff. The particular area of treatment will be determined through consultation with the WQWG and the FAWG and subject to approval by Ecology. Elimination of non-native invasive macrophytes will occur once per year immediately following the annual survey, if these macrophytes cover any of the surface area surveyed.

New barriers will be placed on top of old barriers, which, because they will be burlap, will decompose in the reservoir. Barriers will only be removed if treatment is no longer deemed necessary at a given location. Effectiveness monitoring will be accomplished during the barrier maintenance trips identified in Section 3.3.

3.7. Other Potential Macrophyte Control Measures

Suppression of invasive submerged aquatic macrophytes will be addressed adaptively. Adaptive management will allow for changes in the way in which bottom barriers are deployed or, possibly, the integration and use of alternative methods of macrophyte control in the areas designated in Section 3.2. At annual meetings of the WQWG (see Section 6), SCL, in consultation with WQWG and FAWG participants, will assess the success of bottom barrier deployment and the potential use of other macrophyte control technologies, including harvesting, if barrier performance is deemed inadequate. Alternative measures will be considered at the sites identified in Section 3.2 only if they are feasible from the standpoint of safety and logistics and do not have the potential to permanently or significantly jeopardize fish and aquatic resources or water quality. In addition, SCL will remain apprised of any advances in macrophyte suppression methods by participating in information exchanges and regional efforts to coordinate the monitoring, prevention, and control of invasive aquatic macrophytes.

4 MONITORING FOR INVASIVE AQUATIC SPECIES

As noted in Section 2.1, zebra and quagga mussels are not currently found in the state of Washington (Benson 2009a, 2009b), and although New Zealand mudsnails have been introduced to the Columbia and Snake rivers, as well as Kalispell Creek, their presence has not yet been documented in the Pend Oreille River. The goals of the monitoring program will be to provide early detection whether any of these mollusk species becomes established in the Project area, so that an appropriate response can be planned in coordination with Ecology and other resource agencies.

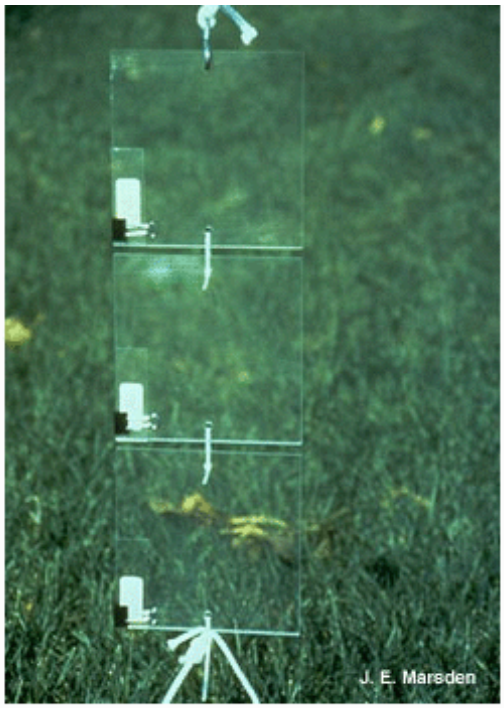
4.1. Monitoring for Zebra and Quagga Mussels

4.1.1. Substrate Sampling

The objective of this component of the monitoring program will be to detect zebra and quagga mussels if they become established in the Project area. To achieve this objective, SCL will install artificial substrate samplers at two boat launches in Boundary Reservoir: i.e., the Forebay Recreation Area boat launch and the Metaline Waterfront Park boat launch. Before deploying artificial substrates, SCL, in conjunction with the WQWG and FAWG, will coordinate with the Center for Lakes and Reservoirs at Portland State University to ensure that the proposed number of samples (up to two additional substrate sampling sites may be added, following license issuance, if deemed appropriate by the Center for Lakes and Reservoirs at Portland State University), design, placement, and monitoring regime associated with the artificial substrate samplers is appropriate. Figure 4.1-1 shows an artificial substrate used to sample for zebra mussels; a similar design, or one slightly modified to accommodate local conditions, will be used in Boundary Reservoir.

Artificial substrates will be concealed to prevent vandalism and located so that they do not interfere with boat traffic or other recreational activities. SCL will deploy the artificial substrates in April and retrieve them in October of each year. Samplers will be checked once per month during this period for signs of mussel colonization. Any sessile bivalves attached to the artificial substrate will be placed in a plastic bag and stored in the refrigerator. Specimens will be sent to the Center for Lakes and Reservoirs, Portland State University for identification.

In addition to data gathered from the artificial samplers, field crews will opportunistically inspect, during the monthly checks of the artificial substrates, hard structures in the vicinity of the boat launches, including, if present, floats, buoys, ropes, anchors, rocks, and logs. Again, any sessile bivalves attached to these surfaces will be placed in a plastic bag and stored in the refrigerator. Specimens will be sent to the Center for Lakes and Reservoirs at Portland State University for identification.



ZM-S28.	Plexiglass 15 cm square plates used to sample settling zebra larvae.
Photo Credit:	J. Ellen Marsden
Organization:	Lake Michigan Biological Station

Figure 4.1-1. Example of an artificial substrate for monitoring zebra/quagga mussel colonization.

4.1.2. Tow Sampling

SCL will conduct horizontal and vertical zooplankton tow net sampling for zebra and quagga mussel veligers. The goal of this sampling effort is early detection of zebra or quagga mussels in the Project area. The horizontal tow samples will be collected at three locations in the Project to represent inflow (below Box Canyon dam, PRM 34.3), outflow (Boundary forebay, PRM 17.6), and mid-reservoir (Metaline Pool area, PRM 28.7) locations. Samples will be taken once in each of the following months: June, July, and August (i.e., when conditions are suitable for mussel spawning and larval dispersal). Sampling will be conducted each year for the term of the new license, beginning in Year 1.

Sampling methods will follow those recommended by WDFW and Ecology as described by Grant PUD in its Priest Rapids Aquatic Invasive Species Control and Prevention Plan (Grant County PUD 2009). These methods include use of a Wisconsin plankton net (363µ mesh net) that is towed horizontally for a distance of 40-100 feet at a depth of approximately 20 feet at each location. The plankton net will be thoroughly rinsed and all sample material transferred into a 250 ml Teflon bottle and preserved immediately with 70 percent isopropyl alcohol. The samples will then be shipped to a certified laboratory for analysis and determination of veliger presence or absence.

SCL will also collect vertical tows that will sample the entire water column at each site. Methods for collecting vertical tow samples are almost identical to the horizontal tow sampling method as described above, except that samples will be taken from 3 feet above the bottom of the river up through the entire water column without drifting.

4.2. Monitoring for New Zealand Mudsnails

SCL will conduct New Zealand mudsnail surveys in the vicinities of two public boat launches in Boundary Reservoir: i.e., the Forebay Recreation Area boat launch and the Metaline Waterfront Park boat launch. Mudsnail surveys will be conducted according to the same schedule as the zebra and quagga mussel monitoring, i.e., monthly from April through October of each year.

During each survey month, personnel (anticipated to be a single person) will locate an area of cobble/boulder substrate, wade along a 100-foot transect at a depth of approximately 2 feet, and at 10-foot intervals pick up five rocks ranging in size from 6 to 12 inches. All gastropods attached to the rocks, including the undersides of the rocks, will be collected. Three grab samples will also be taken from sand/silt substrate in the vicinity of each of the boat launches. The samples will be examined in the field for the presence of mudsnails. If any gastropods appear to be New Zealand mudsnails (the field person will have training so that he or she can ascertain whether a snail may be a mudsnail), they will be preserved in ethanol and sent to an approved laboratory for analysis (laboratory to be selected in consultation with Ecology and other members of the WQWG and FAWG).

4.3. Other Invasive Aquatic Species

Monitoring for invasive aquatic species will be addressed adaptively, that is, SCL will monitor for newly listed aquatic invasive species identified by Ecology or other appropriate invasive species committees. At annual meetings (see Section 6), WQWG and FAWG participants will have the opportunity to propose additional invasive aquatic species (beyond zebra and quagga mussels and New Zealand mudsnails) for monitoring. If these species are officially recognized as invasive aquatic species in the vicinity of the Project, and Ecology believes that monitoring for these species is warranted, SCL will develop appropriate monitoring protocols in consultation with the WQWG and FAWG, and SCL will implement the protocols, provided they are considered safe, cost effective, and logistically feasible, and do not have the potential to jeopardize fish and aquatic resources or water quality. In addition, SCL will remain up to date on aquatic invasive species introductions and developments associated with the methods of detecting and controlling such species by participating in information exchanges and regional efforts to coordinate monitoring, prevention, and control activities associated with invasive aquatic species. Should zebra or quagga mussels or New Zealand mudsnails or any other newly listed invasive species become established and problematic as determined by the WQWG and FAWG, SCL will consult with the workgroups to determine potential management strategies, which would include additional monitoring and reasonable and feasible control measures implemented by SCL consistent with regional control programs.

4.4. Rapid Response and Coordination

Through this AISCPP, SCL will implement monitoring programs that will help detect new aquatic invasive species infestations as soon as possible. In the event of identification of new invasive species within the Project area, SCL will conduct the following response activities:

- Immediate notification to Ecology (for plants) or WDFW (for animals) of possible new invasive species identified during monitoring. Digital photographs will be taken and sent to Ecology or WDFW for assistance in identification.

- SCL will coordinate with Ecology or WDFW to confirm aquatic invasive species identification.

- Upstream (Box Canyon Dam) and downstream (Seven Mile Dam) operators will be notified immediately if aquatic invasive species not previously identified in the Pend Oreille River system (e.g., zebra or quagga mussels) are found.

- If zebra or quagga mussels or New Zealand mudsnails are discovered in the Project area, SCL will evaluate potential control methods in coordination with regional invasive species control programs and in consultation with the WQWG and FAWG.

- SCL will coordinate with Ecology and WDFW to develop appropriate press releases to alert the public of any new aquatic invasive species.

- SCL will take reasonable and feasible steps, as determined in consultation with the WQWG and FAWG, to manage and/or contain the new aquatic invasive species, including providing assistance as needed for Ecology or WDFW site visits to confirm presence and determine extent of infestation, and coordinate with Ecology and WDFW to develop a further response, e.g., boat launch closures at launches under SCL's jurisdiction, if deemed necessary by Ecology and WDFW. Although SCL does not have the authority to deny entry to or exit from the reservoir by potentially infested boats or trailers, SCL will implement appropriate I&E measures to curtail the potential transfer of any new aquatic invasive species from the Project area to other waterbodies.

- SCL will conduct effectiveness monitoring to determine the success of aquatic invasive species management/containment actions implemented; coordinate with the WQWG and FAWG on monitoring results and discuss appropriate next steps to determine long-term monitoring and reasonable and feasible control efforts in coordination with the WQWG and FAWG during the annual workgroup meeting.

