
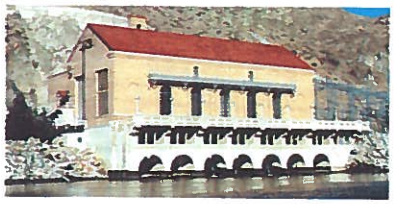


PUBLIC UTILITY DISTRICT NO. 1 *of* CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

April 3, 2017

VIA ELECTRONIC FILING

Ms. Kimberly D. Bose, Secretary
Mr. Nathaniel J. Davis, Sr., Deputy Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, NE
Washington, DC 20426

Subject: Rocky Reach Hydroelectric Project, FERC No. 2145
Article 401 and Appendix A, Section 5.6(2) – Aquatic Invasive Species Monitoring and Control Annual Report for 2016

Dear Secretary Bose and Deputy Secretary Davis:

The Federal Energy Regulatory Commission (Commission or FERC) issued the "Order Modifying and Approving Aquatic Invasive Species Monitoring and Control Plan Pursuant to Article 401 and Condition 5.6(2) on January 14, 2011, which requires Chelan PUD to file the annual monitoring reports with the Commission by April 1 of each year. The report is to include: 1) the previous year's monitoring and control activities; 2) any proposed and needed changes to the monitoring plan to be implemented the following year, based on the previous year's results, any new scientific information, or its coordination with WDOE and the Rocky Reach Fish Forum; and 3) documentation of consultation or comments received from WDOE and the Rocky Reach Fish Forum on the annual report and documentation of their agreement with the proposed monitoring and control measures for the following year.

In accordance with the above License requirements, Chelan PUD hereby files the Aquatic Invasive Species Monitoring and Control Annual Report for 2016.

If you have questions or concerns, please contact me or Marcie Clement at (509) 661-4186.

Sincerely,

Keith Truitt

for
Jeffrey G. Osborn
License Compliance Supervisor
(509) 661-4176
jeff.osborn@chelanpud.org

Attachment: Aquatic Invasive Species Monitoring and Control Annual Report for 2016

cc: Erich Gaedeke, FERC Portland Regional Office
Breean Zimmerman, WDOE Central Regional Office

2016 AQUATIC INVASIVE SPECIES MONITORING AND CONTROL REPORT

FINAL

ROCKY REACH HYDROELECTRIC PROJECT
FERC Project No. 2145

April 3, 2017

Public Utility District No. 1 of Chelan County
Wenatchee, Washington

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TERMS AND ABBREVIATIONS

AIS	Aquatic Invasive Species
Chelan PUD	Public Utility District No. 1 of Chelan County
Douglas PUD	Public Utility District No. 1 of Douglas County
EAS	Environmental Assessment Services
Ecology	Washington State Department of Ecology
FERC	Federal Energy Regulatory Commission
Grant PUD	Public Utility District No. 2 of Grant County
License	FERC License for the Rocky Reach Project
HCP	Anadromous Fish Agreement and Habitat Conservation Plan
NMFS	National Marine Fisheries Service
Project	Hydroelectric Project
RM	river mile
RRFF	Rocky Reach Fish Forum
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDFW	Washington Department of Fish and Wildlife
WQC	water quality certification

SECTION 1: INTRODUCTION

The Public Utility District No. 1 of Chelan County (Chelan PUD) owns and operates the Rocky Reach Hydroelectric Project (Project) on the Columbia River. The Project is operated under the terms and conditions of Federal Energy Regulatory Commission (FERC) Hydroelectric Project License No. 2145. The Project boundary, which extends approximately 43 miles along the Columbia River, begins at the Project tailrace at river mile 474) and extends upriver to the Wells Dam tailrace at river mile 516.

The Project consists primarily of an 8,235-acre reservoir; a 2,847-foot-long by 130-foot-high concrete gravity dam spanning the river, including a powerhouse and spillway; a juvenile fish bypass system, and recreation and hatchery facilities.

Chelan PUD currently operates the Project through the coordinated operation of the seven-dam system (collectively called the "mid-Columbia dams") and other Columbia Basin entities with current operational agreements with fishery agencies, tribes and other operators to provide protection and enhancement for a range of fisheries within, and downstream of the Project. These agreements include the Hanford Reach Fall Chinook Protection Plan, the Hourly Coordination Agreement, and the Rocky Reach Habitat Conservation Plan (HCP) (and associated Anadromous Fish Agreement). The Project is also subject to the many provisions of its FERC License (License), the 2006 Rocky Reach Comprehensive Settlement Agreement, and related laws and regulations. Additionally, the Project is subject to the requirements (incorporated by reference in the License) of the Biological Opinion for the Project issued by National Marine Fisheries Service (NMFS) for its effects on anadromous salmon, the Clean Water Act Section 401 Water Quality Certification (WQC) issued by the Washington Department of Ecology (Ecology), and the Biological Opinion issued by the U.S. Fish and Wildlife Service regarding the effects of the Project on bull trout.

On April 4, 2006, Ecology issued a Final WQC for the operation of the Project. On February 19, 2009, the FERC issued its Order on Offer of Settlement and Issuing New License for the Rocky Reach Project. Article 401 of the License Order and the WQC required Chelan PUD to develop and implement an Aquatic Invasive Species (AIS) Monitoring and Control Plan (Monitoring Plan) in consultation with Ecology and the Rocky Reach Fish Forum (RRFF) within one year of the effective date of the new License. Chelan PUD submitted the Monitoring Plan to FERC on February 19, 2010. On January 14, 2011 the FERC issued its Order Modifying and Approving Aquatic Invasive Species Monitoring and Control Plan pursuant to Article 401 and 401 Certification Condition 5.6(2).

In accordance with the Monitoring Plan (Appendix A), Chelan PUD is to monitor for the presence of new invasive species at or near Project facilities. The Plan is coordinated with Ecology's Freshwater Aquatic Weed Control Program. The Monitoring Plan includes the following components:

a) Signage at boat launches and distribution of educational materials and boater questionnaires to voluntary participants at Rocky Reach Reservoir boat launch sites during the peak boating season (May 1-October 30 each year) to increase boater awareness of dangers of spreading AIS, including the methods one can take to decrease the spread of AIS (e.g., clean the weeds off the boat and drain the live well before going to a new water body);

b) Methodology and schedule of prevention, monitoring and control measures regarding the presence and movement of AIS at or near Project facilities; and
c) Submittal of an annual report of monitoring and educational activities conducted each year.

FERC's Order requires Chelan PUD to file annual monitoring reports with the Commission by April 1 of each year. The report shall include: 1) the previous year's monitoring and control activities; 2) any proposed and needed changes to the monitoring plan to be implemented the following year, based on the previous year's results, any new scientific information, or its coordination with Ecology and the RRFF; and 3) documentation of consultation or comments received from Ecology and the RRFF on the annual report and documentation of their agreement with the proposed monitoring and control measures for the following year.

This report contains a summary of monitoring, control, and educational activities conducted under the Monitoring Plan in 2016 and proposed actions to be implemented in 2017.

SECTION 2: 2016 PREVENTION, MONITORING AND CONTROL ACTIVITIES

2.1 Educational Outreach

One component of Chelan PUD's Monitoring Plan is to provide educational opportunities for the public about the risks involved with AIS. In 2016 this included distribution of educational materials at Rocky Reach boat launches consistent with Section 5.6(2)(a) of the 401Water Quality Certification issued by Ecology on April 4, 2006, which requires the following:

> *"Signage at boat launches and distribution of educational materials and boater questionnaires to voluntary participants at Rocky Reach Reservoir boat launch sites during the peak boating season (May 1 – October 30 each year) to increase boater awareness of dangers of spreading AIS, including the methods one can take to decrease the spread of AIS (e.g. clean the weeds off the boat and drain the live well before going to a new waterbody)."*

In 2016, Chelan PUD used existing kiosks and signage at boat launches within the Project to distribute educational material during the peak of the boating season (May 1 through October 30). Boat launch sites where educational material was distributed included Lincoln Rock and Daroga State Parks, Orondo River Park, Beebe Bridge Park, and Chelan Falls Park (see Appendix B for maps showing launch locations). Educational materials placed at each site consisted of free pamphlets and informational signage (Appendix C). The goal of these educational materials is to increase public awareness of the dangers of spreading AIS, as well as how its spread can be reduced and/or prevented.

Typical Kiosk with signage.

The pamphlets and boat launch signs used to educate the public were obtained from the Washington State Department of Fish and Wildlife (WDFW) and the U.S. Fish and Wildlife Service (USFWS) to keep the signage used in the Project consistent with the other AIS signs used throughout Washington State. The educational material clearly presents ways to avoid the spread of AIS (e.g., by removing and disposing of the weeds off the boats and trailers, and draining the live wells prior to moving to another water body).

2.2 Volunteer Self Survey

Boater surveys modeled after the survey forms created by the 100th Meridian Initiative were provided at Lincoln Rock and Daroga State Parks, Beebe Bridge Park, Chelan Falls Park, and Enitat Park.

The purpose of the survey is explained on the form and the boaters are asked to complete the form and place it in a return box located on site or return it via mail to Chelan PUD. This boater self-survey requests information from the boater including home residence; number of times the boat was launched last year; other lakes/river where the boat has been recently launched; the destination of the boat; if the boater cleans the boat, bait well, and fishing gear between each launch; storage methods for the boat, and if the boater is aware of the threat of AIS. In 2016, no self-surveys were returned to Chelan PUD.

2.3 AIS Plant Monitoring

Chelan PUD contracted with Environmental Assessment Services (EAS) to conduct the AIS plant monitoring for the 2016 season. EAS followed all protocols and methods as established in the FERC approved 2010 Aquatic Invasive Species Monitoring and Control Plan.

2.3.1 AIS Shoreline Plant Monitoring

EAS conducted shoreline monitoring and mapping for AIS species listed on the Washington State Noxious Weed list. Specific objectives of the 2016 monitoring were to:

- Re-map previously mapped macrophyte beds,
- Provide updated GIS shape files of the weed bed polygons mapped during the late summer/fall of 2016, and
- Provide a summary of dominant and subdominant species composition of the sampled macrophyte beds.

EAS characterized and mapped 84 macrophyte beds (860 acres) within the Rocky Reach Reservoir (Figure 2-1). Macrophyte beds were characterized using two methods. In Method 1, the dominant-subdominant plant species were estimated visually from the outer edge of the macrophyte bed by observers in the vessel. A dominant and subdominant classification was assigned to each macrophyte bed based upon what was perceived as the most abundant and second most abundant species observed over the surface area of the macrophyte bed. Table 2-1 summarizes the dominant and subdominant species observed in 84 macrophyte beds mapped during 2016 (EAS, 2016)(Appendix D).

Table 2-1: Summary of dominant and subdominant species composition of the 84-macrophyte beds mapped during 2016

Species	Number of Macrophyte Beds Where Species was Dominant	Percent (%) of Macrophyte Beds Where Species was Dominant	Number of Macrophyte Beds Where Species was Subdominant	Percent (%) of Macrophyte Beds Where Species was Subdominant
Common Waterweed *(Elodea canadensis)*	35	42%	16	19%
Eurasian Watermilfoil *(Myriophyllum spicatum)*	33	39%	31	37%
Curly Leaf Pondweed *(Potamogeton crispus)*	14	17%	28	33%
Richardson's Pondweed *(Potamogeton richardsonii)*	0	0%	1	1%
Coontail *(Ceratophyllum demersum)*	1	1%	7	8%
Water Star-grass *(Heteranthera dubia)*	1	1%	1	1%
Total	84		84	

In some cases, visibility of the macrophyte bed was difficult to observe due to the size and/or weather conditions; as a result, Method 2 was used as well as Method 1. Method 2 employed equidistant survey transects of 10 foot by 10-foot survey plots modified from Despain et al. (1991) throughout the macrophyte bed. EAS's complete report of methods and results is located in Appendix D of this annual report. Table 2-2 and Table 2-3 summarize the species composition (presence) of macrophyte bed and average percent cover of macrophyte species surveyed during 2016 using Method 2.

Table 2-2: Species composition (presence) of macrophyte beds surveyed using Method 2

Macrophyte Bed Site Identification	**Common Waterweed** *(Elodea canadensis)*	**Eurasian Watermilfoil** *(Myriophyllum spicatum)*	**Richardsons Pondweed** *(Potamogeton richardsonii)*	**Curly Leaf Pondweed** *(Potamogeton crispus)*	**White-Stemmed Pondweed** *(Potamogeton praelongus)*	**Fern-Leaf Pondweed** *(Potamogeton robbinsii)*	**Coontail** *(Ceratophyllum demersum)*	**Water Star-grass** *(Heteranthera dubia)*
RR01	X	X	X					
RR07	X	X		X			X	
RR09	X	X	X	X			X	
RR19	X				X		X	
RR20	X	X	X				X	
RR28	X							
RR31	X	X	X	X			X	X
RR36	X	X	X	X			X	
RR39	X	X	X	X			X	X
RR48	X	X	X	X			X	
RR63	X	X	X	X			X	
RR67	X	X		X				
RR70	X	X	X	X			X	
RR73	X	X	X	X		X	X	
RR76	X	X	X	X			X	
RR79	X	X	X	X				
RR81	X	X	X	X				
RR82	X	X	X	X			X	
RR84	X	X	X				X	

Table 2-3: Average percent cover of macrophyte species surveyed using Method 2

Macrophyte Bed Site Identification	**Number of Plots**	**Common Waterweed** *(Elodea canadensis)*	**Eurasian Watermilfoil** *(Myriophyllum spicatum)*	**Richardsons Pondweed** *(Potamogeton richardsonii)*	**Curly Leaf Pondweed** *(Potamogeton crispus)*	**White-Stemmed Pondweed** *(Potamogeton praelongus)*	**Fern-Leaf Pondweed** *(Potamogeton robbinsii)*	**Coontail** *(Ceratophyllum demersum)*	**Water Star-grass** *(Heteranthera dubia)*
RR01	3	87%	58%	5%	0%	0%	0%	0%	0%
RR07	8	66%	72%	0%	12%	0%	0%	11%	0%
RR09	6	64%	13%	1%	3%	0%	0%	26%	0%
RR19	4	75%	0%	0%	0%	13%	0%	34%	0%
RR20	5	100%	28%	1%	0%	0%	0%	11%	0%
RR28	2	70%	0%	0%	0%	0%	0%	0%	0%
RR31	6	100%	28%	1%	12%	0%	0%	20%	3%
RR36	8	88%	33%	24%	17%	0%	0%	26%	0%
RR39	6	69%	11%	10%	5%	0%	0%	45%	7%
RR48	10	79%	39%	11%	14%	0%	0%	20%	0%
RR63	9	96%	9%	12%	24%	0%	0%	2%	0%
RR67	3	55%	20%	0%	23%	0%	0%	0%	0%
RR70	8	94%	67%	13%	8%	0%	0%	14%	0%
RR73	10	95%	25%	19%	7%	0%	3%	40%	0%
RR76	5	100%	34%	14%	6%	0%	0%	40%	0%
RR79	2	95%	75%	2%	5%	0%	0%	0%	0%
RR81	5	90%	12%	14%	24%	0%	0%	0%	0%
RR82	9	83%	4%	21%	3%	0%	0%	20%	0%
RR84	12	79%	35%	18%	0%	0%	0%	8%	0%
Collective Average	121	84%	30%	11%	9%	0.4%	0.2%	19%	0.5%

