Proposed Rocky Reach Resident Fish Study

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Section 1: Introduction

The Chelan County Public Utility District has recently contacted the Washington Department of Fish and Wildlife's Large Lakes Research Team to develop a draft study plan addressing resident fishes within the Rocky Reach Project. The LLRT has conducted similar surveys of resident fishes in a number of eastern Washington Lakes and Reservoirs and we are currently collaborating with the USGS on a Grant Co. funded study in the Priest Rapids Project area. Although smaller in scope, the proposed Chelan PUD funded project will be completed in a manner that will allow comparisons to portions of the Grant Co. PUD funded project. To effectively monitor and assess changes in the resident fish community within the Rocky Reach Hydroelectric Project (FERC Project No. 2145) it is imperative that comprehensive baseline data be collected at the beginning of the project and monitored over time.

The Rocky Reach Hydroelectric Project, which is owned by Chelan County PUD, was started in 1956 and completed in 1961. In 1969, additional generating units were added and the project reached it present size and configuration in 1971. The dam created a 43- mile long reservoir referred to as Lake Entiat. To meet the natural resource requirements, a Natural Resources Working Group was organized to develop a Comprehensive Resident Fish Management Plan for the Rocky Reach Project. A draft of this plan was recently released and it has three clear goals, to protect and enhance resident fish, to protect their habitat, and to enhance recreational fishing opportunities. In addition, Chelan PUD agreed to implement several resident fish Protection, Mitigation, and Enhancement measures (PMEs). One was to: "monitor and assess changes in resident fish species, particularly native species abundance, composition, and distribution" (Draft Rocky Reach Comprehensive Resident Fish Management Plan, p14) in Lake Entiat to evaluate any adverse impacts caused by the Project.

Section 2: Study Goals

The goal of this project is to develop and implement a sampling plan to collect and monitor biological and physical parameters within the Rocky Reach Project. The two primary objectives of this project as referred to in the Resident Fish Management Plan are as follows: (4.1.3) Explore the feasibility of enhancing or providing additional resident fisheries within the Rocky Reach Project. (4.2) Develop and conduct an effect resident fishery sampling regime. Secondarily, the LLRT will investigate localized water quality investigations specifically in areas of heavy aquatic vegetation growth. Additionally, an emphasis will be placed on resident predators such as northern pikeminnow, bass species, walleye and catfish.

Section 3: Study Area

The Rocky Reach Project extends from the tailrace of the Rocky Reach dam approximately 69 km upstream to the Wells Dam tailrace (Chelan Co. PUD 1999). The dam itself is located in

north central Washington approximately seven miles from the city of Wenatchee. The large size of the project dictates we employ a sub-sampling regime.

Section 4: Methods and Analysis

Due to the size of the Rocky Reach Project area the first order of business will be to divide the project water's littoral length into 400 m adjacent sites and assign the appropriate coordinates. This task will be completed prior to field collections begin using GIS. Using previously collected habitat data (Chelan County PUD 1999) as well as conducting several reconnaissance trips, we will be able to partition the available habitat into sections that can be sampled using gillnetting, fyke netting and electrofishing techniques. Consequently, sites will be selected based on a stratified random sampling design with proportional representation regarding habitat allocations. Sites will also be designated as suitable for sampling with respect to the different types of sampling gears we employ.

The LLRT has developed standard operating procedures (SOP) as well as quality control measures for all of the methods and operations utilized. Following our SOP's assures that the data collected is temporally comparable and statistically valid. The LLRT currently has all the necessary state and Federal permits to sample within the Columbia Mainstem. These permits are necessary on the Columbia River as there is the potential to impact sensitive native resident and non-resident fish. Because there is risk associated with all methods of collection, we will conduct our sampling in a manner that will reduce the likelihood of negatively impacting sensitive species.