Figure 4.4-1 provides a summary of the rapid response steps in the event of an introduction of a new aquatic invasive species. The designated contacts are the Ecology 401 Certification lead and the WDFW Project Lead. A full list of contacts is provided in Table 4.4-1.

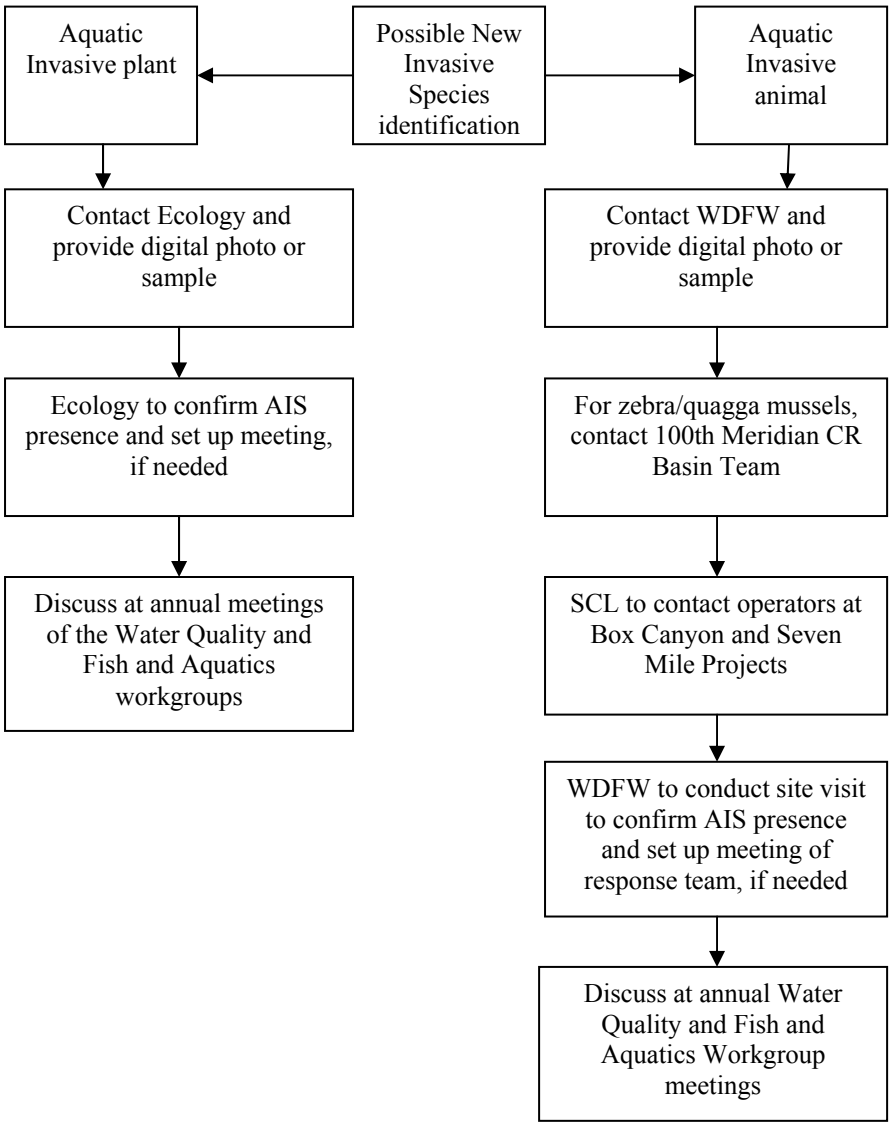


Figure 4.4-1. Aquatic invasive species rapid-response flowchart.

Table 4.4-1. Designated contacts in the event that a new aquatic invasive species is detected in the Project area.

Organization	Position	Address and Phone Number
Ecology	401 Certification Lead	Eastern Regional Office 4601 N. Monroe Spokane, WA 99205-1295 (509) 329-3529
	Aquatic Invasive Species Lead	Headquarters Office PO Box 47600 Olympia, WA 98504-7600 (360) 407-6000
WDFW	WDFW Project Lead	Eastern Regional Office 2315 North Discovery Place Spokane Valley, WA 99216-1566 (509) 892-1001
Pend Oreille County Noxious Weed Control Board	Noxious Weed Coordinator	PO Box 5085 Newport, WA 99156-5085 (509) 447-2402
100th Meridian Initiative: Columbia River Basin Team	Invasive Species Hotline	1-877-786-7267
Pend Oreille County PUD	Environmental Specialist	PO Box 190 130 N. Washington Newport, WA 99156 (509) 447-3137
BC Hydro	Environmental Specialist	6911 Southpoint Drive Burnaby, BC V3N 4X8 Canada (604) 224-9376

5 INTERPRETATION AND EDUCATION PROGRAM

SCL will implement an I&E program aimed at reducing the potential for the spread of invasive macrophyte and mollusk species (zebra and quagga mussels and New Zealand mudsnails). The goals and objectives of the I&E program and a description of how it will be administered are provided in SCL's RRMP).

The locations of I&E facilities and other media are critical to the success of the program. Specific sites within the Project area will be finalized based on their ability to support interpretation of the Project's identified theme, subthemes, and messages. Preliminary I&E sign/kiosk sites are identified in the RRMP, Appendix 4, concept site plans. Signs or kiosks providing information on reducing the risk of invasive species dispersal will be installed at Project boat launches at the Forebay Recreation Area and Metaline Waterfront Park. Other media related to invasive species, i.e., brochures and possibly maps, will be available at the Vista House, Tailrace, and Forebay recreation areas, community information centers in Metaline and

Metaline Falls, and possibly at regional tourism/information centers and Scenic Byway portal sites. I&E costs are addressed in the RRMP.
The design and content of the signs, including exact wording, will be finalized by SCL following issuance of the new license in consultation with the WQWG, the FAWG, and the Pend Oreille County Noxious Weed Control Board. Potential text for I&E signs related to preventing dispersal of invasive species is provided below. In addition to the following recommendations, the sign should include photographs of zebra and quagga mussels, New Zealand mudsnails, and Eurasian watermilfoil, possibly including a boat hull or other piece of equipment infested with mussels.

- Please take precautions to avoid the dispersal of invasive species between and within water bodies.
  - Your actions can help prevent the introduction of invasive zebra mussels, quagga mussels, and New Zealand mudsnails to the Pend Oreille River.
  - Please take precautions to avoid dispersing Eurasian watermilfoil within Boundary Reservoir and transporting it to other locations where it has not yet become established.
- When removing your boat from the water from any water body/before launching it in any other water body:
  - Inspect all exposed surfaces - small mussels feel like sandpaper to the touch.
  - Wash the hull of each watercraft thoroughly.
  - Remove all plant and animal material from your boat, trailer, fishing gear, or any other equipment.
  - Drain all water and dry all areas.
  - Drain and dry the lower outboard unit.
  - Clean and dry all live-wells.
  - Empty and dry any buckets.
  - Dispose of all bait in the trash.
  - Keep watercraft dry between launches into different fresh waters.
  - Report suspected mussels or mudsnails to the Washington Department of Fish and Wildlife 1-888-933-9247
- While in the water:
  - Avoid breaking up milfoil with boat propellers or other gear, as fragments of the plant can colonize areas where milfoil is not yet established.
  - Be particularly cautious operating jet skis in shallow or slow-water areas where milfoil tends to grow.

6 WATER QUALITY WORKGROUP

Administering the AISCPP is expected to require one meeting per year of the Water Quality Workgroup, to discuss the outcome of the year's field activities and plan the following spring's activities. In addition to the meetings, site visits may be needed at times. Preparation for meetings will include conducting verification mapping in areas where bottom barriers are to be installed or reinstalled, summarization of any relevant field data, and photography needed to document progress or difficulties being encountered in the field. Each year, SCL, in consultation with the WQWG and FAWG, will determine whether any changes to the AISCPP may be warranted. If changes are agreed to by SCL and Ecology, SCL will revise the AISCPP and submit it to the workgroup before the spring implementation efforts occur. Representatives of the FAWG will be invited to attend meetings of the Water Quality Workgroup and review sections of the AISCPP that pertain to the control of invasive submerged macrophytes.

7 ADAPTIVE MANAGEMENT

This AISCPP describes adaptive management provisions to be implemented in coordination with the WQWG as summarized below:

- SCL will hold one meeting a year with the WQWG and FAWG to discuss the outcome of the year's field activities and plan for the following spring's field efforts.
- Verification monitoring of macrophyte beds will occur within two years following the license to confirm exact placement of bottom barriers in the four general areas identified in Section 3.2.1 in consultation with the WQWG and FAWG.
- Once bottom barriers are placed, monthly monitoring will occur, with reports on effectiveness provided annually to the WQWG and FAWG.
- Annual monitoring and macrophyte control measures at the boat launch locations identified in Section 3.2.2 will be implemented three years following completion of boat launch upgrade construction activities identified in the RRMP.
- At the annual meeting, SCL, in consultation with the WQWG and FAWG, will determine whether any changes to the AISCPP may be warranted.
- Site visits with the WQWG and FAWG will be conducted as necessary to review effectiveness and/or issues with treatment locations or methods identified in this AISCPP.
- The Rapid Response and Coordination Protocol described in Section 4.4 will be used in the event that new invasive species are identified through monitoring efforts in the Project area.

8 IMPLEMENTATION SCHEDULE

Within six months of the issuance of the new Project license, SCL will submit a Quality Assurance Project Plan (QAPP), which will include a schedule for conducting macrophyte verification mapping, to Ecology for approval.

Bottom barriers will be installed at the locations identified in Section 3.2 after spring runoff of the third year following license issuance, following completion of verification mapping. Barriers

will be maintained and replaced, as described in sections 3.3 and 3.4, over the term of the new license or until their use is discontinued by Ecology and the WQWG and the FAWG.

Monitoring for zebra and quagga mussels and New Zealand mudsnails will commence during April of the first year following Ecology's approval of the QAPP and continue for the term of the new license or until discontinued by Ecology and the WQWG and FAWG.

The implementation schedule for the I&E program is provided in the RRMP.