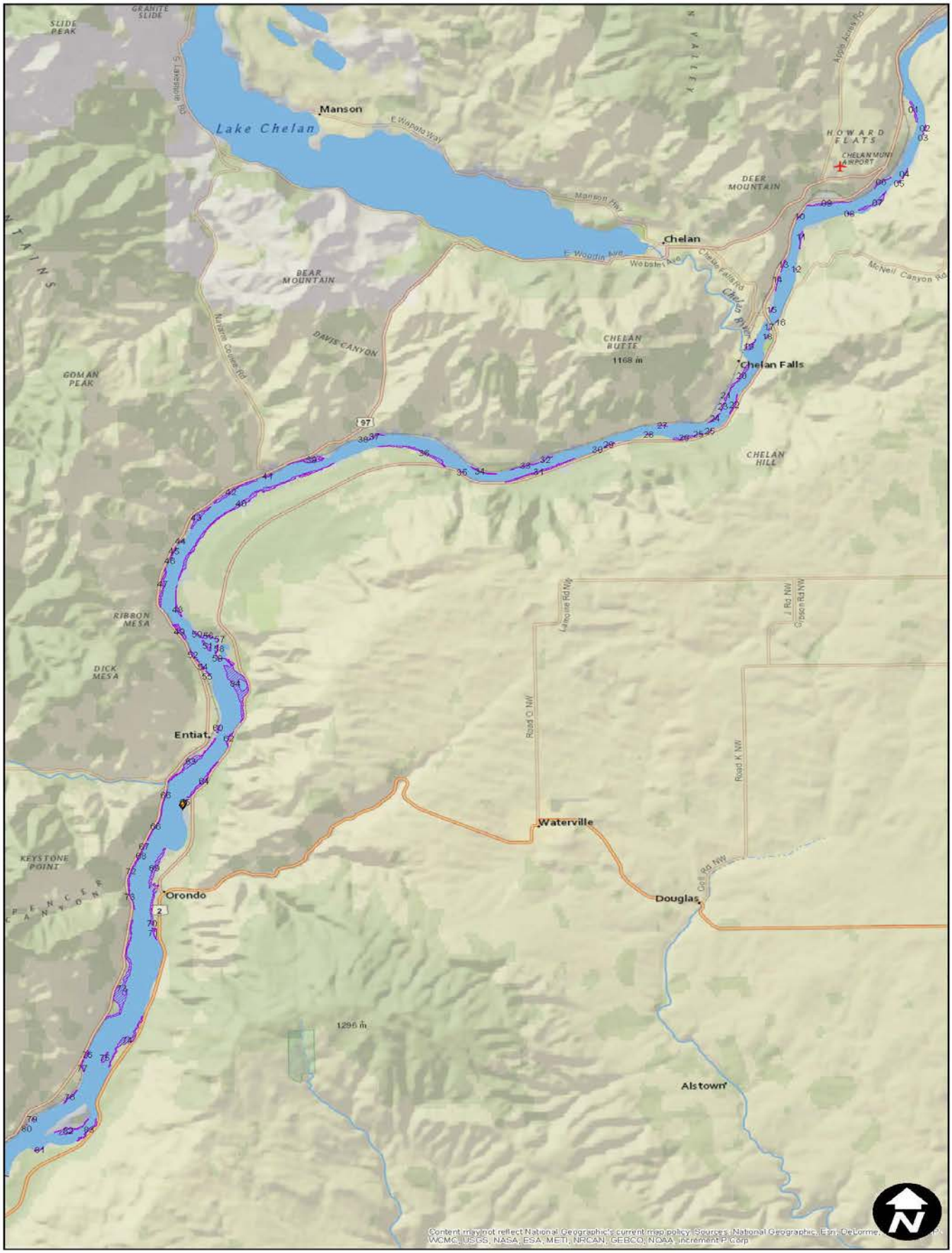

Figure 2-1: Macrophyte beds mapped and characterized by Environmental Assessment Services in 2016

2.3.2 Boat Launches

The following boat launches on the Rocky Reach Reservoir were monitored for the presence of AIS plant species on August 30 through September 2; Lincoln Rock and Daroga State Parks, Beebe Bridge Park, Chelan Falls Park, and Entiat Park. Boat launch monitoring was conducted during the shoreline monitoring mentioned in Section 2.3.1. No new AIS plant species were observed during 2016 monitoring at the boat launches.

2.4 AIS Plant Maintenance and Management Activities

In 2016, Chelan PUD continued to distribute educational brochures at high use swimming and boating areas and provide signs at public boat launches (also described in Section 2.1 above). Additionally, Chelan PUD performed regular maintenance to remove Eurasian watermilfoil (Myriophyllum spicatum) growth at high-use swimming areas and public boat launches through mechanical harvesting in front of Chelan PUD owned parks and swim beaches.

The harvesting machine (harvester) is a specialized underwater mowing machine specifically designed to cut and collect aquatic plants. Cut plants are immediately removed from the water via a conveyer belt. The cut plants are stored on the machine until they can be off-loaded at an upland site, desiccated, and disposed of properly. Milfoil is harvested while traveling upstream to capture most of the fragments. If a clump breaks away, the operator of the harvester will circle around and capture it. As milfoil is well established within the Columbia River, eradication is not an option. Regular harvesting at public areas by trained operators is used by Chelan PUD as a maintenance measure.

Currently, the only known AIS plants established within the Project area are Eurasian watermilfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*). A small patch of flowering rush (*Butomus umbellatus*) was observed by the Chelan County Noxious Weed Control Board's consultant, Aquatechnex LLC in the summer of 2015. The approximate location of the patch was on private property on the Douglas County side of the Columbia River; directly across from the mouth of the Entiat River. In 2015, through funding made available by the Washington State Department of Agriculture (AGR), the patch of flowering rush was mechanically removed and a bottom barrier placed over it. When the site was revisited in 2016, several additional plants were located. Ecology, Chelan County Noxious Weed Control Board and AGR mechanically removed the additional plants. Locations of individual flowering rush patches were recorded also as GPS point features by EAS during their macrophyte bed mapping and characterization.

Terrestrial, wetland, and/or riparian zone AIS plants are currently monitored, managed, and controlled as part of other ongoing Chelan PUD efforts (e.g., parks maintenance, noxious weed control program, wildlife surveys, and real estate surveys).

2.5 AIS Animal Monitoring

2.5.1 Fish

Chelan PUD did not conduct specific resident fish monitoring in 2016. However, staff conducting fish sampling at the Rocky Reach Juvenile Fish Bypass Sampling Facility were able to monitor for AIS species.

Fish species that were observed in 2016 at the sampling facility were:

- Chiselmouth (*Acrocheilus alutaceus*)
- Juvenile Coho (*Oncorhynchus kisutch*)
- Juvenile Sockeye (*Oncorhynchus nerka*)
- Juvenile Steelhead (*Oncorhynchus mykiss*)
- Juvenile Walleye (*Sander vitreus*)
- Juvenile yearling/subyearling Chinook (*Oncorhynchus, tshawytscha)*
- Juvenile/adult Lamprey (*Entosphenus tridentatus*)
- Northern pikeminnow (*Ptychocheilus oregonensis*)
- Peamouth (*Mylocheilus caurinus*)
- Smallmouth Bass (*Micropterus dolomieu*)
- Three-spine stickleback (*Gasterosteus aculeatus*)
- Whitefish (*Prosopium williamsoni*)

No AIS fish species were observed during fish sampling at the Rocky Reach Juvenile Fish Bypass Sampling Facility in 2016.

2.5.2 Zebra and Quagga Mussels

Chelan PUD contracted with EAS to conduct the AIS Animal Monitoring (plankton tows and artificial substrate sampling) for the 2016 season. EAS followed all protocols and methods as established in the FERC approved 2010 Aquatic Invasive Species Monitoring and Control Plan as well as WDFW established protocol.

Horizontal and Vertical Zooplankton Tow Net Sampling

As per the Monitoring Plan, horizontal and vertical tow samples will be collected at three locations throughout the Project: Lincoln Rock State Park, Daroga State Park, and Chelan Falls Park. During 2016, EAS collected samples consistent with the methods detailed in the Monitoring Plan at these three locations on 4 days (August 29 and 30, and September 2 and 23). Samples were analyzed by DBA Western Biological Services LLC for the presence of zebra and quagga mussels. *Dreissena* mussel larvae (zebra and quagga mussels) were not detected in these samples. Three other types of bivalves were detected in these plankton samples including the straight-hinge juveniles of the introduced clam, *Corbicula fluminea*, as well as glochidia larvae from two native unionid mussels, *Anodonta* and *Gonidea*.

Artificial Substrate Monitoring

Artificial substrates were deployed year round at the following boat launch docks; Lincoln Rock and Daroga State Parks, Beebe Park, Chelan Falls Park, and Enitat Park. Substrates were deployed at least one meter above the bottom of the riverbed at locations determined to be secure, but still accessible. The substrates were checked when the horizontal zooplankton tow net sampling was completed (August 29 and 30 and September 2 and 28). No zebra or quagga mussels or New Zealand mud snails were observed on the artificial substrates in 2016.

SECTION 3: 2017 ACTION PLAN

Table 3-1 provides the proposed action plan and schedule related to tasks to be completed under the monitoring and management of AIS in the Project in 2017. Further details of each action are described in the subsections below.

Table 3-1: 2017 Proposed Action Plan

Task	Action	Schedule
Place signs, educational materials, and self-surveys at Project boat launches. (See Section 3.1 Educational Outreach)	Maintain signs at boat launches, update pamphlets, and replenish surveys as needed.	Prior to May 1
Monitor for new/spreading aquatic invasive plants and animals. (See Section 3.2 AIS Plant Monitoring)	Monitor Project Facilities (boat launches) annually	Between July and September
Monitor for zebra and quagga mussels. (See Section 4.2 AIS Animal Monitoring)	Monitor for the presence of veligers for a total of four days, two in August and two in September.	August-Sept
AIS Surface shoreline monitoring	WDFW Surface Shoreline Zebra and Quagga Mussel Monitoring	August - September
Report to Ecology and RRFF on AIS program.	Summarize monitoring efforts in annual report	Draft report February 21
Participate in regional forums.	Attend in person or via conference-call meetings of regional forums addressing AIS.	Ongoing
Stay current on rapid response methods and technology.	Coordination with WDFW, the Columbia River Basin Team, 100th Meridian Initiative, USACE and USGS	Ongoing
Notes: AIS - Aquatic Invasive Species, USACE – United States Army Corps of Engineers, USGS - United States Geological Survey, and WDFW – Washington State Department of Fish and Wildlife.		

3.1 Educational Outreach

Chelan PUD will continue the distribution of educational materials and boater self surveys, using the same sites and materials as were used in 2016 (see Section 2.1 and Appendix C).

3.2 AIS Plant Monitoring at Project Facilities (Boat Launches)

Monitoring for AIS plant species will be conducted between July and September at the same locations as those monitored in 2016 (see Section 2.3.2).

3.3 AIS Management/Control Activities

As required by the Project License and Ecology's WQC, during 2017 Chelan PUD will continue to focus its management/control of Eurasian watermilfoil (*Myriophyllum spicatum*) at or near Project facilities through monitoring, education, and public awareness. Additionally, Chelan PUD will perform regular maintenance to remove Eurasian watermilfoil growth at high-use swimming areas and public boat launches through mechanical harvesting in front of Chelan PUD owned parks and swim beaches.

3.4 AIS Animal Monitoring

3.4.1 Fish

Chelan PUD is not planning to conduct resident fish monitoring in 2017. Future resident fish surveys as required by the Rocky Reach License will be directed by the RRFF. However, any new AIS fish species encountered during other Chelan PUD activities will be documented and reported as necessary.

3.4.2 Zebra and Quagga Mussels

EAS will monitor for the presence of Zebra and Quagga mussels using the two methods described below.

Horizontal and Vertical Zooplankton Tow Net Sampling

EAS will conduct horizontal and vertical zooplankton tow net samples at three locations within the Project (Lincoln Rock and Daroga State Parks and Chelan Falls Park). The samples will be collected a total of four days, two in August and two in September. Sampling will be conducted consistent with the approved Monitoring Plan and WDFW sampling protocol.

Chelan PUD will request data sheets for this sampling from WDFW and will scan and email completed data sheets to WDFW within one week of completion in order for WDFW to keep a nearly real time monitoring data base.

Artificial Substrate and Shoreline Monitoring

The artificial substrates EAS deployed and maintained in 2016, will remain in their current locations throughout 2017 (see Section 2.5.2). The artificial substrate monitoring protocols will continue to be followed as provided by WDFW for the 2017 monitoring season. Substrates will be examined monthly, to the extent feasible, from June through September. While artificial substrates are being examined, dock structures, boat ramps and concrete structures will also be examined for Zebra and Quagga Mussels and recorded on data sheet forms provided by WDFW for the 2017 monitoring season. Completed forms will be scanned and emailed to WDFW within one week of completion in order for WDFW to keep a nearly real time monitoring data base.

Substrate Monitoring at Rocky Reach Dam

As per the Monitoring Plan, Chelan PUD will continue monitoring for presence of adult zebra and quagga mussels that may have become attached on fishways, intake screens, cooling units, and other equipment at Rocky Reach Dam. Equipment that is regularly taken out of operation for maintenance will be inspected by Chelan PUD staff. Chelan PUD will implement response actions as described in Section 4 if zebra or quagga mussels are detected or suspected.

3.4.3 New Zealand Mudsnail

As per the Monitoring Plan, EAS will monitor for New Zealand mudsnails while conducting the boat launch monitoring studies. Additionally, the artificial substrates deployed for zebra and quagga mussel monitoring also serve as colonization samplers for New Zealand mudsnails.

3.5 Participation in Regional Forums

Chelan PUD will continue regular participation in regional forums, coordinating with Ecology, WDFW, the Columbia River Basin Team - 100th Meridian Initiative, USACE and USGS.

SECTION 4: RESPONSE AND COORDINATION

Early detection and rapid response to an infestation of AIS is essential to the control and potential containment of AIS. Per the Monitoring Plan, Chelan PUD will implement monitoring programs that will help detect new AIS infestations. In the event of positive identification of new AIS within the Project area, Chelan PUD will conduct the following response activities:

- Immediate notification to Ecology (for plants) or WDFW (for animals) of positive identification or suspected AIS species observed during monitoring and/or boat inspections. Digital photographs will be taken and sent to Ecology and/or WDFW for assistance in identification. Table 4-1 provides contact information for AIS personal to be contracted in event of new AIS identification.