I. Fisheries Evaluations

To assess the resident fish population in the section of the Columbia River impounded by the Rocky Reach hydroelectric project, we will capture fishes during the summer and fall using passive and active methodologies described within the WDFW littoral sampling protocol (Bonar et al 2000). Methods of capture will include boat electrofishing, gillnetting or tangle net, fyke netting. Electrofishing will be conducting using an 18'Smith Root 5.0 Generator Powered Pulsator (GPP) electrofishing boat. Shock boats will be operated parallel to the shoreline at a rate of 1-1.4 km/h, in a depth of water not to exceed three meters. The goal of boat electrofishing is to sample in a manner that is efficient and safe for crew and fish alike. With respect to fish safety we will adjust our boat settings so as to promote galvanotaxis of the fish in our effective shocking area. Several parameters such as temperature, dominant species and conductivity will be factored at each site and electrofishing settings adjusted accordingly. Gill or tangle nets will be set at varying depths for short periods of time throughout the project waters. Due to the presence of sensitive species within the proposed sample area we will not soak nets for more than 1-hour continuously. We will also deploy non-lethal fyke or hoop nets in the littoral zones of the Rocky Reach Project for 12-24 hours sets.

In areas of thick macrophytes and appropriate depths we will deploy popnets (Morgan et al. 1988). Sites will be selected using a stratified random sampling design (Scheaffer et al. 1996). The popnets consist of a 3.05 x 3.05 m (10 x 10 ft) frame of polyvinyl chloride (PVC) filled with float material and a frame of equal dimensions filled with weights. This sampling covers a 9.29

m^2 (100 ft^2) area per net set (figure 1). The frames are connected by a 1.83 m (6 ft) net with 6.35 mm (0.25 in) knotless mesh. Upper and lower frames will be pinned together and the nets set flush with the substrate. Contact between the substrate and the bottom frame will be accomplished by placing sandbags over the bottom frame to ensure that fish cannot escape the sample area.

Approximately 24 h after setting a net, we will pull the pins causing the top frame to float to the surface and enclose the fish within the area of the net. Popnets will be triggered manually via long cords attached to cotter pins that hold the floating frame to the sinking frame that is secured to the substrate. Once a popnet has been deployed a specialized vertical seine will be pulled through the popnet enclosure to capture all the fish following a depletion method (Everhart and Youngs 1981). Seining will cease after all fish within the popnet have been effectively captured or until less than once quarter of the fish are captured relative to the previous pass.

Figure 1. Popnet deployed by LLRT staff in Moses Lake, Washington.

Although pikeminnow are generally considered the most abundant and deleterious predator within the Columbia River, walleye and bass have also been documented from the Lower Columbia (Beamesderfer and Reiman 1991, Zimmerman 1999) to the Upper Columbia (Baldwin et al. 2003). Multiple gear types will be used to minimize gear bias with respect to species and sizes of fishes captured. However, the different gear types can only be deployed in the appropriate habitats. Sites will be randomly selected for each of the sampling techniques from the corresponding suitable habitats. The primary collection of data from sampled fishes will include species, length and weight. If requested it may be feasible to collect secondary data such as stomach content samples, scales from fish that are alive and otolith and tissue samples from dead fishes (Table 1). It should be noted that we would not sacrifice sensitive species during our efforts.

Table 1. List of proposed data to be collected by the LLRT during seasonal sampling.

Datum	Purpose	Alive or Sacrificed
Species	Species composition	Alive or Sacrificed
Length	Length Frequency	Alive or Sacrificed
Weight	Biomass	Alive or Sacrificed
Stomach contents[1]	Diet/bioenergetics modeling	Alive or Sacrificed
Scale[1]	Aging, length at age	Alive or Sacrificed
Otolith[1]	Aging, length at age	Sacrificed
Tissue sample[1]	Stable isotope analysis	Sacrificed

[1]Data that could also be collected and archived for future analysis.

