
ROCKY REACH COMPREHENSIVE RESIDENT FISH MANAGEMENT PLAN

First Draft

**ROCKY REACH HYDROELECTRIC PROJECT
FERC Project No. 2145**

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

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SECTION 1: INTRODUCTION

In 1999, the Public Utility District No. 1 of Chelan County, Washington (Chelan PUD), initiated the alternative relicensing process for the Rocky Reach Hydroelectric Project (Project), FERC No. 2145. A Natural Sciences Working Group (NSWG) was established for the Project to identify issues, develop study plans, review study reports, and develop long-term management plans. The NSWG for the Rocky Reach Project consisted of the USDA Forest Service (USFS), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries (NOAA), Washington Department of Ecology (WDOE), Washington Department of Fish and Wildlife (WDFW), the U.S. Bureau of Land Management (BLM), the Colville Confederated Tribes (CCT), the Yakama Nation (YN) and other interested parties.

The Rocky Reach Comprehensive Resident Fish Management Plan (RFMP) was developed by the NSWG to address potential effects from continued operation of the Rocky Reach Hydroelectric Project. Because specific management plans have been developed for bull trout, Pacific lamprey, and white sturgeon, this management plan does not include specific measures for these species.

Relicensing baseline studies to determine the current status of fishery resources in Rocky Reach reservoir were initiated in the Project area in 1999. Studies investigated: (1) sport catch through conducting a creel survey; (2) sportsmans' access on the Wenatchee River; (3) aquatic habitat mapping survey; (4) fish presence and habitat survey; (5) benthic analysis; and (6) role of large woody debris.

The primary goal of the Rocky Reach Comprehensive Resident Fish Management Plan is: To protect and enhance resident fish and habitat in the Rocky Reach Project area by mitigating any specific adverse impacts demonstrated to be caused by continued operation of the Project.

Figure 1: Rocky Reach Hydroelectric Project Area Map (Placeholder)

SECTION 2: BIOLOGY AND ENHANCEMENT HISTORY

2.1 Resident Fish Species

The Rocky Reach Hydroelectric Project reservoir has sufficient spawning habitat, rearing habitat and food supply to support sizeable populations of native catostomids (suckers), cyprinids (northern pikeminnow, chubs, shiners) and stickleback (Mullan, 1986a; Dell, et al., 1975; DES, 2001a). Mountain whitefish are also present, although spawning success in the reservoir is probably limited because of warm temperatures in the fall and early winter (Mullan, 1986a). Rainbow trout are common but not abundant. Historic hatchery planting of catchable-sized trout in the Entiat River and residualization of hatchery steelhead smolts probably contribute to this population. Bull trout, federally listed as a threatened species, are present but limited in numbers. Bull trout populations throughout the tributaries to the mid-Columbia River have declined, probably in large part from over fishing. Adult and juvenile white sturgeon, a Washington state priority species, are present, but numbers are presumed to be limited (R.L. & L., 2002).

A fish presence and habitat use study was completed for the Rocky Reach reservoir in 1999 and 2000 (DES, 2001a). The fish assemblage of the reservoir was dominated by non-sport fish species, which contributed more than 99 percent to the total number of fish recorded. The major non-sport fish species included, in order of decreasing abundance, threespine stickleback, northern pikeminnow, redbelt shiner, sucker (various species, primarily largescale sucker), chiselmouth and peamouth. The most abundant resident sport fish species recorded was the rainbow trout (anadromous chinook salmon were the most abundant overall). Lesser numbers of mountain whitefish (native), and smallmouth bass (exotic) were captured. Mountain whitefish and smallmouth bass were relatively minor constituents of the sport fish population; only 10 mountain whitefish and seven smallmouth bass were recorded, compared to 549 anadromous chinook salmon and 62 resident rainbow trout.

Distinct spatial distribution patterns were observed for the major fish species recorded in the reservoir, and these patterns were due primarily to the different physical characteristics of habitat in different sections of the reservoir. The lower section of the reservoir (Rocky Reach dam to the Entiat River) is lacustrine in character and primarily supports species that prefer low-velocity habitats. The middle section of the reservoir is a transition zone between the predominantly slower-moving, deeper habitat in the lower section and the riverine habitat in the upper section. The middle section includes the confluences of the Entiat and Chelan rivers. The upper section of the reservoir (Beebe Bridge to Wells dam) has more constrictive characteristics with higher velocities.

Rainbow trout were recorded in all three sections of Rocky Reach reservoir. However, the numbers of this species were highest in the upper section of the reservoir and declined with increasing distance downstream. Mountain whitefish and smallmouth bass were recorded only in the middle section of the reservoir.