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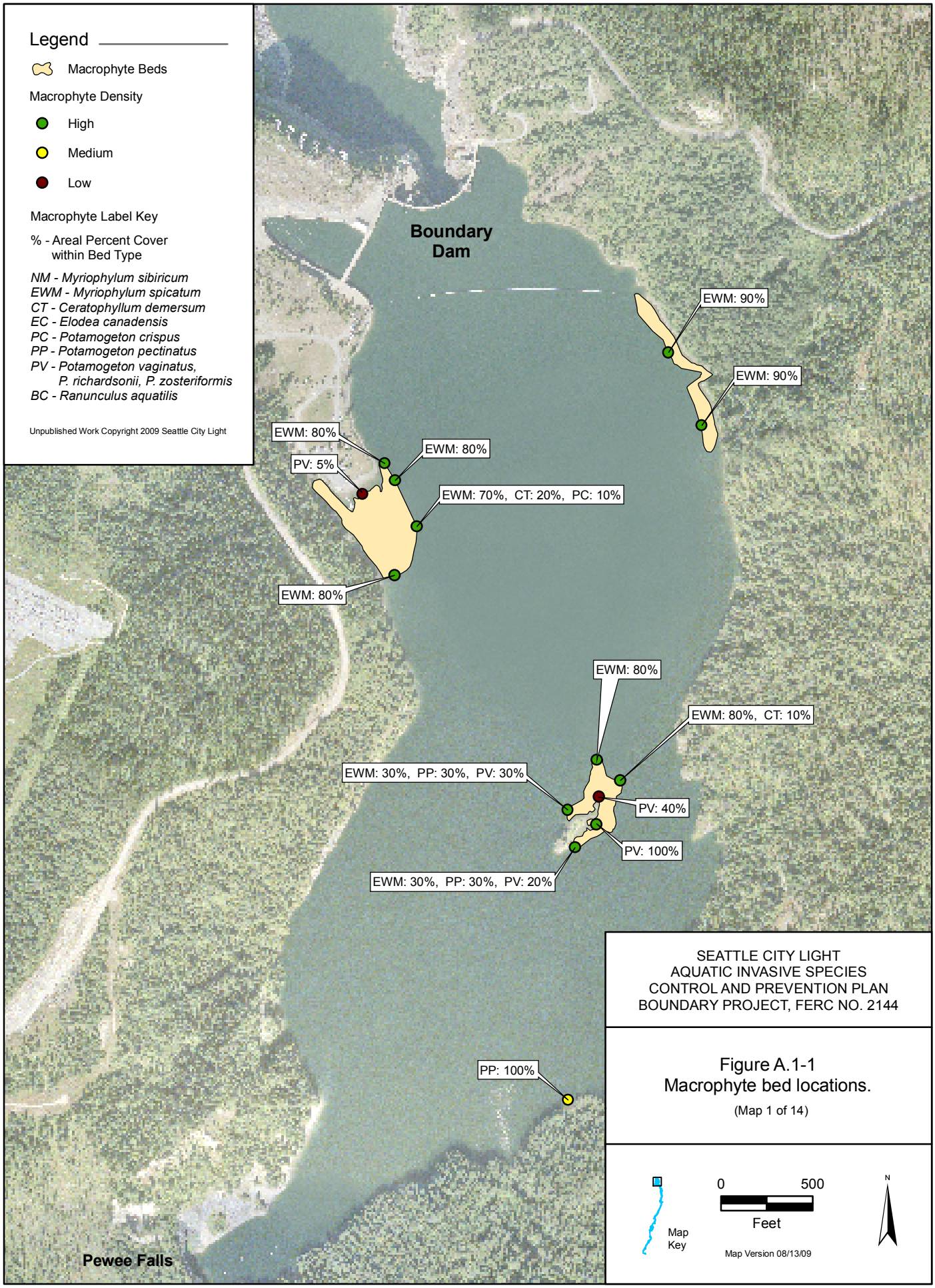
Appendix 1: Maps of Macrophyte Bed Locations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Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
Boundary Dam
EWM: 90%
EWM: 90%
EWM: 80%
EWM: 80%
PV: 5%
EWM: 70%, CT: 20%, PC: 10%
EWM: 80%
EWM: 80%
EWM: 80%, CT: 10%
EWM: 30%, PP: 30%, PV: 30%
PV: 40%
PV: 100%
EWM: 30%, PP: 30%, PV: 20%
PP: 100%
Pewee Falls
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 1 of 14)
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Feet
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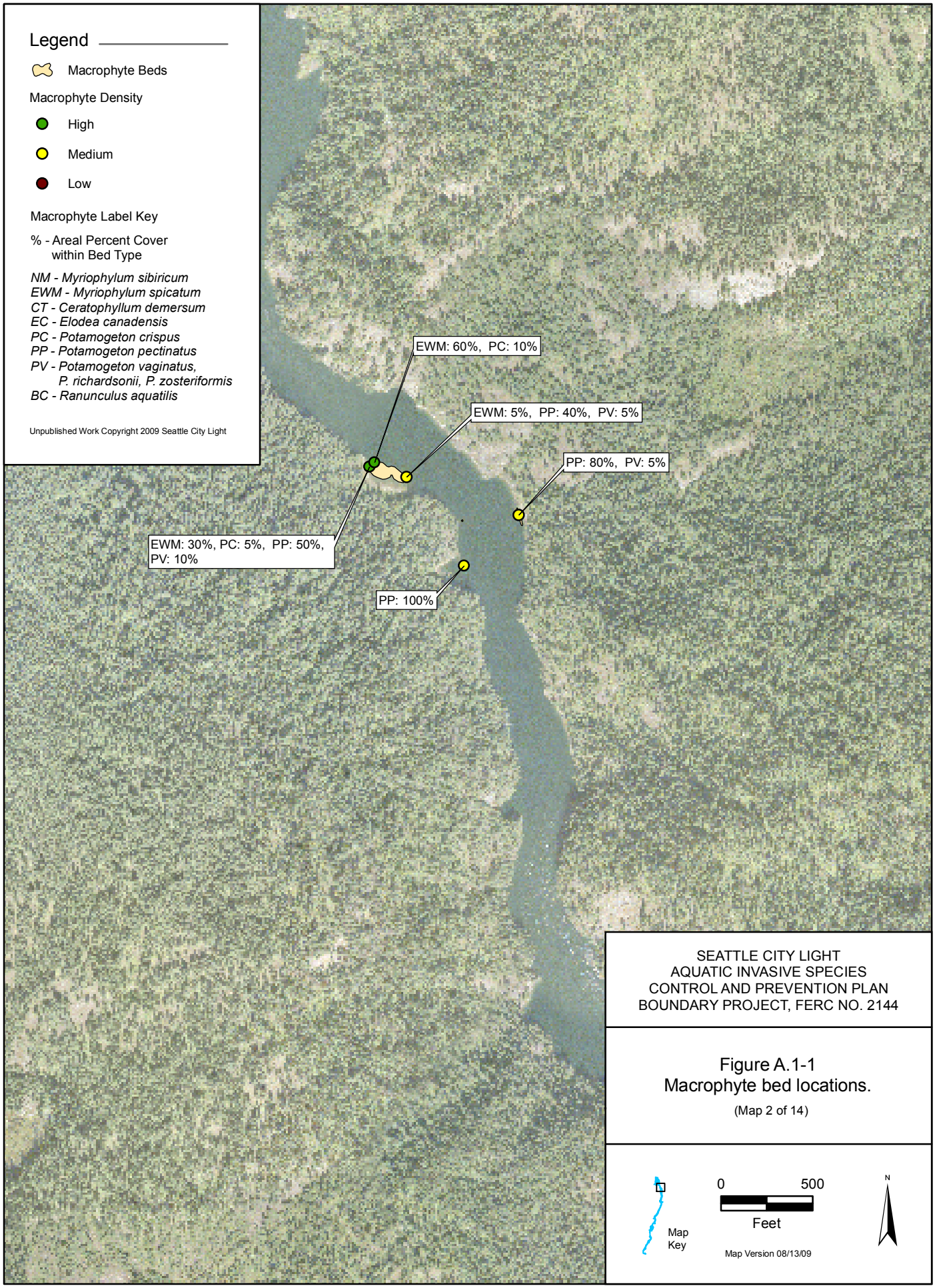
Map Version 08/13/09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BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
EWM: 60%, PC: 10%
EWM: 5%, PP: 40%, PV: 5%
PP: 80%, PV: 5%
EWM: 30%, PC: 5%, PP: 50%, PV: 10%