II. Water Quality Evaluations

The presence of aquatic vegetation can be advantageous to an aquatic community as mosaic patterns exist and provide forage and predator avoidance habitat (Keast 1977; Diehl 1992). One study in particular found that macrophytes are used by fishes to forage or as refuge to avoid predators (Savino and Stein 1982). Conversely another study found that fish such as bluegill should move offshore in order to feed optimally and target Daphnia (Mittelbach 1981). As well as directly impacting fish, aquatic vegetation can also indirectly impact fish by altering water quality such as pH, temperature and dissolved oxygen. To investigate the potential impacts of the large mats of aquatic vegetation within the Rocky Reach project we will also monitor water quality parameters.

Water quality determinations will begin immediately upon project funding and will continue on a bi-weekly basis using a mobile YSI. Transects will be set up throughout the Rocky Reach Project and additional sites will be added during times of high vegetation growth. Use of standard transects will enable temporal and spatial comparisons among sections of the project. lake. Water quality data including dissolved oxygen, water temperature, and turbidity will be collected at each of the established transects. In addition, hourly recording thermographs will be deployed at multiple locations within the project.

Section 5: Data Management and Reporting

Following our sampling design will permit us to better assess the fishes within the Rocky Reach Project and using multiple gear types will provide better estimates of predatory fish composition and biomass than previously estimated. Data collected in the field will be copied, kept in separate locations and immediately entered into a database specific to this project. An agreement between the WDFW and the Chelan PUD will first need to be reached in order to define the deliverables with respect to reporting frequency.

Section 6: Staffing and Equipments Needs

The LLRT currently has all the necessary gear to complete the proposed tasks. However, certain expendable field materials will need to be purchased on a regular basis. Our SOP for water quality monitoring which was derived from the Washington Stated Department of Ecology dictates we calibrate our YSI mobile water quality device prior to every field-sampling event. Additional needs include intangible items associated with fieldwork such as fuel and travel costs. Staff necessary to complete this project will include 3 scientific technicians and a biologist 3 currently employed with the LLRT.

Section 7: Timeline and Budget

Due to the fluid nature of fieldwork an adaptive management approach will be necessary to account for unanticipated factors that may arise. Despite potential changes within the data collecting process we have created a flow chart that demonstrates the possible trajectories of the proposed Chelan County PUD funded Rocky Reach Project (figure 2). Once a basic scope of work has been agreed upon the LLRT with the approval of the Chelan Co. PUD will develop a timeline when data will be collected, analyzed and written up. We are anticipating starting the fieldwork portion of this project during the summer of 2011.