- If the AIS are a zebra or quagga mussel, Chelan PUD will also notify upstream and downstream dam operators (Douglas PUD and Grant PUD) and Columbia River Basin Team. Chelan PUD will work collaboratively with WDFW and the Columbia River Basin Team in rapid response implementation as applicable to the Project, according to the Washington Dreissenid Mussel Rapid Response Plan (2014). Table 4-1 provides contact information for AIS personnel to be contacted in the event of new AIS identifications.

- Chelan PUD will assist in the coordination of agency site visits in confirming the presence and extent of AIS infestation and determination of immediate or long-term control/eradication needs.

Table 4-1: Contact List for AIS Response.

Contact	Name	Phone Number	E-Mail Address
Ecology	Nathan Lubliner or Lizbeth Seebacher	360-407-6563 360-407-6938	nlub461@ecy.wa.gov lsee461@ecy.wa.gov
	Jenifer Parsons	509-457-7136	jenp461@ecy.wa.gov
	Breean Zimmerman	509-575-2808	breean.zimmerman@ecy.wa.gov
WDFW	Allen Pleus	360-902-2724	allen.pleaus@dfw.wa.gov
	Jesse Schultz	360-902-2184	jesse.schultz@dfw.wa.gov
	Sgt. Carl Klein	360-902-2426	carl.klein@dfw.wa.gov
Invasive Species Council	Justin Bush	360-902-3088	justin.bush@rco.wa.gov
Columbia River Basin Team	Stephen Phillips	503-595-3100 1-877-STOP-AIS	sphillips@psmfc.org
Douglas PUD	Chas Kyger	509-881-2388	chask@dcpud.org
Grant PUD	Carson Keeler	509-754-5088 ext 2687	ckeeler@gcpud.org

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APPENDIX A: AIS MONITORING AND CONTROL PLAN



PUBLIC UTILITY DISTRICT NO. 1 *of* CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

February 19, 2010

VIA ELECTRONIC FILING

Honorable Kimberly D. Bose, Secretary
Nathaniel J. Davis, Sr., Deputy Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, NE
Washington, DC 20426

Subject: Rocky Reach Hydroelectric Project, FERC No. 2145
Article 401 and Appendix A, Section 5.6(2) – Aquatic Invasive Species Monitoring and Control Plan

Dear Secretary Bose and Deputy Secretary Davis:

The Federal Energy Regulatory Commission (Commission or FERC) issued the "Order on Offer of Settlement and Issuing New License" (License) and "Order on Rehearing and Clarification" for the Rocky Reach Hydroelectric Project No. 2145 (Project) on February 19, 2009, and May 21, 2009, respectively. In accordance with License Article 401 and Certification Condition Number 5.6(2) of Appendix A – Section 401 Water Quality Certification of the License, the Public Utility District No. 1 of Chelan County (Chelan PUD) is required to file a Aquatic Invasive Species Monitoring and Control Plan (AIS Monitoring and Control Plan) within one year of License issuance with the Commission.

Chelan PUD hereby files the AIS Monitoring and Control Plan for the Rocky Reach Project to monitor for presence of new invasive species at or near Project facilities. The Plan was coordinated with the Washington Department of Ecology's Freshwater Aquatic Weed Control Program. The Plan includes the following components:

a) Signage at boat launches and distribution of educational materials and boater questionnaires to voluntary participants at Rocky Reach Reservoir boat launch sites during the peak boating season (May 1-October 30 each year) to increase boater awareness of dangers of spreading AIS, including the methods one can take to decrease the spread of AIS (e.g., clean the weeds off the boat and drain the live well before going to a new waterbody); and

b) Methodology and schedule of prevention, monitoring and control measures to regarding the presence and movement of AIS at or near Project facilities; and
c) An annual report of monitoring and educational activities conducted each year.

Appendix B provides the record of consultation with the Rocky Reach Fishery Forum in preparing the Plan.

If you have any questions or require additional information, please contact me or Waikele Hampton at (509) 661-4627.

Sincerely,

Michelle Smith
Licensing & Compliance Manager
(509) 661-4180
michelle.smith@chelanpud.org

Enclosures: Final Aquatic Invasive Species Monitoring and Control Plan

cc: Erich Gaedeke
Portland Regional Office
Federal Energy Regulatory Commission
805 SW Broadway, Suite 550
Portland, OR 97205

Patricia S. Irle
Washington Department of Ecology
Central Regional Office
15 West Yakima Ave -- Suite 200
Yakima, WA 98902-3452
pirl461@ecy.wa.gov

2010 AQUATIC INVASIVE SPECIES MONITORING AND CONTROL PLAN

FINAL

ROCKY REACH HYDROELECTRIC PROJECT
FERC Project No. 2145

February 19, 2010

Public Utility District No. 1 of Chelan County
Wenatchee, Washington

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EXECUTIVE SUMMARY

The Public Utility District No. 1 of Chelan County (Chelan PUD) owns and operates the Rocky Reach Hydroelectric Project (Project) on the Columbia River. The Project is operated under the terms and conditions of Federal Energy Regulatory Commission (FERC) Hydroelectric Project License No. 2145.

Chelan PUD currently operates the Project through the coordinated operation of the seven-dam system and other Columbia Basin entities with current operational agreements with the fishery agencies, tribes and other operators to provide protection and enhancement for a range of fisheries within, and downstream of the Project. These agreements include the Hanford Reach Fall Chinook Protection Plan, the Hourly Coordination Agreement, and the Rocky Reach Habitat Conservation Plan (HCP) (and associated Anadromous Fish Agreement). The Project is also subject to the provisions of its FERC License (License), which includes several provisions of the 2006 Rocky Reach Comprehensive Settlement Agreement, and related laws and regulations. Additionally, the Project is subject to the requirements (incorporated by reference in the License) of the Biological Opinion for the Project issued by National Marine Fisheries Service (NMFS) for its effects on anadromous salmon, the Clean Water Act Section 401 Water Quality Certification issued by the Washington Department of Ecology (WDOE), and the Biological Opinion issued by the U.S. Fish and Wildlife Service regarding the effects of the Project on bull trout.

The WDOE issued a Final 401Water Quality Certification (401 Certification) on April 4, 2006, for the operation of the Project. Under the 401 Certification, Section 5.6(2), Chelan PUD is required, in consultation with the Rocky Reach Fish Forum (RRFF), to develop and implement an Aquatic Invasive Species (AIS) Monitoring and Control Plan (Monitoring Plan) within one year of effective date of the new License. The Monitoring Plan shall also be coordinated with WDOE's Freshwater Aquatic Weed Control Program. The plan is also required under License Article 401(a) and must be approved both by WDOE and by FERC prior to implementation.

The following Monitoring Plan contains education, monitoring, and control components intended to meet the requirements of the 401 Certification. The educational components include placement of informational materials at Project boat launches, as well as voluntary boater surveys. These efforts will help inform the public about the risks of AIS transport and ways they can help or reduce those risks. Additionally, boater surveys will provide Chelan PUD with information related to the level of risk of AIS transport into the Project, and may help to guide monitoring and response efforts. The monitoring component includes annual zebra/quagga mussel monitoring, annual plant surveys at Project boat launches, and biennial Project-wide shoreline surveys. These monitoring efforts are intended to help provide identification of new AIS introduced into the Project, and may also provide an opportunity to respond to such an introduction prior to the species becoming established. Monitoring will also provide tracking information related to potential control/eradication efforts for a given AIS.

SECTION 1: INTRODUCTION

Public Utility District No. 1 of Chelan County, Washington (Chelan PUD) owns and operates the Rocky Reach Hydroelectric Project (Project), located on the Columbia River (Figure 1). The Project boundary, which extends for about 43 miles along the Columbia River, begins at the Project tailrace (River Mile [RM] 474) and extends upriver to the Wells Dam tailrace at RM 516 (Figure 1).

The Project consists primarily of an 8,235-acre reservoir; a 2,847-foot-long by 130-foot-high concrete gravity dam spanning the river, including a powerhouse and spillway; a juvenile fish bypass system, and hatchery facilities.

On February 19, 2009 the Federal Energy Regulatory Commission (FERC) issued its Order On Offer of Settlement and Issuing New License (License) for the Rocky Reach Hydroelectric Project for a term of 43 years to Chelan PUD (License term ends February 1, 2052). Article 401 of the License order, *Commission Approval and Filing of Amendments*, requires the following:

> *Two conditions of this license found in Washington Department of Ecology's (Washington Ecology) water quality certification (Appendix A) require the licensee to prepare and implement plans without prior Commission approval. Each such plan shall be submitted to the Commission for approval prior to implementation. These plans are listed below.*

No.	Certification Condition Number	Plan Name	Due Date
1	5.6(2)	Aquatic Invasive Species Monitoring and Control Plan	Within 1 year of license issuance
2	5.7(1) &(2)	Quality Assurance Project Plan	Within 1 year of license issuance and annually thereafter

> *The Commission reserves the right to make changes to any plan submitted. Upon Commission approval, the plan becomes a requirement of the license, and the licensee shall implement the plan or changes in project operations or facilities, including any changes required by the Commission.*

Additionally, Section 5.6(2) of the 401Water Quality Certification (401 Certification) issued by Ecology on April 4, 2006, requires the following:

> *Within one year of the effective date of the New License, in consultation with the RRFF, Chelan PUD shall develop and begin implementation of an AIS Monitoring and Control Plan (Monitoring Plan) for the Rocky Reach Project, to monitor for presence of new invasive species at or near Project facilities. The Monitoring Plan shall be coordinated with the Ecology's Freshwater Aquatic Weed Control Program. The Monitoring Plan and implementation shall include the following components:*
>
> ***a)*** *Signage at boat launches and distribution of educational materials and boater questionnaires to voluntary participants at Rocky Reach Reservoir boat launch sites during the peak boating season (May 1 -October 30 each year) to increase boater awareness of dangers of spreading AIS, including the methods one can take to decrease the spread of AIS (e.g., clean the weeds off the boat and drain the live well before going to a new waterbody).*
>
> ***b)*** *Methodology and schedule of prevention, monitoring and control measures regarding the presence and movement of AIS at or near Project facilities.*
>
> ***c)*** *An annual report of monitoring and educational activities conducted each year.*

Aquatic invasive species (AIS), defined by RCW 77.08.010, are described as any prohibited, regulated, unregulated, or unlisted aquatic animal or plant species, any aquatic weed on the state noxious weed control

list adopted under RCW 17.10.080, and, as stated in RCW 77.60.130(1), any nonnative aquatic plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, or recreational activities dependent on such waters.

This Monitoring Plan focuses on addressing ways to monitor and manage aquatic invasive flora and fauna in the Project. Key components of this Monitoring Plan include education, monitoring, and control that are designed to help manage, control, and potentially prevent introduction and spread of new AIS within the Project area. This Monitoring Plan will be updated annually based on results from the previous year's education, monitoring, and control efforts and will be in effect for the term of the FERC operating license for the Project (currently set to expire in February 2052).

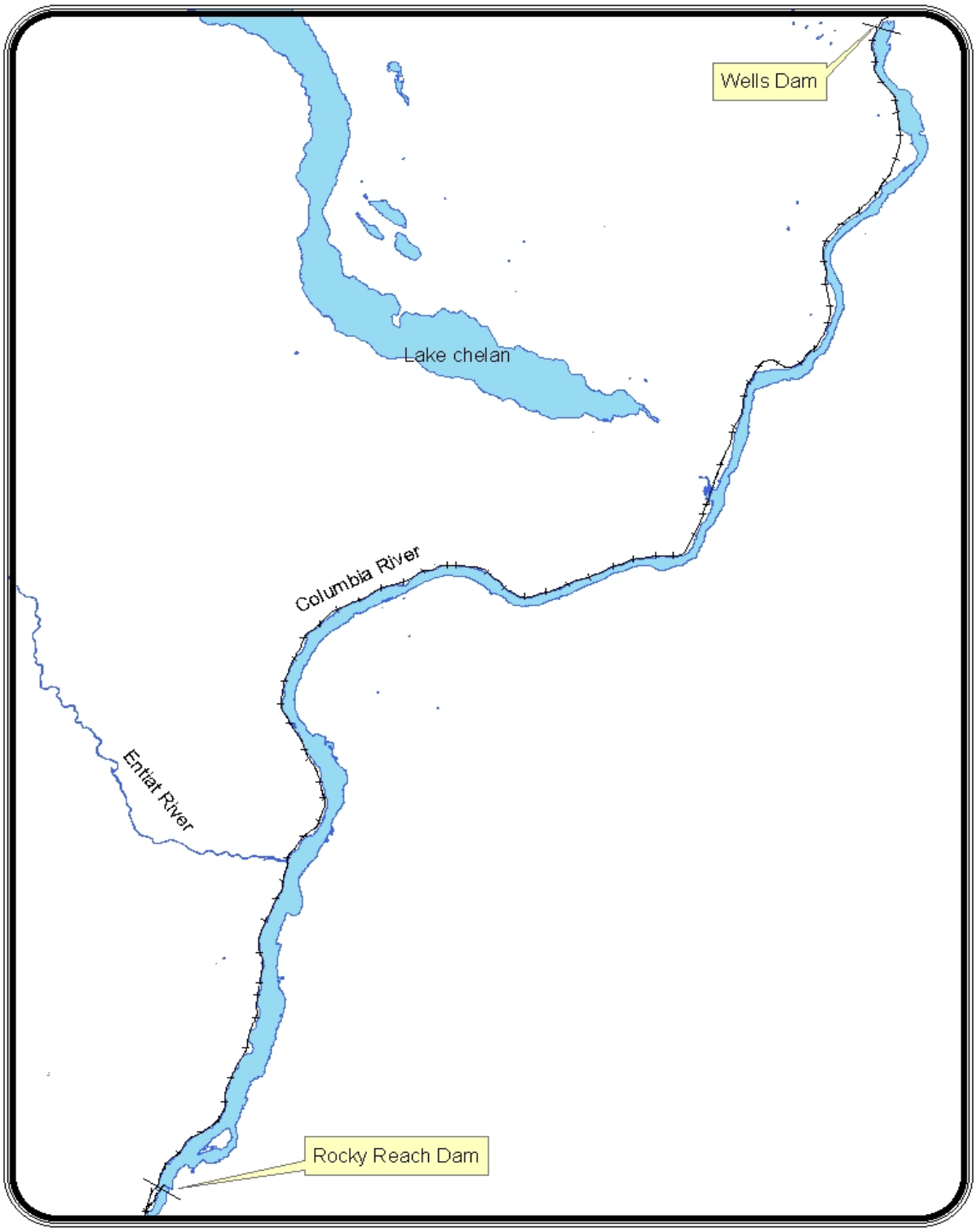

Figure 1-1. Project Area.