PP: 100%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
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(Map 2 of 14)
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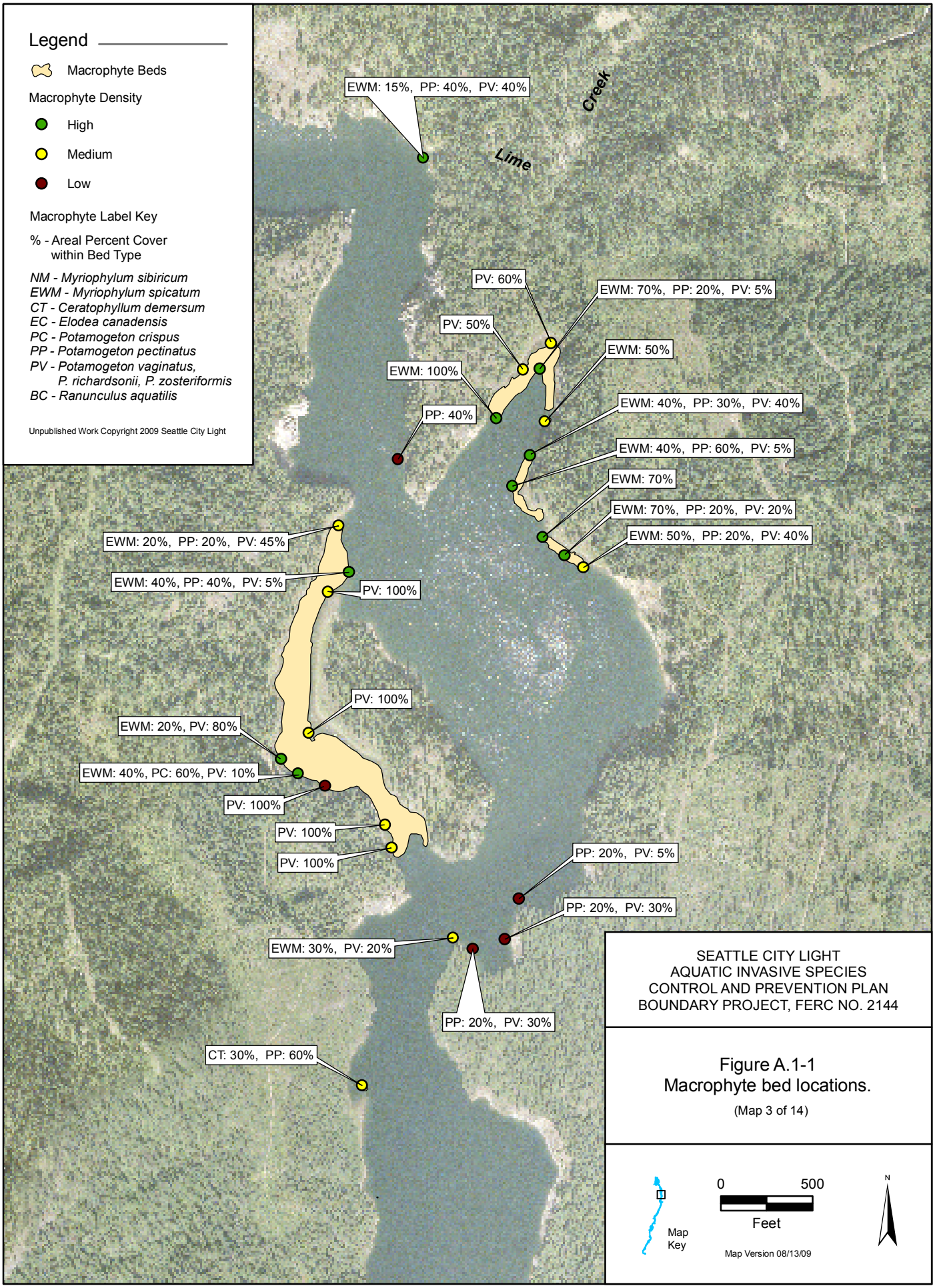
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PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
Lime Creek
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PV: 60%
EWM: 70%, PP: 20%, PV: 5%
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PV: 100%
PV: 100%
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CT: 30%, PP: 60%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
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Macrophyte bed locations.
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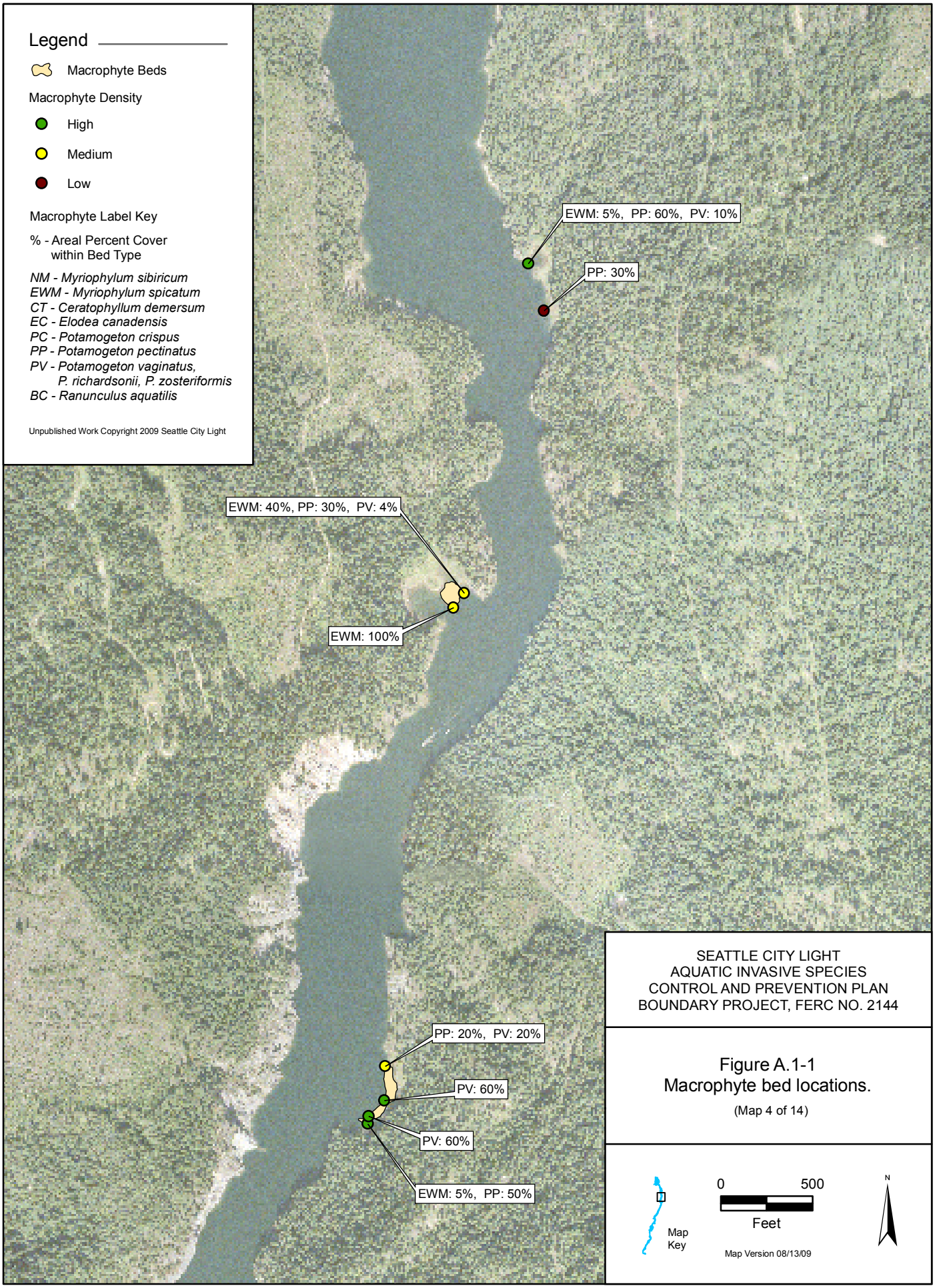
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BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
EWM: 5%, PP: 60%, PV: 10%
PP: 30%