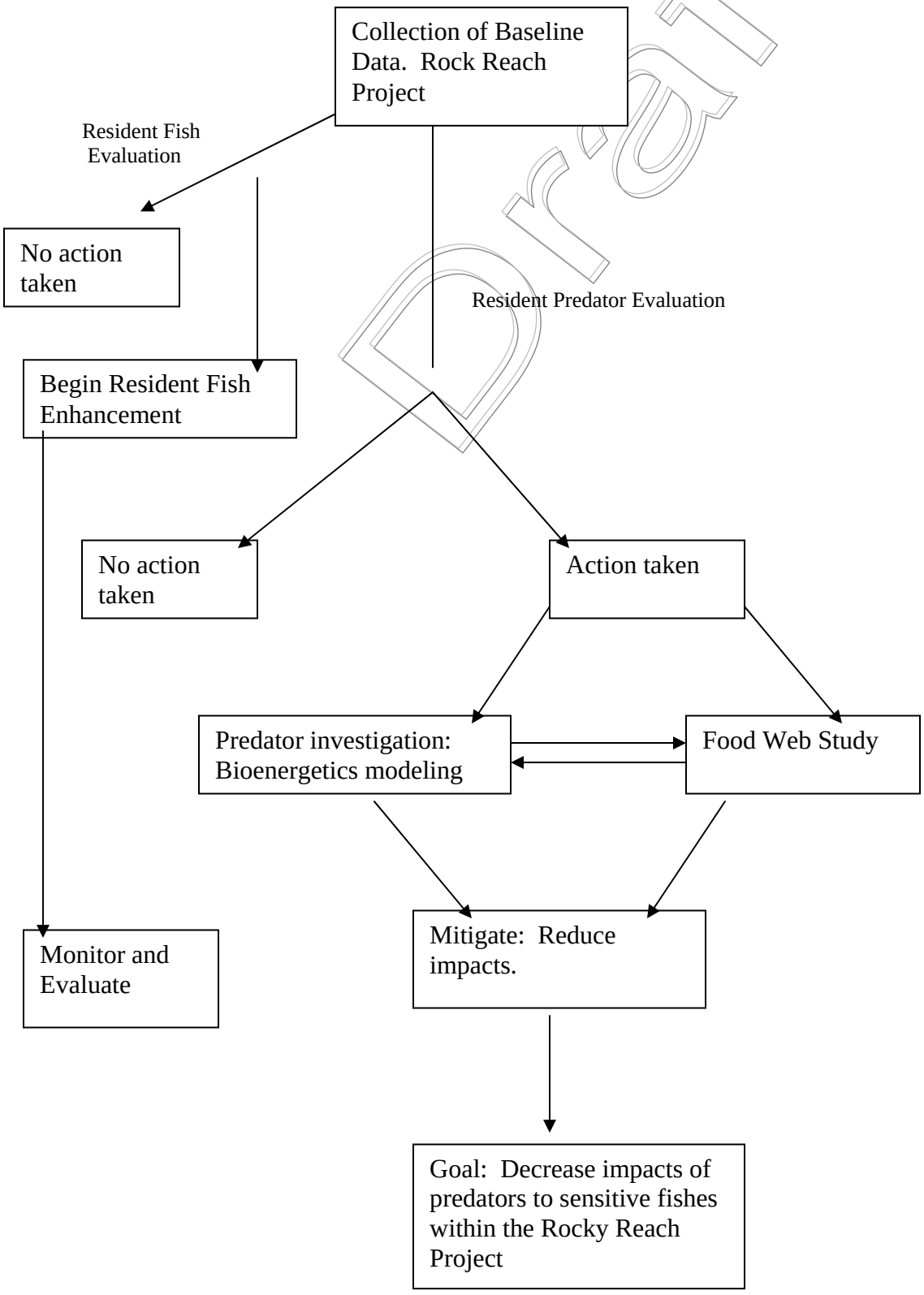

Figure 2: Chelan County PUD project flow chart.

Section 8: References

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Section 9: Appendix 1.

Large Lakes Research Team
Standard Operating Procedures and Gear Types

Boat Operations and Towing

All permanent LLRT personnel are required to complete both the Department of the Interior's Motorboat Operators Certification Course (MOCC) as well as the Smith-Root Principles of Electrofishing class. Operators and crew are required to wear U.S. Coast Guard approved PFD's (type I, II, III, IV) at all times. All LLRT vessels are equipped with mapping GPS, however, operators should not rely on these systems during operations and always be on the lookout for hazards. While operating a vessel with the LLRT it is important you adhere to the MOCC student manual as well as the Washington State Parks Adventures in Boating Washington Handbook. Prior to trailering a boat it is the responsibility of the crew to conduct a thorough safety check of both the tow vehicle and trailer.

Safety checklist

Tow Vehicle

- Tire pressure
- Oil
- Coolant
- Lights and indicators

Trailer and Boat

- Safety chain properly secured
- Lights hooked up and operational
- Everything inside vessel is secured
- Boat is secured to trailer
- Tire pressure
- Greased bearing buddies
- Motor up and locked
- Batteries turned off
- Plug is out during trailering

Towing

- Maintain longer distances between yourself and car in front
- Frequently check mirrors and status of boat

Launching Boat

- Do not unstrap and unchain boat until down the ramp
- Make sure plug is in
- Batteries turned on
- Motor lifted and unlocked

- Lights unplugged
- When stopped on ramp leave truck in gear or park and engage parking brake
- When making final launching approach take off seatbelt and open windows for communications between yourself and crew members outside of vehicle

Fish Collections

GPS coordinates (UTM) for all sampling gears are collected at each location.