Figure 1-2. Aerial View of Rocky Reach Dam.

1.1 Pathways for AIS Introduction

Infestation of AIS can come through several different pathways, which is dependent on the use characteristics of a given waterbody (including upstream and downstream uses), and potential risks associated with each of those uses. For the Rocky Reach Project area, the following pathways have been identified as being the most likely pathways for AIS introduction or spread.

Chelan PUD will continue to monitor and research potential new pathways not identified in this Monitoring Plan that may need to be addressed through the annual updates of the Plan. This may include participation in regional AIS forums (e.g. Columbia River Task Force) and meetings with WDOE and Washington Department of Fish and Wildlife (WDFW) staff, which will include discussions of potential new AIS pathways potentially applicable to the Project area.

1.1.1 Recreation

One of the primary methods of infestation for AIS is through transport on recreational boating vessels. AIS can become entangled or attached to the boat hull, motor, propeller, jet-intake, and/or trailer and will be unknowingly transported and introduced into a new water body. This kind of activity can result in a rapid spread and infestation of AIS. Recreational and commercial fishing activities can also increase the threat of AIS introductions. For example, the New Zealand mudsnail is commonly transported by fisherman on their waders, and other AIS species can be introduced when fisherman empty their bait buckets into the receiving waters. Because the primary method of infestation for several AIS is through transport from recreational boating or fishing activities, prevention of AIS infestation through public education is one of the most widely used proactive approaches to managing and/or preventing AIS infestations. Therefore, Chelan PUD will use education, monitoring, and response as its primary methods to reduce new AIS infestations within the Project. Chelan PUD will also monitor and manage AIS that already exist in the Project. See Sections 2 - 5 additional information on Chelan PUD's AIS education, monitoring, and control activities.

1.1.2 Flows Approaching the Project from Upstream

Because the Project is located within an open river system, AIS can flow into the Project area from upstream locations. Close coordination with Public Utility District No. 1 of Douglas County (Douglas PUD), which owns and operates the next hydroelectric project upstream of Rocky Reach, will be done as part of this Monitoring Plan to help identify potential upstream introductions and coordinate response actions.

1.1.3 Tributary/Irrigation Return Flows

Incoming flows from tributaries and irrigation return flows are also possible pathways for AIS introductions. Some of the water sources that drain into these tributaries and irrigation return flows receive heavy recreation use and are therefore subject to AIS introduction and potential transport into the Project area. As described in Section 3 of this Monitoring Plan, Chelan PUD will conduct AIS monitoring and control activities intended to provide early detection of new AIS introductions and control existing AIS within the Project area.

1.1.4 Planting of Ornamental Pond Plants and Dumping of Unwanted Pets and Ornamental Plants

Intentional planting of ornamental plants and dumping of unwanted pets (e.g., fish, frogs, snakes) or ornamental plans is yet another pathway by which AIS can be introduced to new waters. While most of these organisms will die, some may be able to survive and become established, resulting in the degradation of aquatic resources.

SECTION 2: EDUCATIONAL OUTREACH

One component of Chelan PUD's Monitoring Plan will be to provide educational opportunities for the public about the risks involved with AIS. This will include distribution of educational materials as well as administration of boater self-surveys.

Section 5.6(2)(a) of the 401Water Quality Certification issued by Ecology on April 4, 2006, requires the following:

> *"Signage at boat launches and distribution of educational materials and boater questionnaires to voluntary participants at Rocky Reach Reservoir boat launch sites during the peak boating season (May 1 – October 30 each year) to increase boater awareness of dangers of spreading AIS, including the methods one can take to decrease the spread of AIS (eg clean the weeds off the boat and drain the live well before going to a new waterbody)."*

These educational tools are discussed in the following three sections.

2.1 Educational Materials

Chelan PUD will utilize existing kiosks and signage at boat launches within the Project to distribute educational material each year during the peak of the boating season (May 1–October 30). Potential boat launch sites include: Lincoln Rock and Daroga State Parks, Beebe Bridge Park, Chelan Falls Park, and Entiat Park (Figures 3 and 4). Any new boat launches developed in the future will also be considered for placement of educational signs or kiosks. Educational materials will consist of free pamphlets, identification cards, and signs. The goal of these educational materials is to increase public awareness of the dangers of spreading AIS, as well as how its spread can be reduced and/or prevented.

The pamphlets, identification cards, and boat launch signs used to educate the public will be obtained from WDFW and the U.S. Fish and Wildlife Service (USFWS) to keep the signage used in the Project consistent with the other AIS signs used throughout Washington State. Educational material may also be available to discourage dumping of unwanted pets through the following website: http://habitattitude.net. The educational material will clearly present ways to avoid the spread of AIS (e.g., by removing and disposing of the weeds off the boats and trailers, and draining the live wells prior to moving to another water body). Pamphlets that help educate fisherman on proper gear cleaning and live bait handling methods may also be placed at the boat launches identified above.

2.2 Voluntary Self-Survey

Prepared self-surveys to boaters will be modeled after the survey forms created by the 100th Meridian Initiative (Appendix A) and will be stocked at those sites deemed feasible. The purpose of the survey will be explained on the form and the boaters will be asked to complete the form and place it in a return box located on site or return it via mail to Chelan PUD. This boater self-survey requests information from the boater including home residence; number of times the boat was launched last year; other lakes/river where the boat has been recently launched; the destination of the boat; if the boater cleans the boat, bait well, and fishing gear between each launch; storage methods for the boat, and if the boater is aware of the threat of AIS.

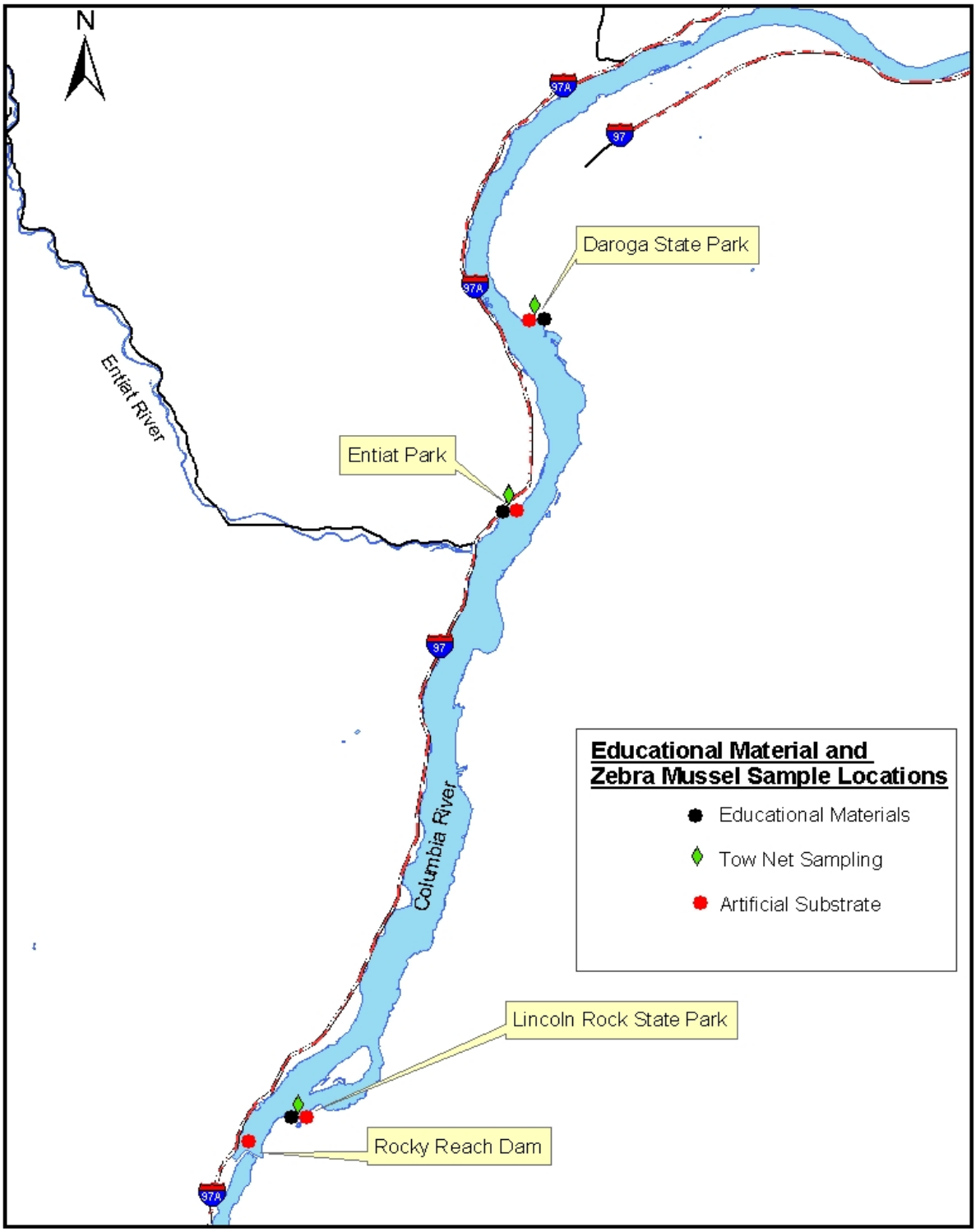

Figure 2-1. Proposed Locations of Potential Educational Materials and Zebra Mussel Sampling on the Lower Reach of the Rocky Reach Reservoir.

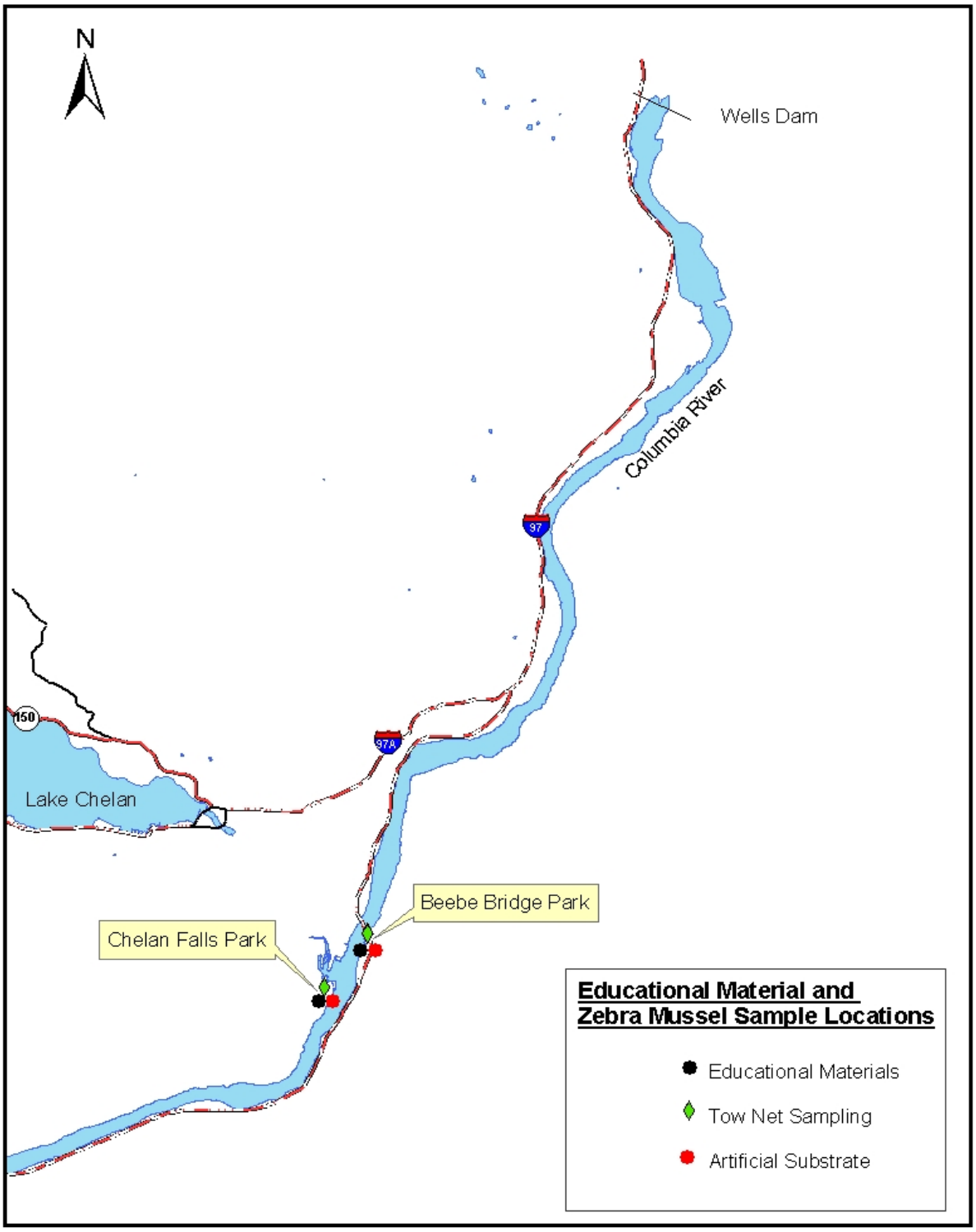

Figure 2-2. Proposed Locations of Potential Educational Materials and Zebra Mussel Sampling on the Upper Reach of the Rocky Reach Reservoir.

SECTION 3: AIS PLANT MONITORING

Monitoring of both present and new AIS flora is an important component to AIS management. As part of the Monitoring Plan, Chelan PUD proposes to monitor the entire Columbia River corridor portion of the Project to the ordinary high water mark (OHWM) on the shoreline every other year and all Project boat launches annually for AIS plants. The boat launch monitoring and the Project wide monitoring would begin the first year following WDOE and FERC approval of this Monitoring Plan. Chelan PUD will monitor for all aquatic invasive plants listed on the Washington State Noxious Weed List as outlined in RCW 17.26.020(5)(c) (see also Table 1). The goal of the AIS plant monitoring component will be to identify newly introduced AIS plants, as well as to map and track the movement of newly found and/or existing AIS plants. Monitoring will also allow for determination of success of control/eradication efforts.

Although this Monitoring Plan focuses on aquatic invasive plant species, as part of the plant monitoring effort Chelan PUD will also monitor and map for existing and new terrestrial, wetland, and/or riparian zone plants that can be identified from the shoreline/boat launch monitoring efforts, as described below. Potential additional monitoring and/or control efforts will be coordinated through Chelan PUD's Wildlife and Parks departments.

Table 3-1. AIS Plants that will be Monitored for in the Columbia River as Part of the Rocky Reach Project.