EWM: 40%, PP: 30%, PV: 4%
EWM: 100%
PP: 20%, PV: 20%
PV: 60%
PV: 60%
EWM: 5%, PP: 50%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
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(Map 4 of 14)
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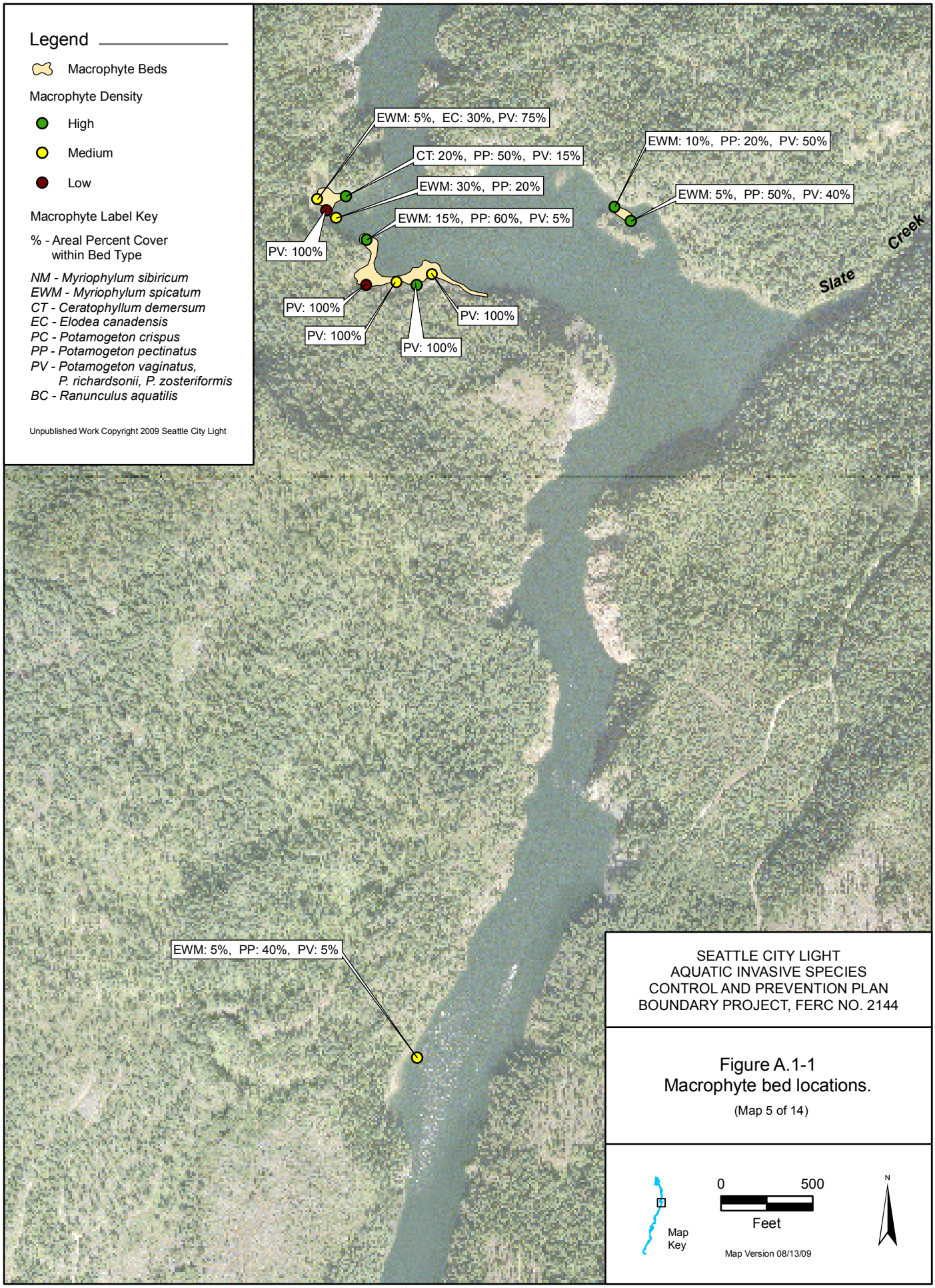
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Unpublished Work Copyright 2009 Seattle City Light
EWM: 5%, EC: 30%, PV: 75%
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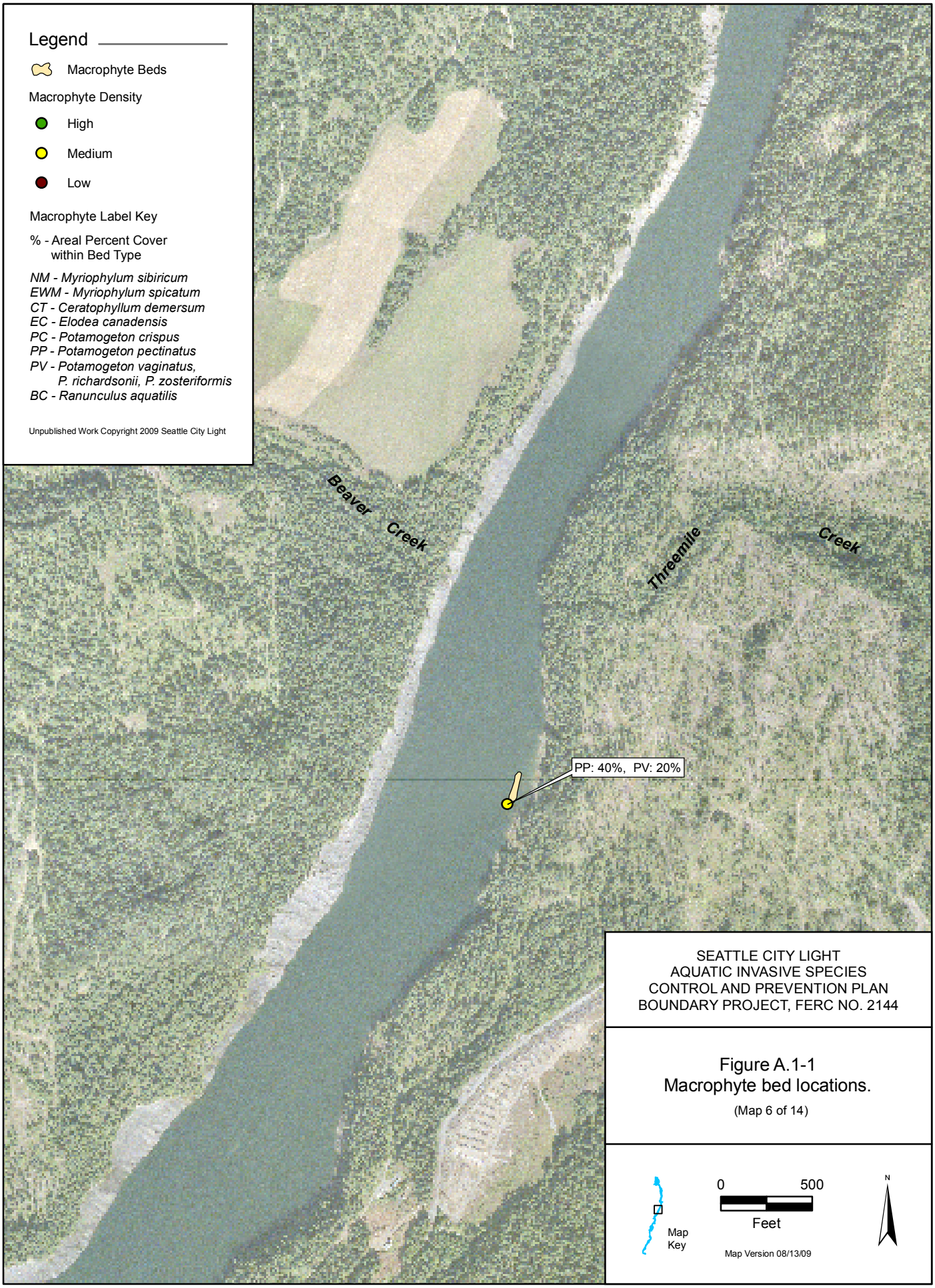
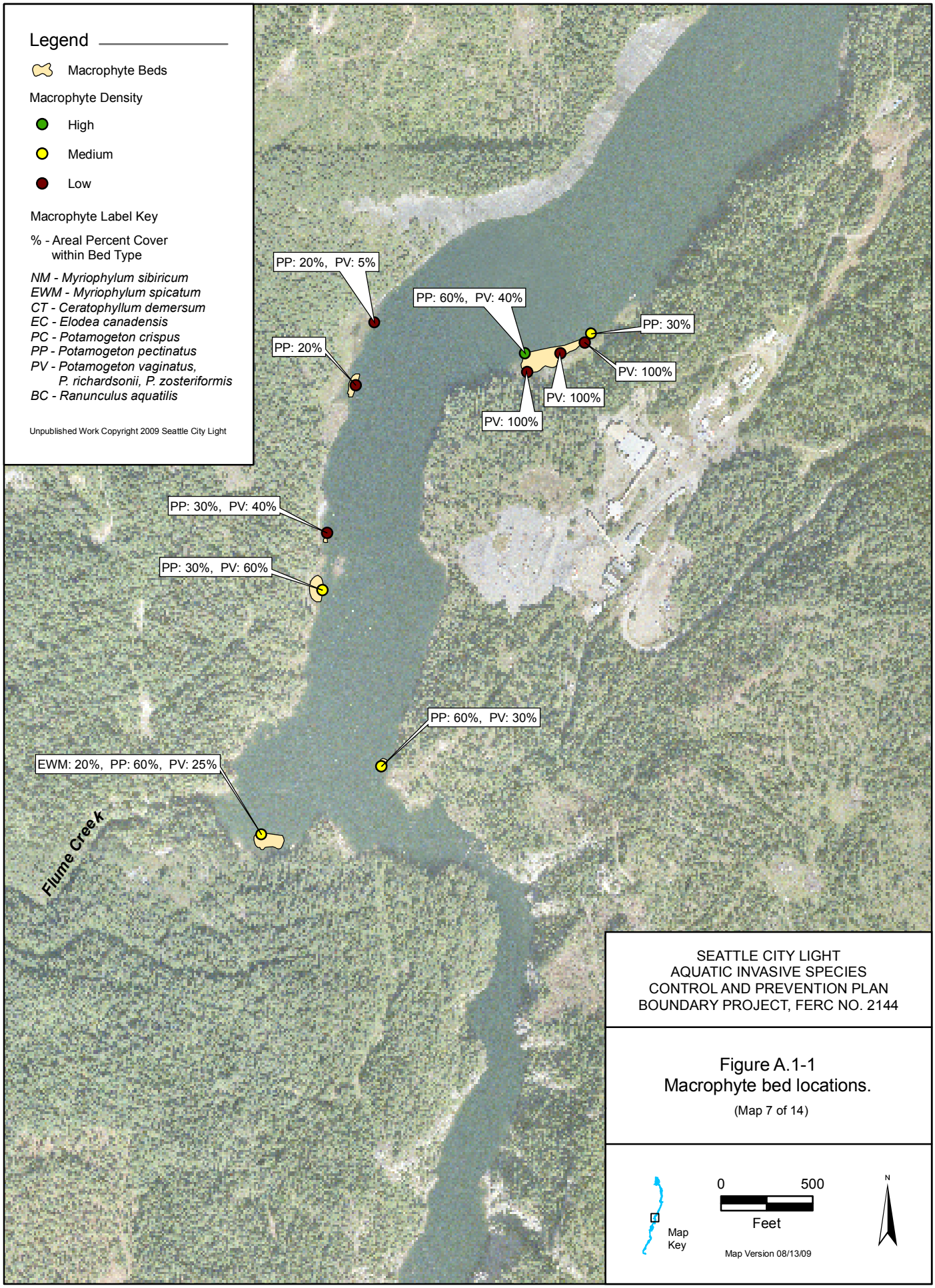
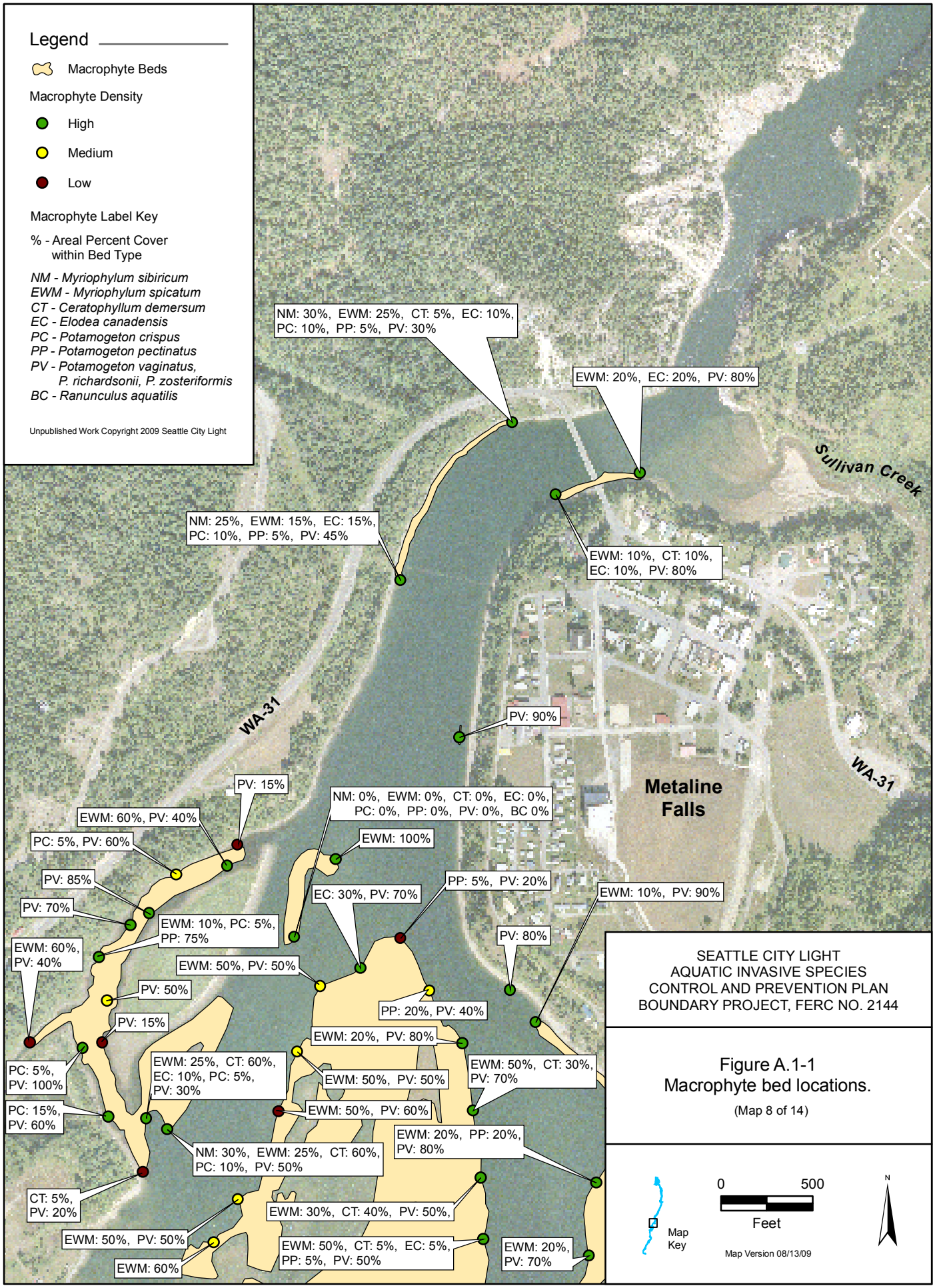
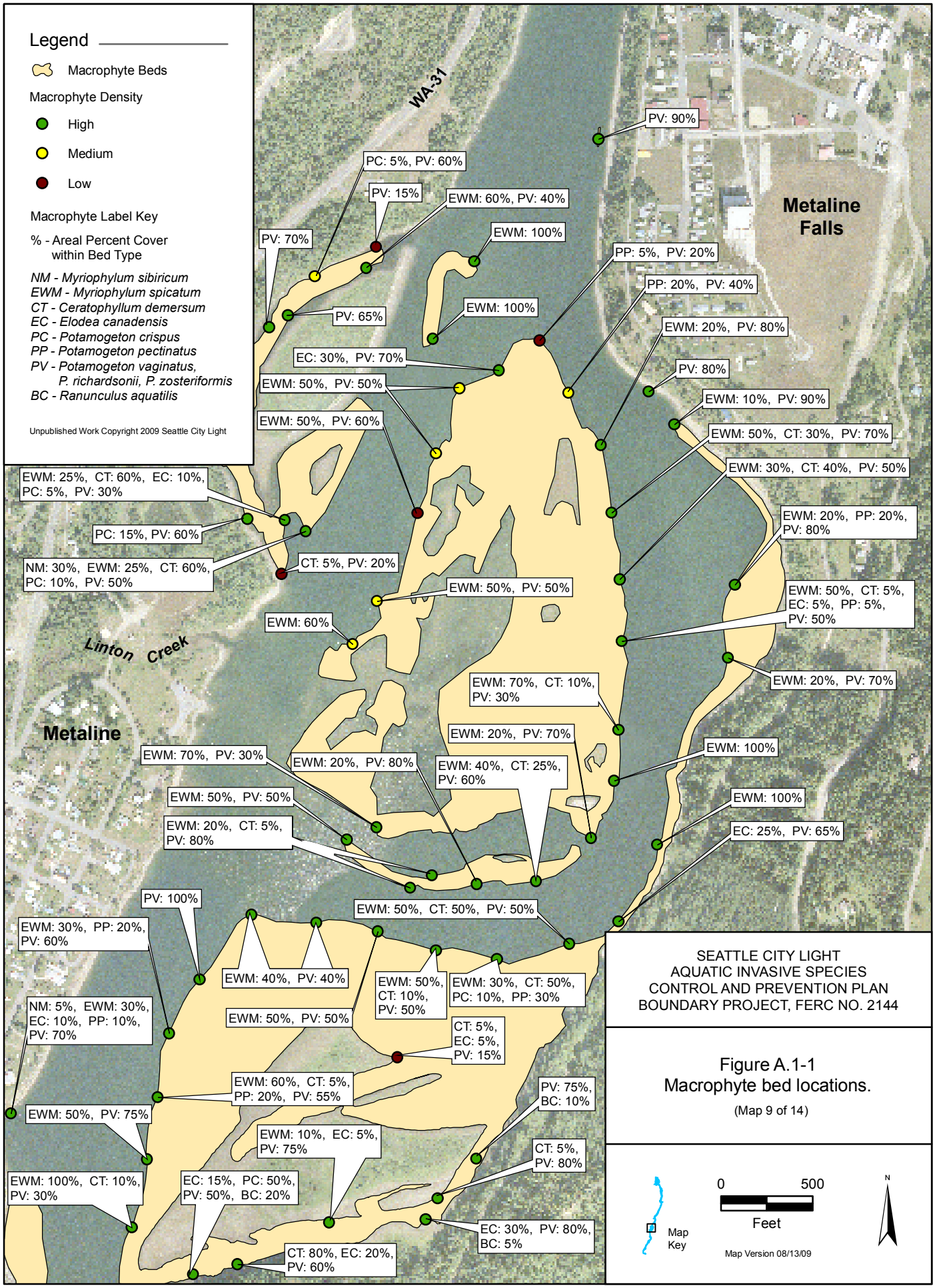
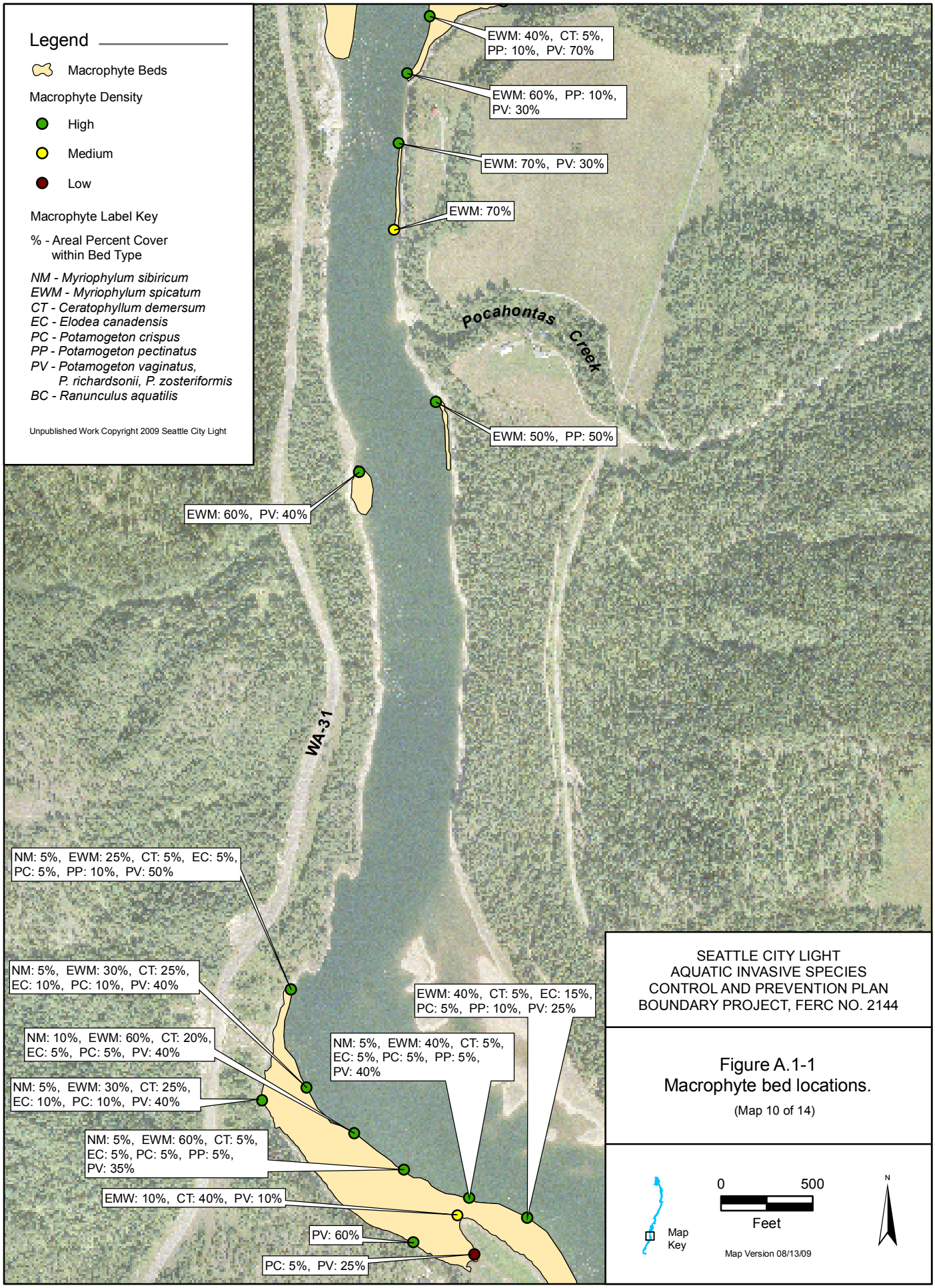
PV: 100%
PV: 100%
PV: 100%
PV: 100%
PV: 100%
EWM: 10%, PP: 20%, PV: 50%
EWM: 5%, PP: 50%, PV: 40%
Slate Creek
EWM: 5%, PP: 40%, PV: 5%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 5 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09