Standardizing Techniques on the Lakes (Bonar et al 2000)

Gill Nets: 150' by 8' variable mesh monofilament with the following mesh size and panel length: 0.5" square - 25', 0.75" square - 25', 1" square - 50', 2" square - 50'.

- Gill nets should be set in the evening before electrofishing starts and retrieved the next morning.
- Nets should be set perpendicular to shore;
- Smallest mesh size should be closest to shore; and
- Although net–nights will be the unit of interest, record set time and pick up time.

Fyke Nets: 4' high, 3/8" diameter aluminum or stainless steel circular hoops with two 25' wings and up to an 100' lead. Mesh size is 0.25"

- Fyke nets should be set perpendicular to shore
- Nets should be set in the evening/late afternoon before electrofishing starts and retrieved the next morning;
- Record set time and pick up time; and
- Try to set the net so the top of the first hoop is no more than about 1 foot under the water's surface.
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Electrofishing: 18 ft Smith Root 5.0 Generator Powered Pulsator (GPP) electrofishing boat.

- Electrofishing should be conducted with pulsed DC, high range 100-1000 volts, 120 cycles per second;
- Standardize power output of the electrofishing unit based on the conductivity of each lake
- Electrofish starting at each randomly chosen sampling point for 600 seconds as measured by the timer on the electrofishing unit12. Always record on data sheets the actual number of seconds shocked (e.g., 578 sec, 600 sec, 605 sec, etc.);
- Electrofish in the same direction from the sampling point for all samples;
- Electrofish petal operations (continuous or intermittent) are at the discretion of the operator, and should be designed to capture the highest number of fish. Use intermittent shocking when approaching structure such as beaver lodges, downed trees, docks and weed patches.
- Stay off the pedal until close to structure, then hit the pedal;
- A minimum of two dippers and one driver should be in each electrofishing boat. Dippers
- should attempt to net everything, even young–of–year (YOY)
- We have found that catch rates go down if you electrofish the same section over again.
- Never cover the same section that you have electrofished over again

- Make sure that when fish are worked up, they are released back at the start of the section, and not near the end where they can stray into the next section to be electrofished again. Electrofish at night to have the highest catch rates.

Recent LLRT Amendment to Boat Electrofishing Operations

- Low power, 100-500 volts and 42-48% range at 30 Hz DC. We have found that fishes respond better to and exhibit galvanotaxis more frequently at lower power settings. In addition the probability of injury is lessened when fish exhibit taxis compared to tetany.

Additional Sampling Gears

Fall Walleye Index Nets (Gillnets): 61 m long by 1.8 m deep and consisting of 8 different stretch mesh sizes including 25, 38, 51, 64, 76, 102, 127, and 152 mm

- Set perpendicular to shore
- Rotate small and large mesh into shore
- Soak times 21-27 hours
- Consult Morgan 2002, Manual of Instructions-FWIN

Tangle Nets: To increase likelihood of survival the following steps are taken (Ashbrook et al. 2005).

- Tangle nets are similar to gillnets but made of multifilament mesh that is generally smaller than gill nets (3.5”- 4.5”). Catch fish around the head and maxillary and do not permit larger fish to become ‘gilled’ increasing their chance of asphyxiation.
- Set in a similar manner to gillnets, perpendicular to shore.
- Weights are used to anchor both sinking and floating tangle nets. Weight may vary depending on environment.
- Soak times range from 20-60 minutes.
- Use shorter nets 75-100’
- Carefully remove fish from nets
- Use large recovery box prior to release