Common Name	Genus/Species	Submergent	Emergent	Existing	Potential Control
Eurasian Watermilfoil	Myriophyllum spicatum	X		X	Biological, Physical[1]
Curly-leaf Pondweed	Potamogeton crispus	X		X	Chemical, Physical
Hydrilla	Hydrilla verticillata	X			Chemical, Physical
Variable-leaf Milfoil	Myriophyllum heterophyllum	X	X		Chemical, Physical
Brazilian Elodea	Egeria densa	X			Chemical, Physical
Parrot Feather	Myriophyllum aquaticum		X		Chemical, Physical
Floating Primrose-willow	Ludwigia peploides		X		Chemical, Physical
Waterprimrose	Ludwigia hexapetala		X		Chemical, Physical
Fanwort	Cabomba caroliniana	X			Chemical, Physical
Fragrant Water Lily	Nymphaea odorata	X	X		Chemical, Physical
Yellow Floating Heart	Nymphoides peltata		X		Chemical, Physical
Flowering Rush	Butomus umbellatus		X		Chemical, Physical

[1] Physical controls may includes bottom barrier, harvesting, and/or hand pulling.
Newly listed aquatic invasive plant species not listed here will be added to this table as needed during the annual updates to this plan.

3.1 Shoreline Monitoring

Shoreline monitoring efforts would consist of visually identifying plants and inspecting for AIS from a boat while traveling slowly along each shoreline. In areas where macrophytes cannot be seen, a sampling rake will be used to pull up macrophytes for visual identification. Macrophytes will also be examined for animals (e.g. the New Zealand Mudsnail) that may be attached. Digital photographs will be taken and sent to WDFW and/or WDOE AIS personnel for identification assistance, as necessary. A map showing locations of all areas sampled and plants identified will be created using GPS data collected from the locations where macrophytes were sampled. Once a baseline map and GPS database is established, the same sites will be re-visited every two years between the months of July and September during the peak macrophyte density. This will also allow for determination of newly introduced AIS plant or animals that were not present during the previous sampling event and/or will allow for tracking the increase/decrease of existing plants.

3.2 Boat Launch Monitoring

Monitoring for AIS plant species will also be done via visual surveys at each boat launch. The surveys would be conducted by boat by traveling approximately 50 meters waterward from the launch, or until visual

contact with the macrophytes is lost. Additionally, similar surveys will be conducted approximately 30 meters upstream and downstream of the launch to detect the presence of new AIS that may not have settled immediately at the launch. These macrophyte surveys will be done annually between the months of July and September when the annual macrophyte density is at its peak. Through these visual surveys, Chelan PUD will be able to monitor for new AIS that might have entered the Project through recreational boater use.

3.3 Control/Management

Currently, the only known AIS plants established within the Project area are Eurasian water milfoil and curly-leaf pondweed. Potential control and management efforts are explained in more detail below. Note that terrestrial, wetland, and/or riparian zone AIS plants are currently monitored, managed, and controlled as part of other ongoing Chelan PUD efforts (e.g., parks maintenance, wildlife surveys, real estate surveys). Any newly identified AIS plants found during the monitoring efforts will be discussed with WDOE and WDFW, and potential control, management, and/or eradication efforts for that given species will be determined as necessary. These activities will then be included in the annual report.

3.3.1 Eurasian water milfoil

Eurasian water milfoil is an invasive nonnative plant, and is considered to be one of the most undesirable AIS nuisance plants in North America because of its negative effects on such recreational activities as boating, swimming, and fishing (WDOE 2001). Like native aquatic milfoils, it has feather-like underwater leaves and emergent flower spikes. Eurasian water milfoil is often identified by leaf shape; however, due to its variability, chemical and DNA analysis may be needed to distinguish it from native milfoil species (WDOE 2001).

There are currently several techniques used in the western United States to manage Eurasian water milfoil, with some of the most feasible methods including mechanical harvesting, biological or herbicidal control, and physical control (e.g. bottom barriers). However, each of these methods has uncertainties related to their effectiveness, impacts to other aquatic species and habitat, and feasibility of use within the Project given the large scale of Eurasian water milfoil infestations. Therefore, Chelan PUD will focus its control/management of Eurasian water milfoil through use of education/public awareness activities (see Section 2) as well as monitoring (see Section 3) in an attempt to manage and limit the spread of Eurasian water milfoil throughout the Project. Adaptive management tools will also be used by Chelan PUD to modify its Eurasian water milfoil control/management methods, if needed, based on results of the voluntary boater self-surveys, monitoring efforts, and/or improvements in physical control methods.

If public feedback indicates a need for more aggressive control of milfoil beds is needed at Project boat launches, through adaptive management Chelan PUD will consider additional alternatives for control at the boat launches. These additional alternatives will be discussed within the annual report and with WDOE. Current possible alternatives includes the use of herbicides, but those (and any other new technologies), will need to be further evaluated based on monitoring results, potential impacts to other aquatic species, habitat, recreation, etc.

Additional information on annual reporting and adaptive management can be found within Sections 6 and 7 of this Monitoring Plan.

3.3.2 Curly Leaf Pondweed

Curly-leaf pondweed is a submerged nonnative plant that is widespread in temperate North America and is found throughout Washington. It has distinctly wavy-edged, crispy olive-green to reddish brown leaves that attach in an alternate pattern to the stem. Curly-leaf pondweed produces small flowers that are arranged on dense terminal spikes that rise a few inches above the surface of the water. In the spring, the plant produces dormant vegetative propagules knows as turions.

There are currently several techniques used to manage curly-leaf pondweed, with some of the most feasible methods including mechanical harvesting and herbicidal control. However, each of these methods has uncertainties related to their effectiveness, impacts to other aquatic species and habitat, and feasibility of use within the Project. Therefore, Chelan PUD will focus its control/management of curly-leaf pondweed through use of education/public awareness activities (see Section 2) as well as monitoring (see Section 3) in an attempt to manage and limit the spread of curly-leaf pondweed throughout the Project. Adaptive management tools will also be used by Chelan PUD to modify its control/management methods, if needed, based on results of the voluntary boater self-surveys, monitoring efforts, and/or improvements in control methods.

SECTION 4: AIS ANIMAL MONITORING

Monitoring for AIS animals is another component of this Monitoring Plan. Aquatic Invasive Species fish will be monitored under a separate Resident Fish Monitoring Program (RFMP) conducted as detailed in Chapter 6 of the Comprehensive Plan, Attachment B to the Settlement Agreement, dated February 3, 2006 (included in the License). Under this Monitoring Plan, Chelan PUD will monitor for zebra mussels, quagga mussels, New Zealand mudsnail, and other AIS animals. The sections below summarize AIS animal monitoring efforts.

4.1 Fish

The Project is currently residence to 12 introduced species of fish (Table 2). Chelan PUD will be able to monitor the abundance and spread of these 12 species through the RFMP that will consist of a Project-wide evaluation of resident fish species. Frequency of these comprehensive evaluations will be determined in coordination with the Rocky Reach Fish Forum (RRFF).

In an effort to provide WDFW with information regarding possible new AIS fish introductions within the Columbia River Basin, Chelan PUD will coordinate its RFMP, as well as its other fish management/ monitoring programs, so that suspected identification of new AIS fish can be reported to WDFW AIS personnel. For example, any bycatch of new AIS fish species during Chelan PUD's northern Pike minnow removal program, fish salvage efforts (e.g. during fish-ladder outages), etc. will be reported to WDFW as soon as Chelan PUD's AIS coordinator is notified by Chelan PUD biologists. WDFW will provide an updated list of AIS fish that have potential to be introduced into the Columbia River Basin, and Chelan PUD will provide this list to its biologists working on the various Chelan PUD fish programs. At a minimum, any new AIS fish identified within the Project will be reported to WDFW on a quarterly basis. If no new AIS fish species are identified, that will be included in the annual Monitoring Report.

Table 4-1. Introduced Fish Species Found in the Rocky Reach Project.

Family	Common Name	Scientific Name
Centrachidae	Black crappie	Pomoxis nigromaculatus
	Bluegill	Lepomis macrochirus
	Largemouth bass	Micropterus salmoides
	Pumpkinseed	Lepomis gibbosus
	Smallmouth bass	Micropterus dolomieu
Cyprinidae	Common carp	Cyprinus carpio
	Tench	Tinca tinca
Ictaluridae	Black bullhead	Ameiurus melas
	Channel catfish	Ictalurus punctatus
Percidae	Walleye	Sander vitreus
	Yellow perch	Perca flavescens
Salmonidae	Brown trout	Salmo trutta

4.2 Zebra and Quagga Mussels

Zebra mussels and quagga mussels are prolific invaders that cost the United States hundreds of millions of dollars each year (Univ. of Minnesota Sea Grant Program 2004). These small mussels indigenous to Eurasia can clog water intakes and damage equipment by attaching to boat motors and hard surfaces. They have the ability to damage ecosystems by harming fisheries, smothering native mussels and crayfish, and littering beaches with their sharp shells (Univ. of Minnesota Sea Grant Program 2004).

Zebra mussels occur in many Eastern United States waters and spread primarily by attaching to boat hulls, aquatic plants, nets, fishing equipment, or through water contaminated with their larvae (Univ. of Minnesota Sea Grant Program 2004). Adult zebra mussels can survive out of water for up to 30 days under certain conditions.

4.2.1 Horizontal Zooplankton Tow Net Sampling

Chelan PUD began conducting horizontal zooplankton tow net sampling for zebra and quagga mussel veligers downstream of Rocky Reach and Rock Island dams in the early 2000s in cooperation with WDFW in an early warning zebra/quagga mussel monitoring program. This effort will be extended to the Rocky Reach Project as part of this Monitoring Plan. The horizontal tow samples will be collected at three locations throughout the Project (Figures 3 and 4). Samples will be taken at Lincoln Rock and Daroga State Parks and Chelan Falls Park. The samples will be taken two to four times annually between June and September when conditions are suitable for mussel spawning and larval development.

Sampling methods include use of a Wisconsin plankton net (363µ mesh net) that is drifted for a distance of 40-100 ft at a depth of approximately 20 ft for each location. The plankton net is thoroughly rinsed and all sample material transferred into a 250ml Teflon bottle and preserved immediately with 70 percent isopropyl alcohol. A label is affixed to the sample bottle and appropriately filled out. The sampling procedures follow protocols developed by WDFW (Pamala Meacham, WDFW, pers. com.). The samples are then cataloged and shipped to a certified laboratory for analysis and determination of veliger presence or absence. Chelan PUD will implement response actions as described in Section 5 if zebra or quagga mussels are detected or suspected.

4.2.2 Artificial Substrate Monitoring

In an effort to monitor for zebra and quagga mussels near areas with high boat traffic, Chelan PUD will deploy artificial substrates at Project boat launch docks and or/buoys. Boat launches anticipated for monitoring include Lincoln Rock and Daroga State Parks, Beebe Bridge Park, and Chelan Falls Park, and Entiat Park (Figures 3 and 4). Substrate placement at each site will be dependent upon a secure location on which to mount the substrate; therefore it is possible that not all proposed sites will be used for substrate monitoring. Chelan PUD will follow the artificial substrate monitoring protocols as provided by WDFW. One substrate will be deployed at each site from a boat dock or buoy. The substrates will be kept at least one meter above the bottom and will be examined monthly from June through September. Chelan PUD will implement response actions as described in Section 5 if zebra or quagga mussels are detected or suspected.

4.2.3 Substrate Monitoring at Rocky Reach Dam

As part of this Monitoring Plan, Chelan PUD will also begin monitoring for presence of adult zebra and quagga mussels that may have become attached on fishways, intake screens, cooling units, and other equipment at Rocky Reach Dam. Equipment that is regularly taken out of operation for maintenance will be inspected by Chelan PUD staff. Chelan PUD will implement response actions as described in Section 5 if zebra or quagga mussels are detected or suspected.

Results of this effort, including type of equipment inspected, frequency, and species found will be included in the annual AIS report (see Section 6).

4.3 New Zealand Mudsnail

The New Zealand mudsnail (*Potamopyrus antipodarum*) has become well established in many river drainages throughout the western United States and is quickly spreading to new locations (Richards et al. 2004). The New Zealand mudsnail is a parthenogenic live-bearing, prosobranch snail with high reproductive potential and is spread to new waters via contaminated fishing equipment (Winterbourn 1970, Richards et al. 2004).

4.3.1 Monitoring

Merritt and Cummings (1996) list numerous benthic invertebrate sampling methods that have been developed and are widely used for different purposes and habitats. These include the Surber and Hess sampler, kick-nets, Ponar grabs, snorkeling, SCUBA, hand picking, suction dredges, and colonization samplers or traps.

Chelan PUD will monitor for New Zealand mudsnails while conducting the annual boat launch and biennial shoreline macrophyte monitoring studies (see Section 3). Additionally, the artificial substrates to be installed for zebra and quagga mussel monitoring may also serve as colonization samplers for New Zealand mudsnails.

SECTION 5: RESPONSE AND COORDINATION

Early detection and rapid response to an infestation of AIS is essential to the control and potential containment of AIS. Through this Monitoring Plan, Chelan PUD will implement monitoring programs that will help detect new AIS infestations as soon as possible. In the event of positive identification of new AIS within the Project area, Chelan PUD will conduct the following response activities:

- Immediate notification to WDOE (for plants) or WDFW (for animals) of positive or suspected AIS species identified during monitoring and/or boat inspections. Digital photographs will be taken and sent to WDOE or WDFW for assistance in identification, as needed. Table 3 provides contact information for AIS personal to be contracted in event of new AIS identification.
- If the AIS is a zebra or quagga mussel, Chelan PUD will also notify upstream and downstream dam operators (Douglas PUD and Grant PUD) and the Columbia River Basin Team. Chelan PUD will then assist the Columbia River Basin Team in rapid response implementation as applicable to the Project. Table 3 provides contact information for AIS personnel to be contacted in the event of new AIS identifications.
- Chelan PUD will assist in the coordination of agency site visits as necessary to assist in confirming the presence and extent of AIS infestation and determination of immediate or long-term control/eradication needs.

Table 5-1. Contact List for AIS Response.