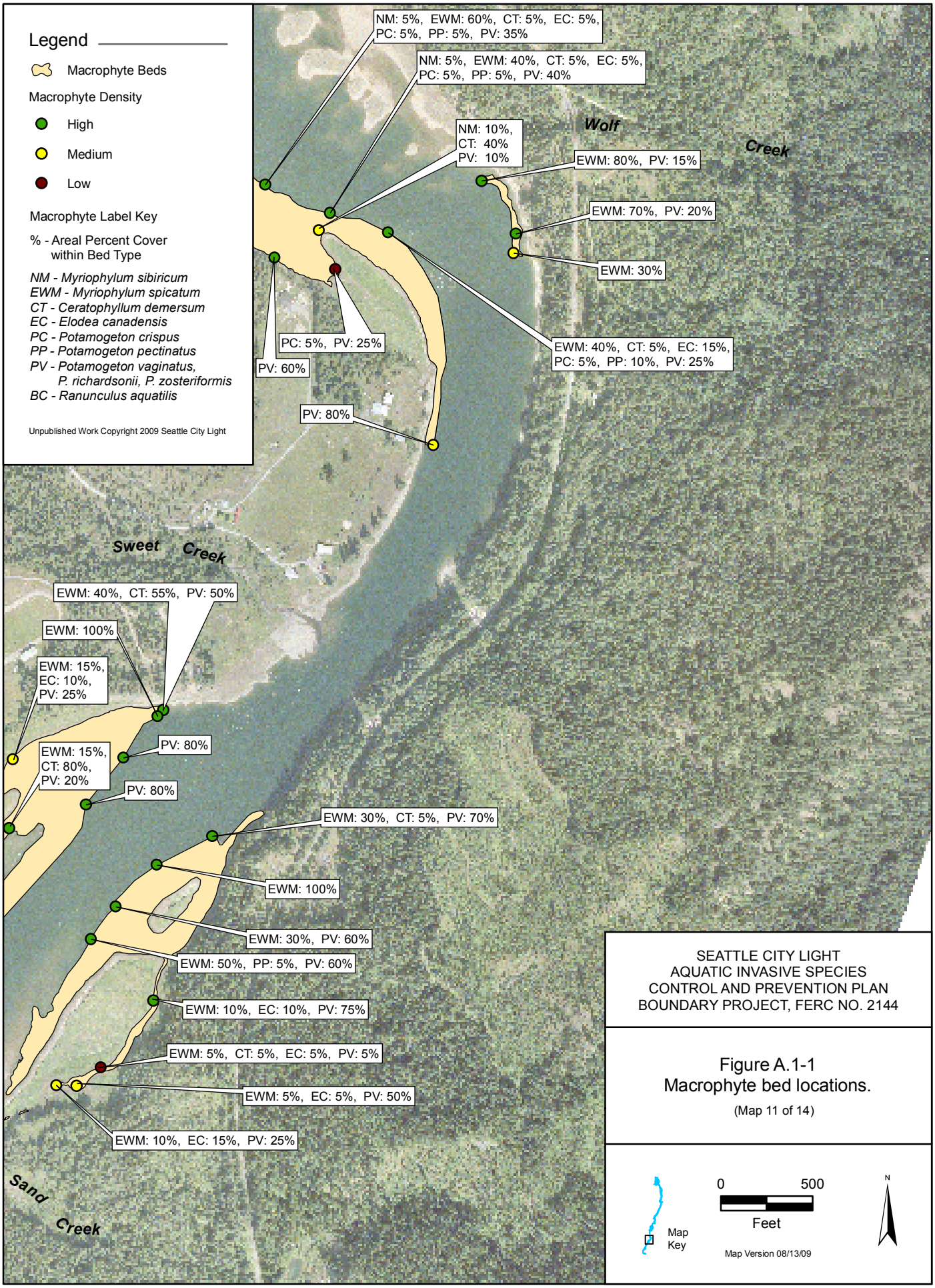

Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
Beaver Creek
Threemile Creek
PP: 40%, PV: 20%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 6 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09

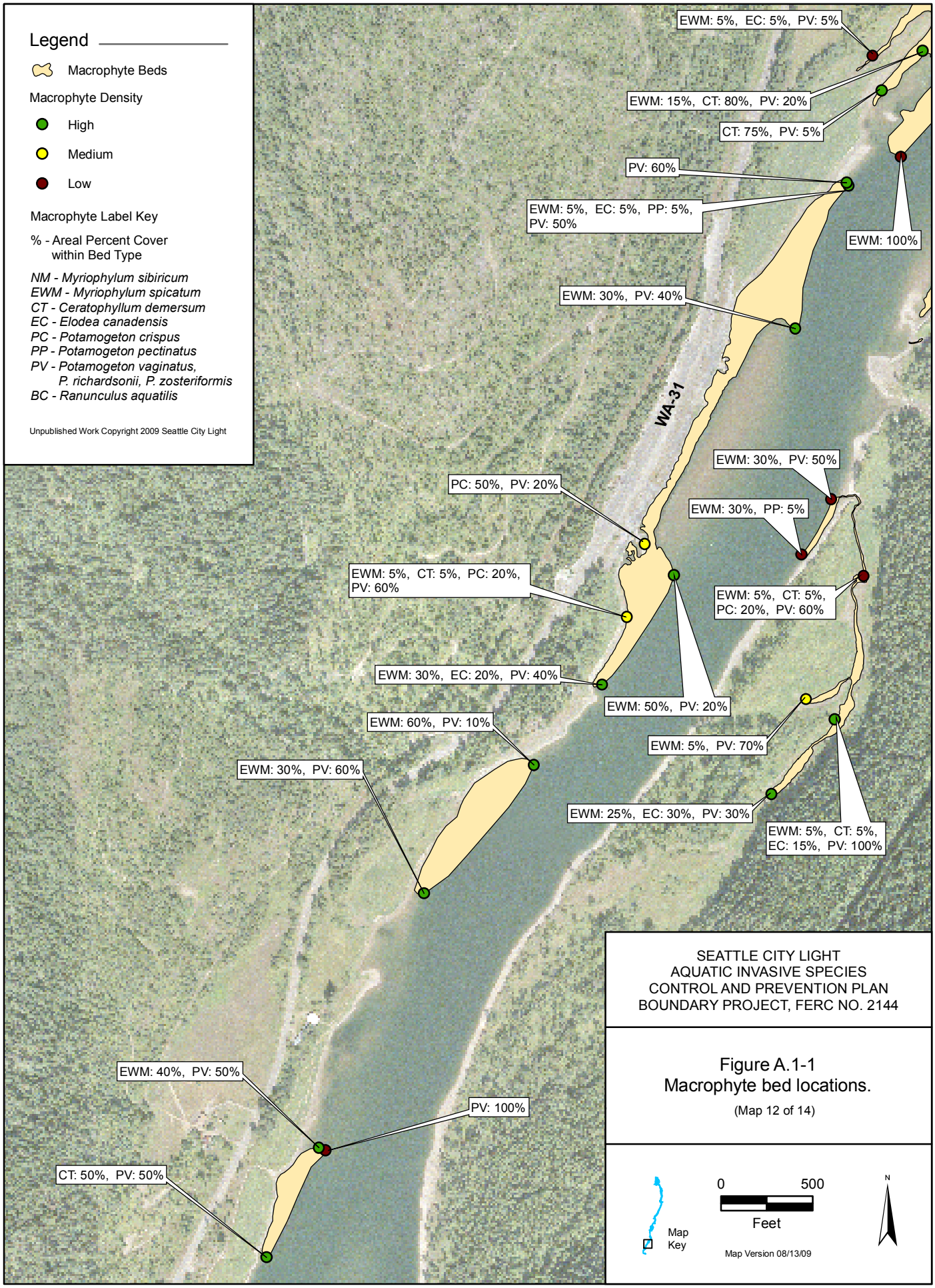

Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
PP: 20%, PV: 5%
PP: 60%, PV: 40%
PP: 30%
PP: 20%
PV: 100%
PV: 100%
PV: 100%
PP: 30%, PV: 40%
PP: 30%, PV: 60%
PP: 60%, PV: 30%
EWM: 20%, PP: 60%, PV: 25%
Flume Creek
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 7 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09

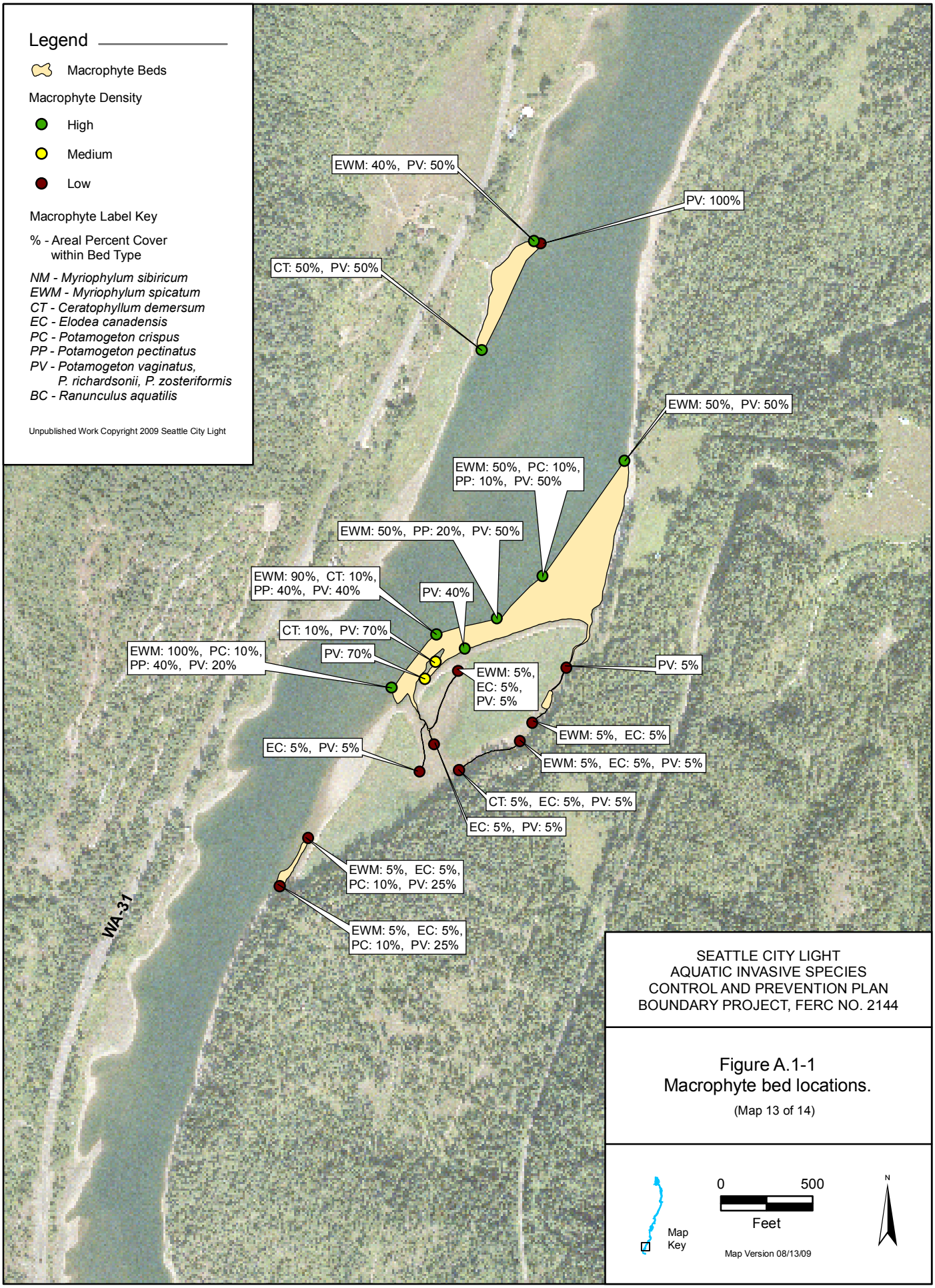

Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
NM: 30%, EWM: 25%, CT: 5%, EC: 10%, PC: 10%, PP: 5%, PV: 30%
EWM: 20%, EC: 20%, PV: 80%
Sullivan Creek
NM: 25%, EWM: 15%, EC: 15%, PC: 10%, PP: 5%, PV: 45%
EWM: 10%, CT: 10%, EC: 10%, PV: 80%
WA-31
PV: 90%
Metaline Falls
WA-31
PV: 15%
NM: 0%, EWM: 0%, CT: 0%, EC: 0%, PC: 0%, PP: 0%, PV: 0%, BC 0%
EWM: 60%, PV: 40%
EWM: 100%
PC: 5%, PV: 60%
PV: 85%
PP: 5%, PV: 20%
EWM: 10%, PV: 90%
PV: 70%
EC: 30%, PV: 70%
EWM: 10%, PC: 5%, PP: 75%
PV: 80%
EWM: 60%, PV: 40%
EWM: 50%, PV: 50%
PV: 50%
PP: 20%, PV: 40%
PV: 15%
EWM: 20%, PV: 80%
PC: 5%, PV: 100%
EWM: 25%, CT: 60%, EC: 10%, PC: 5%, PV: 30%
EWM: 50%, PV: 50%
EWM: 50%, CT: 30%, PV: 70%
PC: 15%, PV: 60%
EWM: 50%, PV: 60%
EWM: 20%, PP: 20%, PV: 80%
NM: 30%, EWM: 25%, CT: 60%, PC: 10%, PV: 50%
CT: 5%, PV: 20%
EWM: 30%, CT: 40%, PV: 50%,
EWM: 50%, PV: 50%
EWM: 50%, CT: 5%, EC: 5%, PP: 5%, PV: 50%
EWM: 20%, PV: 70%
EWM: 60%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 8 of 14)
Map Key
0
500
Feet
Map Version 08/13/09
N