Contact	**Name**	**Phone Number**	**E-Mail Address**
WDOE	Kathy Hamel	360-407-6562	kahm461@ecy.wa.gov
	Jenifer Parsons	509-457-7136	jenp461@ecy.wa.gov
	Pat Irle	509-454-7864	pirl461@ecy.wa.gov
WDFW	Allen Pleus	360-902-2724	allen.pleaus@dfw.wa.gov
	Pam Meacham	360-902-2741	pamala.meacham@dfw.wa.gov
	Sgt. Eric Anderson	360-640-0492	eric.anderson@dfw.wa.gov
Douglas PUD	Josh Murauskas	509-881-2323	joshm@dcpud.org
Grant PUD	Ross Hendrick	509-754-5088 ext 2468	rhendr1@gcpud.org

SECTION 6: ADAPTIVE MANAGEMENT

Adaptive management will be a key component to implementation of this Monitoring Plan over the entire term of the Project's 43-year operating license. The 401 Certification incorporates, by reference, Adaptive Management as defined in the Settlement Agreement and provides the generalized meaning of adaptive management at it relates to meeting requirements within the 401 Certification. As part of this Monitoring Plan, Chelan PUD will conduct the following activities to assure adaptive management is incorporated into this Monitoring Plan:

- By February 19 of each year, provide to WDOE a report summarizing the previous year's AIS activities and any needed changes to the Monitoring Plan that will be implemented during the up-coming year, as described in section 5.6.2(c) of the 401 Certification.
- Based on the results of the previous year's results or new AIS science, this Monitoring Plan may be updated to reflect updated implementation schedules, monitoring methods, educational methods, new AIS threats, and/or new AIS that have been identified through previous year's monitoring efforts and potential control/eradication options.
- Coordinate with WDOE and the Rocky Reach Fish Forum any needed changes to AIS education, monitoring, and/or control methods based on the results from the previous year, new technologies, new AIS threats and/or introductions, new AIS pathways, etc.

SECTION 7: REPORTING

By February 19 of each year, Chelan PUD will submit an annual report to WDOE which will include a summary of monitoring and educational activities conducted each year. Chelan PUD will work in coordination with WDOE and the RRFF to stay current of potential changes involving future AIS management and monitoring in the Project.

SECTION 8: IMPLEMENTATION SCHEDULE

Table 4 provides the proposed implementation schedule related to tasks to be completed under the monitoring and management of AIS in the Project. This table included tasks already being completed as well as new tasks proposed in this Monitoring Plan.

Table 8-1. Implementation Schedule

Task	Action	Schedule
Place signage, educational materials, and self-surveys at Project boat launches	Maintain signs at boat launches, update pamphlets, and replenish surveys as needed	Prior to May 1 of each year following WDOE and FERC approval of AIS Plan
Monitor for zebra and quagga mussels	Monitor for the presence of veligers June - September	Annually June-Sept
Monitor for new/spreading aquatic invasive plants and animals	Monitor Project boat launches annually and entire shoreline biennially	Boat launches: annually between July and September. Shorelines: biennially
Stay current on rapid response methods and technology	Monitor developing response methods and technologies.	As available
Report to WDOE and RRFF on AIS program	Summarize monitoring efforts	Annually by February 19.
Participate in regional forums	Attend in person or via conference-call meetings of regional forums addressing AIS	TBD

SECTION 9: CONCLUSIONS

This Monitoring Plan provides the education, monitoring, and response actions planed by Chelan PUD within the Project area. The goal of this Monitoring Plan is to help reduce potential new AIS introductions, while also attempting to respond to new AIS identifications through control, management, and eradications. The actions described in this Monitoring Plan were developed to meet the conditions of the 401 Certification for the Project. This Monitoring Plan will be updated annually to reflect any changes in implementation schedules, new or improved technologies, or new AIS threats.

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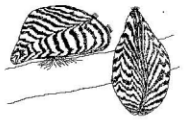
APPENDIX A: VOLUNTEER BOATER SURVEY

LOCATION _____ STATE _____ DATE _____



The Zebra Mussel

100TH MERIDIAN INITIATIVE TO PREVENT THE WESTWARD EXPANSION OF ZEBRA MUSSELS
BOATER SELF-SURVEY

The 100th Meridian Initiative is a multi-agency partnership effort to prevent the westward spread of zebra mussels and other aquatic nuisance species to western North American waters. The U.S. Fish & Wildlife Service is sponsoring and coordinating education outreach and voluntary trailered boat surveys with other agencies in the states on the 100th meridian. Surveys similar to this are being conducted in Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota and the Canadian Province of Manitoba. This survey is now being extended to the Colorado River. You as a boater are being asked to voluntarily inspect your trailer, boat and related equipment for any transported aquatic species, such as the **zebra mussel**, which may be carried accidentally to new locations. Your assistance and participation is appreciated in completing this survey and returning it in the provided, stamped envelope to the agency that is conducting this survey for the U.S. Fish and Wildlife Service. Please review the enclosed information on introduced aquatic species and boat and trailer inspections. Be sure to clean your boat, trailer and equipment after hauling-out the boat and before leaving the ramp area. Thanks for your help!

The following instructions will help you complete the survey.

Part One – Where are you from? (Any information provided is voluntary and anonymous.)
Please state the purpose of your visit, and fill in the boxes relating to your boat and home state. Your most recent launches are very important information, so please be as complete as possible.

Part Two – Where are you going?
Please indicate where you will be launching next **after you leave this lake**. Do not list further launchings at this lake. Again, please be as complete as possible in filling out this section.

Part Three – Returning the survey.
That's all there is to it! All you need to do is place this page in the provided, stamped, return envelope, seal it, and drop it in the mail.

SURVEY INFORMATION (Please Print)

PART ONE: Where are you from?	Home State:	Zip Code:
Type of Boat: ☐ Angling ☐ Pleasure ☐ Jet Ski ☐ Canoe ☐ Other		explain

How many times have you launched in the last year?			
Do you always launch in the same water body? ☐ Yes ☐ No If no, please list below where else you have launched recently.			
Water Body:	State:	County:	Date:
1.			
2.			
3.			

PART TWO: Where are you going? Please list below where you plan to launch next.

Water Body:	State:	County:	Date:
1.			
2.			

Are you already aware of threats of zebra mussels? ☐ Yes ☐ No Or any other aquatic nuisance species? ☐ Yes ☐ No		
Do you clean your boat and trailer between launchings? ☐ Yes	☐ No	
Is you boat kept on land or in water when not in use? ☐ On Land	☐ In Water	
If in water, where is it kept? Water body:	State:	
Any Comments:		

APPENDIX B: CONSULTATION RECORD

B.1 Comment Letters Received

Email with Attachment From Patricia Irle (DOE)
Received January 22, 2010

Comments on Draft Aquatic Invasive Species Monitoring and Control Plan
for Rocky Reach Hydroelectric Project License

By: Jenifer Parsons, aquatic plant specialist, WDOE

Section 1.1
An additional pathway of introduction to consider is intentional planting of ornamental pond plants (particularly by landowners with waterfront property) and dumping of unwanted pets (e.g. fish, frogs, snakes) or ornamental plants.
Section 2.1
Educational material may also be available to discourage dumping of unwanted pets through the following website http://habitattitude.net/

Section 2.2
In addition to voluntary self-surveys it would be good to set up boat inspection and washing stations on high use weekends at the various boat launches. The boating public would be more likely to respond to a person, and they would have the opportunity to have their questions answered directly. This is included in the AIS plan currently in draft form by Grant PUD for the reservoirs farther downstream.
Table 1

- Add Butomus umbellatus (flowering rush) – as it has a submersed growth form though generally it is thought of as an emergent plant – It often grows at depths of 10 – 12 ft
- Egeria is submersed
- Parrotfeather is (sprawling) emergent
- Add Ludwigia hexapetala – very similar to Ludwigia peploides which is on the list
- Add Nymphoides peltata – a floating leaved plant
- (None of these are currently known from the project area)
- Potential control methods – the only species with known biological control agents is Eurasian watermilfoil, chemical control and physical controls (bottom barrier, harvesting, hand pulling) may be an option for all of them

Section 3.1
So, in monitoring year subsequent to the first, would you only visit areas known to provide aquatic plant habitat?

Section 3.2
Suggest also running transects a set distance above and below the launch to detect presence of new AIS that may not have settled immediately at the launch.

Section 3.3.1
Would help to explain what level of milfoil growth would trigger more aggressive control measures at boat launches. Milfoil reaching the surface ? forming mats? Covering some percentage of the water? These areas are particularly critical to control since they would be the main source of fragments to get caught on equipment and carried to other waterbodies.

Also monitor curly leaf pondweed and if it becomes more of an issue be prepared to implement some control over it also.

Section 4.3
Suggest adding some monitoring specific to New Zealand mudsnails, rather than just looking for them on macrophytes. They also use rocks, leaf litter and other substrates as habitat. Suggestions for monitoring methods can be found in the National New Zealand mudsnail management plan at http://www.anstaskforce.gov/control.php

Email from WDFW to Patricia Irle (DOE), forwarded to Licensee
Received January 27, 2010

FYI

From: Pleus, Allen E (DFW)
Sent: Tuesday, January 26, 2010 11:43 AM
To: Parsons, Jenifer (ECY); Irle, Pat (ECY); Eldred, Duane R (DFW)
Cc: Verhey, Patrick M (DFW)
Subject: RE: Rocky Reach Draft Aquatic Invasive Species Monitoring and Control Plan

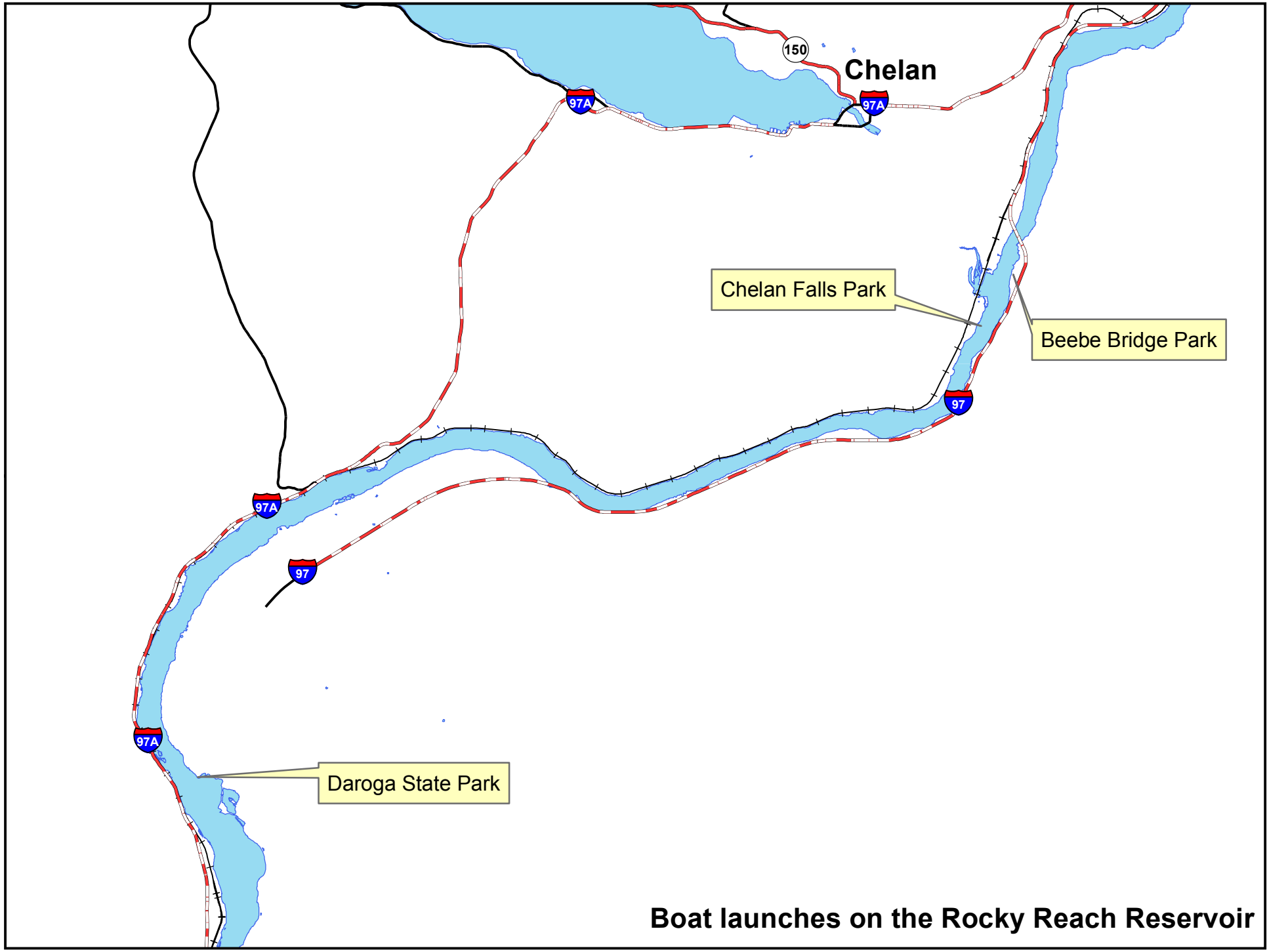
My apologies for not being able to contribute to this plan due to other priorities. Thank you for keeping me in the loop and I hope to participate in future adaptive management of the plan as necessary.