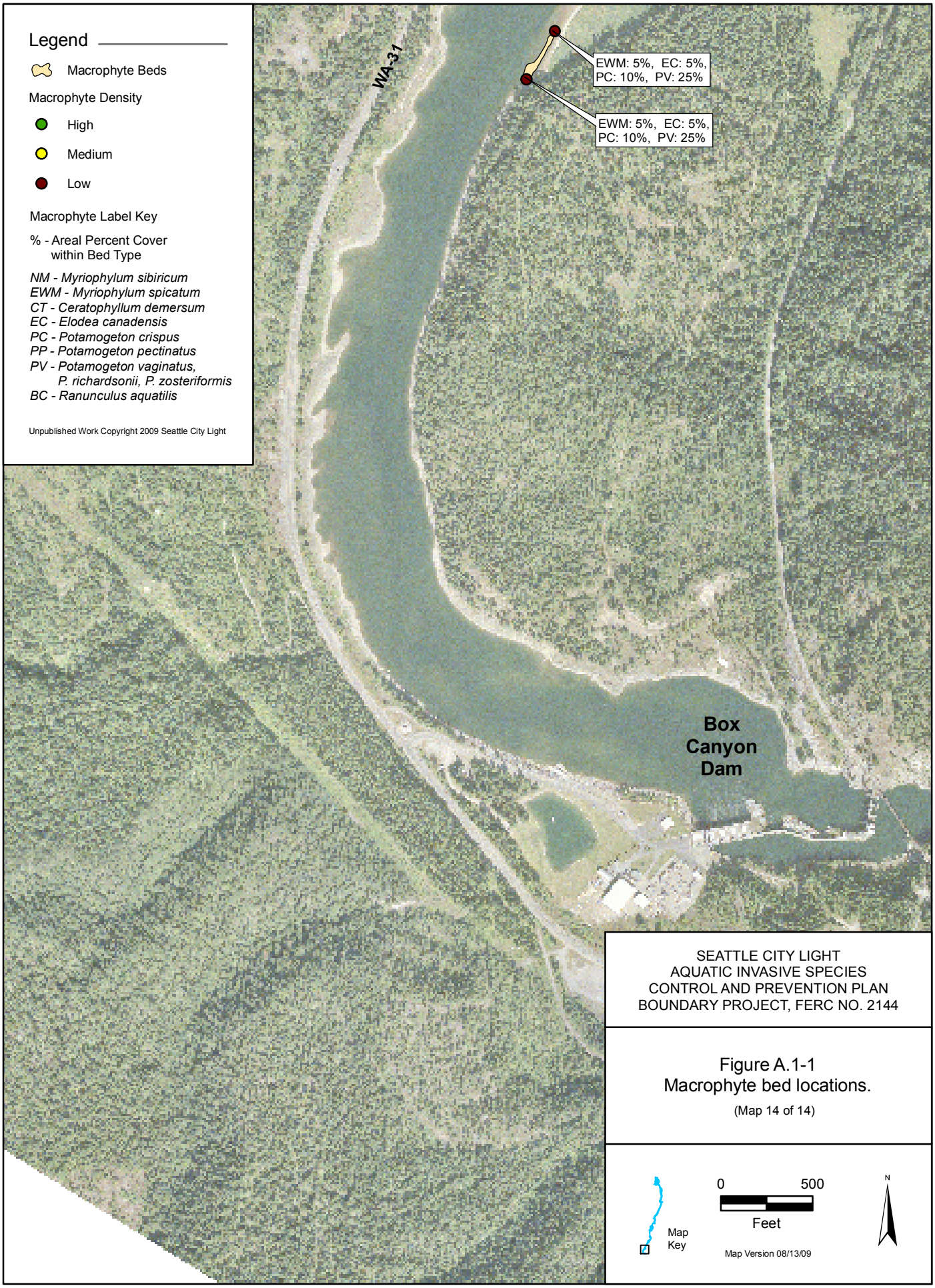

Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
WA-31
Metaline Falls
Metaline
Linton Creek
PV: 90%
PC: 5%, PV: 60%
PV: 15%
EWM: 60%, PV: 40%
PV: 70%
EWM: 100%
PP: 5%, PV: 20%
PP: 20%, PV: 40%
PV: 65%
EWM: 100%
EWM: 20%, PV: 80%
EC: 30%, PV: 70%
PV: 80%
EWM: 50%, PV: 50%
EWM: 10%, PV: 90%
EWM: 50%, PV: 60%
EWM: 50%, CT: 30%, PV: 70%
EWM: 30%, CT: 40%, PV: 50%
EWM: 25%, CT: 60%, EC: 10%, PC: 5%, PV: 30%
EWM: 20%, PP: 20%, PV: 80%
PC: 15%, PV: 60%
NM: 30%, EWM: 25%, CT: 60%, PC: 10%, PV: 50%
CT: 5%, PV: 20%
EWM: 50%, PV: 50%
EWM: 50%, CT: 5%, EC: 5%, PP: 5%, PV: 50%
EWM: 60%
EWM: 20%, PV: 70%
EWM: 70%, CT: 10%, PV: 30%
EWM: 20%, PV: 70%
EWM: 100%
EWM: 70%, PV: 30%
EWM: 20%, PV: 80%
EWM: 40%, CT: 25%, PV: 60%
EWM: 50%, PV: 50%
EWM: 100%
EWM: 20%, CT: 5%, PV: 80%
EC: 25%, PV: 65%
PV: 100%
EWM: 50%, CT: 50%, PV: 50%
EWM: 30%, PP: 20%, PV: 60%
EWM: 40%, PV: 40%
EWM: 50%, CT: 10%, PV: 50%
EWM: 30%, CT: 50%, PC: 10%, PP: 30%
NM: 5%, EWM: 30%, EC: 10%, PP: 10%, PV: 70%
EWM: 50%, PV: 50%
CT: 5%, EC: 5%, PV: 15%
EWM: 60%, CT: 5%, PP: 20%, PV: 55%
PV: 75%, BC: 10%
EWM: 50%, PV: 75%
EWM: 10%, EC: 5%, PV: 75%
CT: 5%, PV: 80%
EWM: 100%, CT: 10%, PV: 30%
EC: 15%, PC: 50%, PV: 50%, BC: 20%
EC: 30%, PV: 80%, BC: 5%
CT: 80%, EC: 20%, PV: 60%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 9 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09


Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
EWM: 40%, CT: 5%, PP: 10%, PV: 70%
EWM: 60%, PP: 10%, PV: 30%
EWM: 70%, PV: 30%
EWM: 70%
Pocahontas Creek
EWM: 50%, PP: 50%
EWM: 60%, PV: 40%
WA-31
NM: 5%, EWM: 25%, CT: 5%, EC: 5%, PC: 5%, PP: 10%, PV: 50%
NM: 5%, EWM: 30%, CT: 25%, EC: 10%, PC: 10%, PV: 40%
NM: 10%, EWM: 60%, CT: 20%, EC: 5%, PC: 5%, PV: 40%
NM: 5%, EWM: 30%, CT: 25%, EC: 10%, PC: 10%, PV: 40%
NM: 5%, EWM: 60%, CT: 5%, EC: 5%, PC: 5%, PP: 5%, PV: 35%
EMW: 10%, CT: 40%, PV: 10%
PV: 60%
PC: 5%, PV: 25%
EWM: 40%, CT: 5%, EC: 15%, PC: 5%, PP: 10%, PV: 25%
NM: 5%, EWM: 40%, CT: 5%, EC: 5%, PC: 5%, PP: 5%, PV: 40%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 10 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09


Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
NM: 5%, EWM: 60%, CT: 5%, EC: 5%, PC: 5%, PP: 5%, PV: 35%
NM: 5%, EWM: 40%, CT: 5%, EC: 5%, PC: 5%, PP: 5%, PV: 40%
NM: 10%, CT: 40% PV: 10%
Wolf Creek
EWM: 80%, PV: 15%
EWM: 70%, PV: 20%
EWM: 30%
EWM: 40%, CT: 5%, EC: 15%, PC: 5%, PP: 10%, PV: 25%
PC: 5%, PV: 25%
PV: 60%
PV: 80%
Sweet Creek
EWM: 40%, CT: 55%, PV: 50%
EWM: 100%
EWM: 15%, EC: 10%, PV: 25%
PV: 80%
EWM: 15%, CT: 80%, PV: 20%
PV: 80%
EWM: 30%, CT: 5%, PV: 70%
EWM: 100%
EWM: 30%, PV: 60%
EWM: 50%, PP: 5%, PV: 60%
EWM: 10%, EC: 10%, PV: 75%
EWM: 5%, CT: 5%, EC: 5%, PV: 5%
EWM: 5%, EC: 5%, PV: 50%
EWM: 10%, EC: 15%, PV: 25%
Sand Creek
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 11 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09


Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
EWM: 5%, EC: 5%, PV: 5%
EWM: 15%, CT: 80%, PV: 20%
CT: 75%, PV: 5%
PV: 60%
EWM: 5%, EC: 5%, PP: 5%, PV: 50%
EWM: 100%
EWM: 30%, PV: 40%
WA-31
EWM: 30%, PV: 50%
PC: 50%, PV: 20%
EWM: 30%, PP: 5%
EWM: 5%, CT: 5%, PC: 20%, PV: 60%
EWM: 5%, CT: 5%, PC: 20%, PV: 60%
EWM: 30%, EC: 20%, PV: 40%
EWM: 50%, PV: 20%
EWM: 60%, PV: 10%
EWM: 5%, PV: 70%
EWM: 30%, PV: 60%
EWM: 25%, EC: 30%, PV: 30%
EWM: 5%, CT: 5%, EC: 15%, PV: 100%
EWM: 40%, PV: 50%
PV: 100%
CT: 50%, PV: 50%
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 12 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09


Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
Unpublished Work Copyright 2009 Seattle City Light
EWM: 40%, PV: 50%
PV: 100%
CT: 50%, PV: 50%
EWM: 50%, PV: 50%
EWM: 50%, PC: 10%, PP: 10%, PV: 50%
EWM: 50%, PP: 20%, PV: 50%
EWM: 90%, CT: 10%, PP: 40%, PV: 40%
PV: 40%
CT: 10%, PV: 70%
PV: 70%
EWM: 100%, PC: 10%, PP: 40%, PV: 20%
EWM: 5%, EC: 5%, PV: 5%
PV: 5%
EWM: 5%, EC: 5%
EWM: 5%, EC: 5%, PV: 5%
EC: 5%, PV: 5%
CT: 5%, EC: 5%, PV: 5%
EC: 5%, PV: 5%
EWM: 5%, EC: 5%, PC: 10%, PV: 25%
EWM: 5%, EC: 5%, PC: 10%, PV: 25%
WA-3-1
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 13 of 14)
Map Key
0
500
Feet
Map Version 08/13/09
N


Legend
Macrophyte Beds
Macrophyte Density
High
Medium
Low
Macrophyte Label Key
% - Areal Percent Cover within Bed Type
NM - Myriophylum sibiricum
EWM - Myriophylum spicatum
CT - Ceratophyllum demersum
EC - Elodea canadensis
PC - Potamogeton crispus
PP - Potamogeton pectinatus
PV - Potamogeton vaginatus, P. richardsonii, P. zosteriformis
BC - Ranunculus aquatilis
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WA-3-1
EWM: 5%, EC: 5%, PC: 10%, PV: 25%
EWM: 5%, EC: 5%, PC: 10%, PV: 25%
Box Canyon Dam
SEATTLE CITY LIGHT
AQUATIC INVASIVE SPECIES
CONTROL AND PREVENTION PLAN
BOUNDARY PROJECT, FERC NO. 2144
Figure A.1-1
Macrophyte bed locations.
(Map 14 of 14)
Map Key
0
500
Feet
N
Map Version 08/13/09