Allen Pleus
WDFW AIS Coordinator
(360) 902-2724 office
(360)-918-3868 cell
Allen. Pleus@dfw.wa.gov

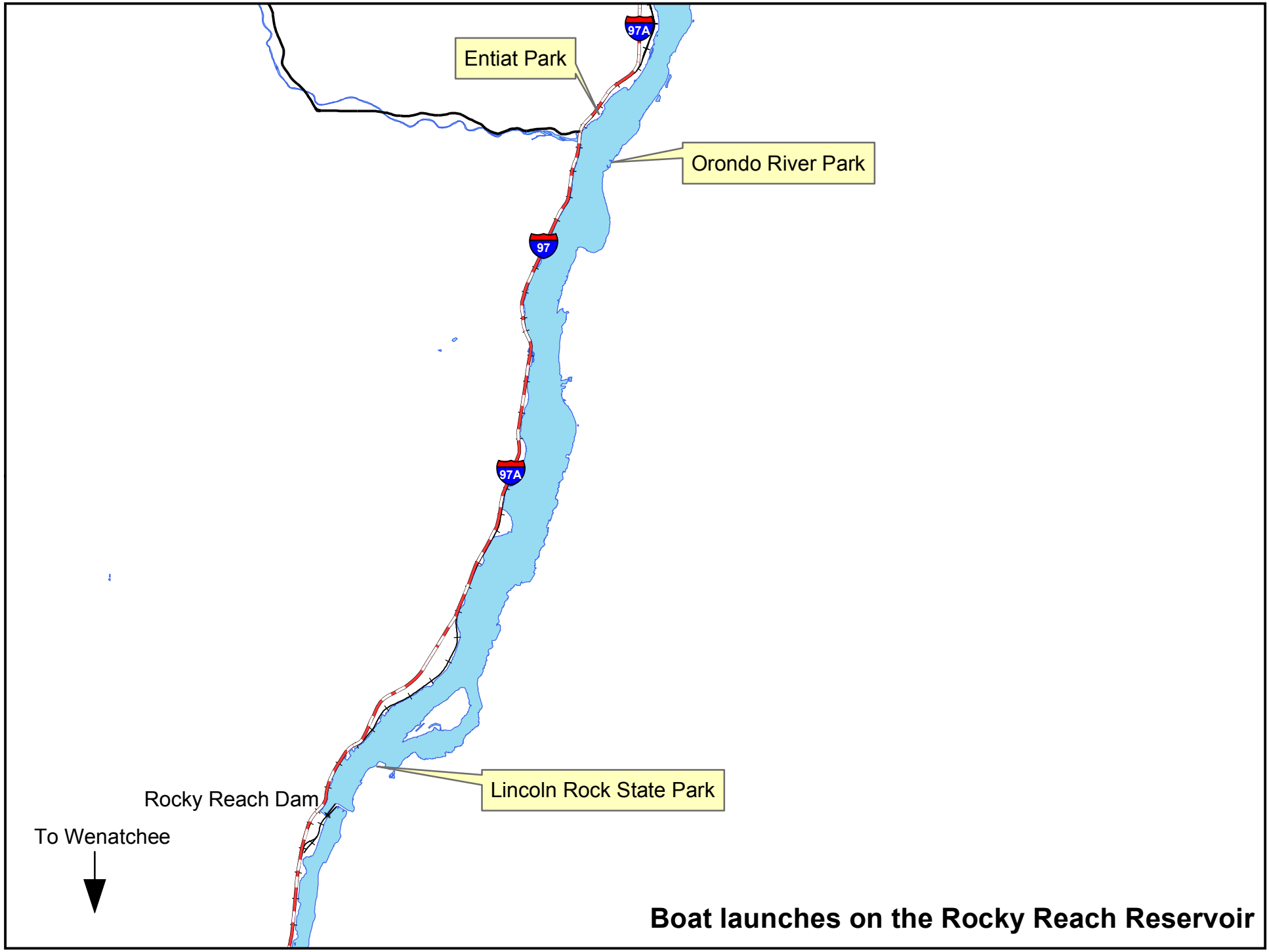
B.2 Response to Comments

Section, Paragraph	Agency Comment	Chelan PUD Response
Section 1.1	An additional pathway of introduction to consider is intentional planting of ornamental pond plants (particularly by landowners with waterfront property) and dumping of unwanted pets (e.g. fish, frogs, snakes) or ornamental plants.	Language added in response to comment.
Section 2.1	Educational material may also be available to discourage dumping of unwanted pets through the following website: http://habitattitude.net/	Language added in response to comment.
Section 2.2	In addition to voluntary self-surveys it would be good to set up a boat inspection and washing stations on high use weekends at the various boat launches. The boating public would be more likely to respond to a person, and they would have the opportunity to have their questions answered directly. This is included in the AIS plan currently in draft form by Grant PUD for the reservoirs farther downstream.	The AIS addresses implementation of all requirements of Rocky Reach License Order Article 401 and Section 5.6(2) of 401 Water Quality Certification. Effectiveness of boat inspections and washing stations need to be further discussed and evaluated.
Table 1	Various revisions to the table.	Suggested revisions made.
Section 3.1	So, in monitoring years subsequent to the first, would you only visit areas known to provide aquatic plant habitat?	That is our intention at this time, but this may be revised in subsequent years and will be addressed accordingly in annual reports.
Section 3.2	Suggest also running transects a set distance above and below the launch to detect presence of new AIS that may not have settled immediately at the launch.	Language added in response to comment.
Section 3.3.1	Would help to explain what level of milfoil growth would trigger more aggressive control measures at boat launches. Milfoil reaching the surface? Forming mats? Covering some percentage of the water? These areas are particularly critical to control since they would be the main source of fragments to get caught and carried to other waterbodies. Also monitor curly leaf pondweed and if it becomes more of an issue be prepared to implement some control over it also.	Language added in response to comment.
Section 4.3	Suggest adding some monitoring specific to New Zealand mudsnails, rather than just looking for them on macrophytes. They also use rocks, leaf litter and other substrates as habitat. Suggestions for monitoring methods can be found in the National New Zealand mudsnail management plan at http://www.anstaskforce.gov/control.php	Language added in response to comment.

APPENDIX B: LOCATION OF BOAT LAUNCHES



Boat launches on the Rocky Reach Reservoir



Boat launches on the Rocky Reach Reservoir

APPENDIX C: EDUCATIONAL MATERIALS

STOP

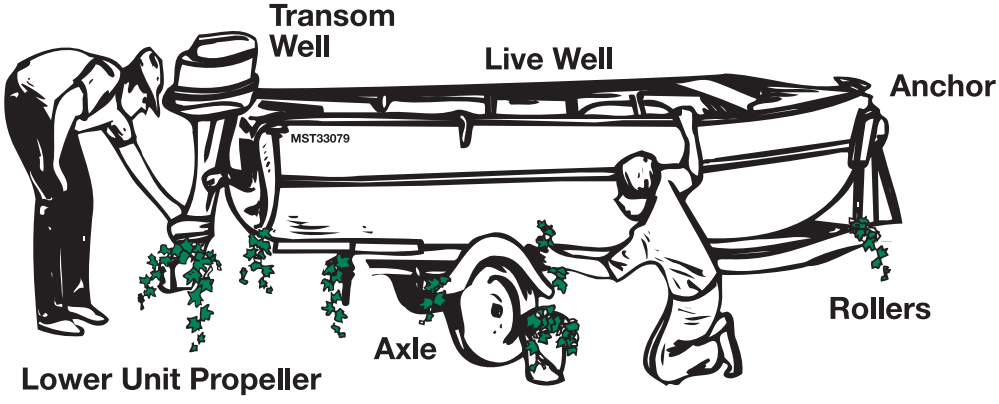
Milfoil

Zebra Mussel

It is *ILLEGAL* to transport or spread Aquatic Invasive Species!

Before Launching & **Before Leaving**

You Must Remove ALL
Plants & Animals from Watercraft, Trailer and Gear.
You Must Drain ALL
Water from Fish/Live Wells, Holds and Bilges.



Unlawful to Transport Aquatic Plants - R.C.W. 77.15.290
Unlawful Use of Prohibited Aquatic Animal Species - R.C.W. 77.15.253
Unlawful Release of Fish, Shellfish or Wildlife - R.C.W. 77.15.250

To obtain information on free boat inspections, Report a sighting or Find out more about Aquatic Invasive Species:
Call 1-888-WDFW-AIS (933-9247) or go to www.WDFW.WA.GOV

Washington Department of FISH and WILDLIFE

STOP AQUATIC HITCHHIKERS!
Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

25128-87870

VOSS SIGNS, LLC. MANLIUS, NY 13104-0553 1-800-473-0698 www.vosssigns.com

STOP AQUATIC HITCHHIKERS!™

www.ProtectYourWaters.net

Follow these simple steps:

☑ Clean

Remove all plants, animals, mud and thoroughly wash everything, especially all crevices and other hidden areas.

☑ Drain

Eliminate all water before leaving the area, including wells, ballast, and engine cooling water.

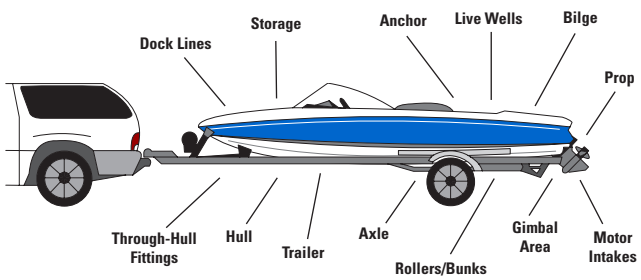
☑ Dry

Allow sufficient time for your boat to completely dry before launching in other waters.

If your boat has been in infested waters for an extended period of time, or if you cannot perform the required steps above, you should have your boat *professionally* cleaned with high-pressure scalding hot water (>140 °F) before transporting to any body of water.

Before launching and before leaving...

Inspect everything!



Quagga mussels encrusting a boat motor

Zebra and quagga mussels are a nuisance for anglers and boaters. They can ruin your equipment, clog motor cooling systems, foul hulls, and jam the centerboard wells under sailboats.

For more information, please visit...

www.100thMeridian.org
www.ProtectYourWaters.net
nas.er.usgs.gov

U.S. FISH & WILDLIFE SERVICE

P.U.D. CHELAN COUNTY
www.chelanpud.org

100th Meridian Initiative

Image Credits: *Zebra Mussels on a Fishing Lure* by Marc Murrell, Kansas Department of Wildlife and Parks • *Zebra Mussels*, *Zebra Mussels on a Beer Can*, *Zebra Mussels on a Native Mussel*, *Bait Bucket*, *Quagga Mussels*, *Zebra/Quagga Mussel Distribution January 2009* by David Britton, U.S. Fish & Wildlife Service • *Zebra Mussels in a Cut-Away Pipe* by Don Schlosser, Great Lakes Science Center • *Zebra Mussels in a Pipe* by Craig Czarnecki, Michigan Sea Grant • *Quagga Mussels Encrusting a Boat Motor* by Matt Watson, The University of Texas at Arlington • The distribution map is based on data compiled by the U.S. Geological Survey's Nonindigenous Aquatic Species Program (http://nas.er.usgs.gov).

100th Meridian Initiative

ZAP THE ZEBRA

www.100thMeridian.org

Please report any sighting by calling our National Hotline:

1-877-STOP-ANS

1-877-786-7267

Invasive Mussels: Expensive Damage!

When zebra and/or quagga mussels invade our local waters they clog power-plant and public-water intakes and pipes. Routine treatment is necessary and very expensive. This leads to increased utility bills. If you use water and electricity, you do not want these mussels.

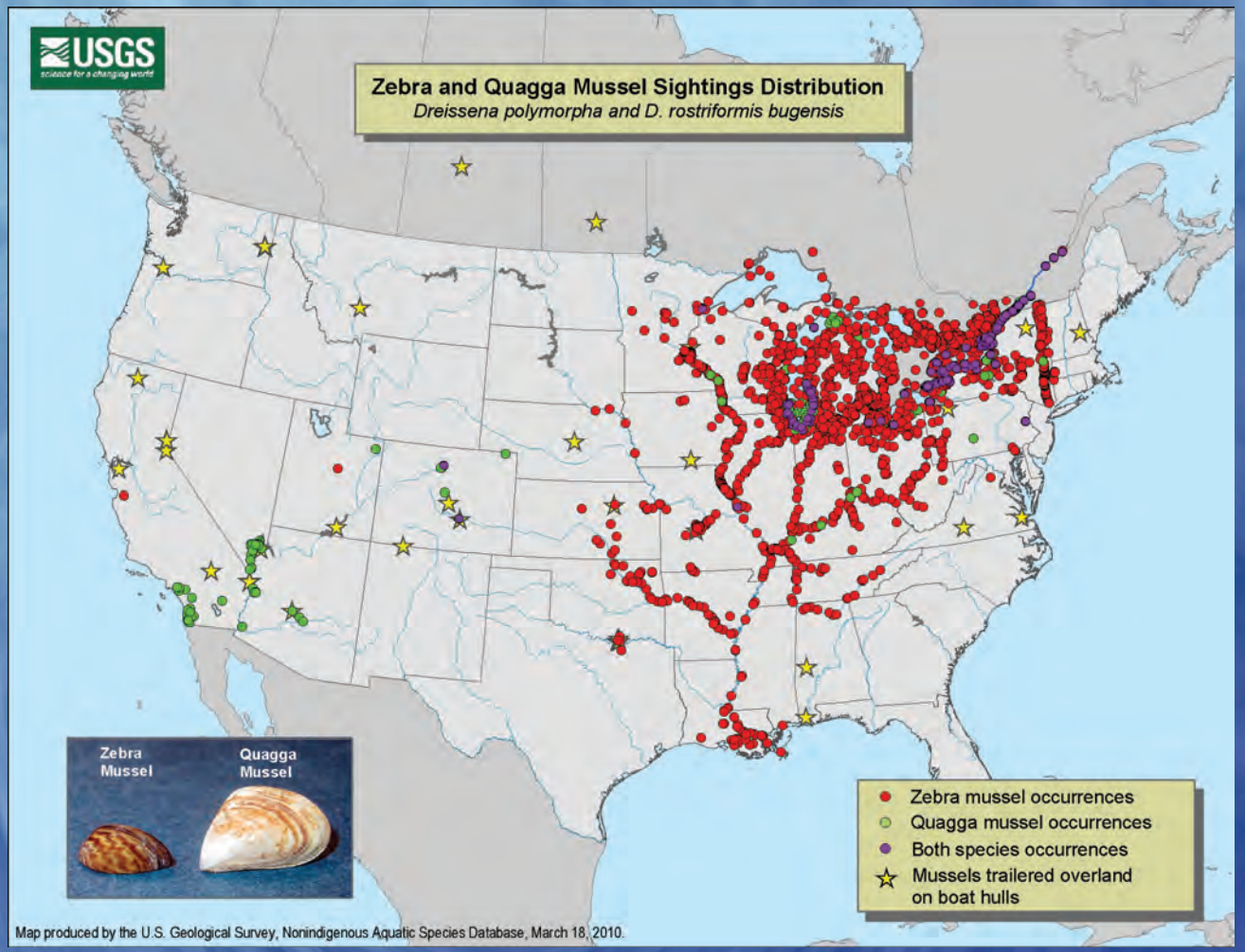
Zebra mussels in a cut-away pipe

Zebra mussels blocking a pipe

Zebra/Quagga Mussels May Use Your Boat to Invade Additional Waters!

Once a boat has been in infested waters, it could carry invasive mussels. These mussels can spread to new habitats on boats trailered by commercial haulers or the public. Zebra and quagga mussels attach to boats and aquatic plants carried by boats. These mussels also commonly attach to bait buckets and other aquatic recreational equipment. An adult female zebra mussel can release up to a million eggs in a year. Please take precautions outlined in this brochure to help reduce the chance that zebra or quagga mussels will spread from your boat or equipment to uninfested areas.

Before zebra mussels | *After zebra mussels*



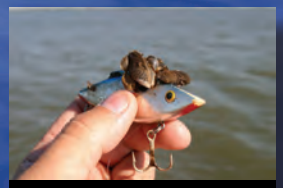
Zebra/Quagga Mussels Harm Native Aquatic Life

Zebra mussels on a crayfish

Zebra mussels on a native mussel

Zebra/Quagga Mussels Encrust Any Hard Surface

Zebra mussels on a beer can



Zebra mussels on a fishing lure

Zebra Mussels / Quagga Mussels

What are they?

Both are closely related, invasive, freshwater bivalve (mollusk) species that encrust hard surfaces.

Where do they come from?

These species came from the Black and Caspian Sea Drainages in Eurasia.

What size are they?

Larvae are microscopic and adults may be up to two inches long. They are usually found in clusters.

Why “Zebra” mussels?

Both species are sometimes referred to as “zebra” mussels because they both have light and dark alternating stripes. Quagga mussels are actually a distinct (but similar) species named after an extinct animal related to zebras.

APPENDIX D: MATERIAL AND METHODS FOR 2016 MACROPHYTE SURVEYS – ENVIRONMENTAL ASSESSMENT SERVICES

October 27, 2016

Marcie Clement
Public Utility District No. 1 of Chelan County
P.O. Box 1231
Wenatchee, WA 98807

Subject: Material & Methods for 2016 Macrophyte Surveys

Macrophyte beds within Rocky Reach Reservoir of the Columbia River were mapped and characterized during 2016. A field team consisting of one boat operator/scientist and an observer systematically searched for macrophyte beds along both the left and right banks of the Rocky Reach Reservoir travelling at approximately one to eight miles per hour in a research vessel. Macrophyte bed characterizations were initiated at the furthest upriver site previously characterized in 2012. When a macrophyte bed was located, the mid-river or channel-side edge of the bed was GIS mapped as viewable by the field staff wearing polarized glasses. Macrophyte beds were recorded with a handheld Trimble GeoXH GPS set to log a line feature at 5 second intervals. Mapping was initiated at the upriver end of the marcorphyte beds and concluded at the downriver end of the macrophyte beds. GPS Pathfinder Office was used to download and differentially correct the GIS data. ArcMap 10.1 was then used to perform GIS conversions. The collected macrophyte line features were overlaid with GIS files provided by Chelan PUD that included a shoreline vector file and 2010 orthophoto file. The outer perimeter of the macrophytes beds were joined with the Chelan PUD shoreline data to create macrophyte bed area features. Deep channel areas (> ~ 20 feet) as estimated from the orthophoto files and field team observations were clipped out of GIS macrophyte bed areas. Locations of individual flowing rush (*Butomus umbellatus*) patches were recorded also via GPS point features. All GIS files were configured to Datum: NAD 83 (CONUS); Coordinate System: Washington State Plane 4601 North; Survey Units: Feet.

In 2016, macrophyte beds were characterized using two methods. In Method 1, the dominant-subdominant data were estimated visually from the outer edge of the macrophyte bed by observers in the vessel. A dominant and subdominant classification was assigned to each macrophyte bed based upon what the observers perceived as the most abundant and second most abundant species observed over the surface area of the macrophyte bed.

In some cases the visibility of the macrophyte bed was difficult for the field observers due to macrophyte bed size and/or weather conditions. As such, Method 2 employed equidistant survey transects using 10 foot by 10 foot survey plots modified from Despain et al. (1991) throughout the macrophyte bed. The methodology was designed to collect a minimum of two plots per macrophyte bed and a maximum of 20 plots per macrophyte bed. Transects were spaced approximately 440 yards apart. For larger macrophyte beds (>880 yards long parallel to shoreline), characterizations included three to four equidistant macrophyte bed transects with survey plots collected along each transect. The number of plots collected for each transect perpendicular to the shoreline was determined by Table 1. A Nikon Prostaff 550 range finder was used to measure the distance between the outer viewable edge of the macrophyte bed and the shoreline. A modified grappling hook was used to recovered macrophyte species throughout macrophyte bed plot area to assess species presence and percent cover. The table below summarizes the shoreline distance and the number of plots per transect.

Table 1 Equidistance Divider Table Applied to Determine the Number of Plots per Transect and Distance from the Shoreline for Each Macrophyte Plot.

Distance from Shoreline to Outer Edge of Viewable Macrophyte Bed	Equidistant Divider to Determine Number of Plots and Plot Location per Transect	Number of Plots per Transect
$\leq$ 30 yards	2	1
> 30 yards and $\leq$ 60 yards	3	2
> 60 yards and $\leq$ 160 yards	4	3
> 160 yards and $\leq$ 240 yards	5	4
> 240 yards	6	5

The following data were collected for each macrophyte bed plot:

- Date of collection,
- Site (i.e., macrophyte bed number),
- Transect number per macrophyte bed (e.g., 1, 2, 3…),
- Distance (yards) to shoreline from the outer edge of viewable macrophyte bed for each transect,
- Plot distance from shoreline as determined by Table 1,
- Macrophyte species were identified according to WDOE (2001), and
- Percent coverage of macrophyte species observed within 10ft x 10 ft plot marked on research vessel gunnel as modified from Despain et al. (1991).

Table 2 summarizes the dominant and subdominant species observed in 84 macrophyte beds mapped during 2016.

Table 2 Summary of Dominant and Subdominant Species Composition of the 84 macrophyte beds mapped during 2016.

Species	Number of Macrophyte Beds Where Species was Dominant	Percent (%) of Macrophyte Beds Where Species was Dominant	Number of Macrophyte Beds Where Species was Subdominant	Percent (%) of Macrophyte Beds Where Species was Subdominant
Common Waterweed *(Elodea canadensis)*	35	42%	16	19%
Eurasian Watermilfoil *(Myriophyllum spicatum)*	33	39%	31	37%
Curly Leaf Pondweed *(Potamogeton crispus)*	14	17%	28	33%
Richardson's Pondweed *(Potamogeton richardsonii)*	0	0%	1	1%
Coontail *(Ceratophyllum demersum)*	1	1%	7	8%
Water Star-grass *(Heteranthera dubia)*	1	1%	1	1%
Total	84		84	

Table 3 summarizes the species composition (presence) surveyed during 2016 using Method 2.

Table 3 Species Composition (Presence) of Macrophyte Beds Surveyed Using Method 2.

Macrophyte Bed Site Identification	**Common Waterweed** *(Elodea canadensis)*	**Eurasian Watermilfoil** *(Myriophyllum spicatum)*	**Richardsons Pondweed** *(Potamogeton richardsonii)*	**Curly Leaf Pondweed** *(Potamogeton crispus)*	**White-Stemmed Pondweed** *(Potamogeton praelongus)*	**Fern-Leaf Pondweed** *(Potamogeton robbinsii)*	**Coontail** *(Ceratophyllum demersum)*	**Water Star-grass** *(Heteranthera dubia)*
RR01	X	X	X					
RR07	X	X		X			X	
RR09	X	X	X	X			X	
RR19	X				X		X	
RR20	X	X	X				X	
RR28	X							
RR31	X	X	X	X			X	X
RR36	X	X	X	X			X	
RR39	X	X	X	X			X	X
RR48	X	X	X	X			X	
RR63	X	X	X	X			X	
RR67	X	X		X				
RR70	X	X	X	X			X	
RR73	X	X	X	X		X	X	
RR76	X	X	X	X			X	
RR79	X	X	X	X				
RR81	X	X	X	X				
RR82	X	X	X	X			X	
RR84	X	X	X				X	

Table 4 Average Percent Cover of Macrophyte Species Surveyed Using Method 2.

Macrophyte Bed Site Identification	Number of Plots	Common Waterweed (*Elodea canadensis*)	Eurasian Watermilfoil (*Myriophyllum spicatum*)	Richardsons Pondweed (*Potamogeton richardsonii*)	Curly Leaf Pondweed (*Potamogeton crispus*)	White-Stemmed Pondweed (*Potamogeton praelongus*)	Fern-Leaf Pondweed (*Potamogeton robbinsii*)	Coontail (*Ceratophyllum demersum*)	Water Star-grass (*Heteranthera dubia*)
RR01	3	87%	58%	5%	0%	0%	0%	0%	0%
RR07	8	66%	72%	0%	12%	0%	0%	11%	0%
RR09	6	64%	13%	1%	3%	0%	0%	26%	0%
RR19	4	75%	0%	0%	0%	13%	0%	34%	0%
RR20	5	100%	28%	1%	0%	0%	0%	11%	0%
RR28	2	70%	0%	0%	0%	0%	0%	0%	0%
RR31	6	100%	28%	1%	12%	0%	0%	20%	3%
RR36	8	88%	33%	24%	17%	0%	0%	26%	0%
RR39	6	69%	11%	10%	5%	0%	0%	45%	7%
RR48	10	79%	39%	11%	14%	0%	0%	20%	0%
RR63	9	96%	9%	12%	24%	0%	0%	2%	0%
RR67	3	55%	20%	0%	23%	0%	0%	0%	0%
RR70	8	94%	67%	13%	8%	0%	0%	14%	0%
RR73	10	95%	25%	19%	7%	0%	3%	40%	0%
RR76	5	100%	34%	14%	6%	0%	0%	40%	0%
RR79	2	95%	75%	2%	5%	0%	0%	0%	0%
RR81	5	90%	12%	14%	24%	0%	0%	0%	0%
RR82	9	83%	4%	21%	3%	0%	0%	20%	0%
RR84	12	79%	35%	18%	0%	0%	0%	8%	0%
Collective Average	121	84%	30%	11%	9%	0.4%	0.2%	19%	0.5%

Literature Cited

Despain, D.W., Ogden, P.R., and E.L. Smith. 1991. Plant frequency sampling for monitoring rangelands. In: G.B. Ruyle. (ed). Some methods for monitoring rangelands and other natural area vegetation. University of Arizona, College of Agriculture, Extension Report 9043. pp. 8-12

Washington State Department of Ecology (WDOE). 2001. An Aquatic Plant Identification Manual for Washington's Freshwater Plants. Washington State Department of Ecology June 2001, Publication 01-10-032. Department of Printing. Olympia, WA.

APPENDIX E: CONSULTATION RECORD

As per FERC's Order Modifying and Approving Aquatic Invasive Species Monitoring and Control Plan Pursuant to Article 401 and Condition 5.6(2) (January 14, 2011), Chelan PUD consulted with Washington State Department of Ecology (Ecology) and the Rocky Reach Fish Forum (RRFF). Members of the RRRFF are listed in the table below. The DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report (Report) was provided to Ecology and the RRFF for review and comment on February 21, 2017. A comment period was provided from February 21 through March 21, 2017. Email documentation is provided on the following page. No comments were received from the RRFF or Ecology. Ecology submitted an email on March 22, 2017 stating that they did not have any comments. That email has been included in the consultation record as well.

Rocky Reach Fish Forum Members

Agency	Name
Chelan PUD	Hemstrom, Steve
US Fish and Wildlife Service	Lewis, Steve
Alcoa	Padgett, Michael
Yakama Nation	Rose, Bob
Washington State Department of Fish and Wildlife	Verhey, Patrick
City of Entiat	Vradenburg, Keith
Washington State Department of Ecology	Zimmerman, Breean

From: Tracy Hillman
To: "Aaron Jackson"; Underwood, Alene; "Andrew Gingerich"; "Bob Rose"; "Brad James"; "Breean Zimmerman"; "Chad Jackson"; "Corey Wright"; "Dave Burgess"; "David Hulse"; Bitterman, Deborah; "Donella Miller"; Kunz, Heidi; "Jason McLellan"; "Jeff Korth"; Osborn, Jeff; "Justin Yeager"; Gottbrecht, Katja; Truscott, Keith; "Keith Vradenburg"; "Kirk Truscott"; Keller, Lance; Clement, Marcie; "Mark Peterschmidt"; Connell, Meaghan; Michael Padgett; Smith, Michelle; "Mike Clement"; "Patrick Verhey"; "Paul Anders"; "Ralph Lampman"; "RD Nelle"; Roconnor@gcpud.org; "Rod O"Connor"; Hays, Steve; Hemstrom, Steven; "Steve Lewis"; "Steve Rainey"; "Susan Rosebrough"; Hatmaker, Teneille; "Tom Skiles"; "Travis Maitland"
Cc: Sokolowski, Rosana
Subject: RRFF: DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report
Date: Tuesday, February 21, 2017 8:23:07 AM
Attachments: Appendix A 2010 AIS Plan.pdf
Appendix B Location of Boat Launches.pdf
Appendix C Educational Materials.pdf
EAS maps.pdf
EAS-Methods-Macrophytes_2016_final.pdf
DRAFT 2016 AIS Report 02172017.docx

Hello RRFF,

Attached for your review is the Draft 2016 AIS report and appendices. As noted in Marcie's message below, comments are due to her by Tuesday, 21 March 2017.

Please let me or Marcie know if you have questions.

Thanks,

Tracy

PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

To: Rocky Reach Fish Forum
From: Marcie Clement, Water Resources Specialist
Public Utility District No. 1 of Chelan County (Chelan PUD)
Re: DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report

Dear members of the Rocky Reach Fish Forum:

Attached for your review and comment are the DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report and Appendices for Rocky Reach Hydroelectric Project. Please review and submit any comments you may have on or before 5:00 p.m. March 21, 2017 via email at marcie.clement@chelanpud.org.

If you have any questions, please do not hesitate to contact me.

Thank you,

Marcie Clement | **Water Resources Specialist**
Public Utility District No.1 of Chelan County | 327 N. Wenatchee Ave. | Wenatchee, WA 98801
509.661.4186 (w) | 509.280.1955 (c) | marcie.clement@chelanpud.org

From:	Zimmerman, Breean (ECY)
To:	Clement, Marcie
Cc:	Smith, Michelle; Osborn, Jeff; Sokolowski, Rosana; Bitterman, Deborah
Subject:	RE: DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report
Date:	Wednesday, March 22, 2017 11:41:10 AM

Marcie,

Thank you for the opportunity to review the Draft 2016 Aquatic Invasive Species Monitoring and Control Report. Washington State Department of Ecology (Ecology) has reviewed this report and has **no comments.**

Thank you,

Breean Zimmerman ¦ **Hydropower Projects Manager**
Water Quality Program | Central Regional Office
(509) 575-2808 (w) | (509) 406-5130 (c) | bzim461@ecy.wa.gov

From: Clement, Marcie [mailto:Marcie.Clement@chelanpud.org]
Sent: Tuesday, February 21, 2017 7:17 AM
To: Zimmerman, Breean (ECY) <bzim461@ECY.WA.GOV>
Cc: Clement, Marcie <Marcie.Clement@chelanpud.org>; Smith, Michelle <michelle.smith@chelanpud.org>; Osborn, Jeff <Jeff.Osborn@chelanpud.org>; Sokolowski, Rosana <Rosana.Sokolowski@chelanpud.org>; Bitterman, Deborah <Deborah.Bitterman@chelanpud.org>
Subject: DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report

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To: Breean Zimmerman, Washington State Department of Ecology

From: Marcie Clement, Water Resources Specialist
Public Utility District No. 1 of Chelan County (Chelan PUD)

Re: DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report

Ms. Zimmerman:

Attached for your review and comment are the DRAFT 2016 Aquatic Invasive Species Monitoring and Control Report and Appendices for Rocky Reach

Hydroelectric Project. Please review and submit any comments you may have on or before 5:00 p.m. March 21, 2017 via email at marcie.clement@chelanpud.org.

If you have any questions, please do not hesitate to contact me.

Thank you,

Marcie Clement | **Water Resources Specialist**
Public Utility District No.1 of Chelan County | 327 N. Wenatchee Ave. | Wenatchee, WA 98801
509.661.4186 (w) | 509.280.1955 (c) | marcie.clement@chelanpud.org