Northern pikeminnow, redbreast shiner and chiselmouth were distributed throughout the reservoir, but all of these species were most abundant in the lower section of the reservoir. The numbers of these species recorded declined with increasing distance upstream. Peamouth was also most abundant in the lower portion of the reservoir and occurred in low numbers in both the middle and upper sections of the reservoir. The abundance of threespine stickleback was greatest in the middle section of the reservoir and very low in the upper section. Suckers were distributed throughout the reservoir but were most abundant in the upper section. There was no apparent difference in the abundance of suckers between the lower and middle sections of the reservoir.

2.1.1 Pygmy Whitefish

Pygmy whitefish (*Prosopium coulteri*) are listed as a Washington state sensitive species, indicating that they are vulnerable, thus declining and likely to become endangered or threatened without cooperative management or removal of threats (WDFW, 2002a). Pygmy whitefish are a native species, currently found in relic populations in western North America. Pygmy whitefish are not found in the Rocky Reach Hydroelectric Project area. The only known population adjacent to the Project area is in Lake Chelan (Hallock and Mongillo, 1998). This species inhabits lakes, typically staying deeper than 18 feet. They also reside in streams, preferring habitats with moderate to swift current.

2.1.2 Burbot

Burbot (*Lota lota*) are listed as a species of concern by WDFW. Burbot are the only fresh-water member of the cod family and are found in the Columbia River system and in deep lakes (Wydoski and Whitney, 1979). Although burbot have been documented rarely in the Rocky Reach Hydroelectric Project area, they are present in the upper Columbia River system and have been reported in Lake Roosevelt, Lake Rufus Woods and Banks Lake. They are also present in Lake Chelan.

2.1.3 Other Species

Several other species are native to the Rocky Reach Hydroelectric Project, including peamouth chub (*Mylocheilus caurinus*), redbreast shiner (*Richardsonius balteatus*), longnose sucker (*Catostomus catostomus*). No management actions or active fisheries for these species are currently under way.

2.2 Recreational Fisheries

According to Washington state fishing regulations for 2002, recreational fishing within the Project area is open year-round for game fish such as smallmouth bass and walleye. In addition to these game fish species, over 20 other species, such as northern pikeminnow, mountain whitefish and pumpkinseed may be taken by anglers while fishing in the Project area. Fishing for white sturgeon is limited to catch and release only but is allowed year-round. In addition, fishing is periodically open to summer/fall chinook when run strength can withstand a fishery. Fishing for trout in the Project area is closed at all times. Fishing for spring-run chinook, steelhead and bull trout is closed due to their federal-listing status. There is no fishing allowed whatsoever, at any time in areas directly surrounding dams. These zones range from the upstream line of each dam to boundary markers located 400 feet downstream of the fish ladders at Rocky Reach and Rock Island hydroelectric projects, and 400 feet downstream of the spawning channel discharge

(on the Chelan County side) and the fish ladder (on the Douglas County side) at Wells Hydroelectric Project.

During the fish presence and habitat use study, associated with the Project reservoir (DES, 2001a), it was found that game fish species accounted for less than 1 percent of all fish recorded. The most abundant game fish species captured were anadromous chinook salmon (549 fish; discussed in detail under anadromous fish species), followed by resident rainbow trout (62 fish). Game fish species that are present in the reservoir are discussed below.

2.2.1 Smallmouth Bass

Smallmouth bass (*Micropterus dolomieu*) are a non-native game fish that have inhabited the mid-Columbia River reach since at least the 1940s. They are listed as a priority species in Washington state because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW, 2002a). Preferred habitat for this species includes rocky shoals, banks or gravel bars. Adult smallmouth bass in the mid-Columbia River are most abundant around the deltas of warmer tributary rivers, but they do not occur in tributary streams. The optimal temperature range for this species is from 21^E to 27^EC (Wydoski and Whitney, 1979), which is higher than the temperatures typically observed in the mid-Columbia River reservoirs.

Ideal spawning temperatures for this species range from 15.5^E to 18.5^EC. Such temperatures do not occur consistently in the mid-Columbia River reservoirs until late summer. Smallmouth bass build and defend nests in sloughs and littoral areas with sand and gravel substrates. Such areas are generally lacking in the mid-Columbia River system. It is believed that primary natural reproduction of smallmouth bass in the mid-Columbia River occurs only in the Hanford Reach below Priest Rapids Hydroelectric Project and in the Okanogan River.

Smallmouth bass were the second most abundant predator species captured in the mid-Columbia River region during predator assessment sampling conducted in 1993. They were most frequently captured from forebay sampling sites (Burley and Poe, 1994). They are a significant fish predator species in the Columbia River and prey on juvenile salmonids. Similar relative abundance estimates of smallmouth bass were observed in recent sampling programs in the mid-Columbia River reservoir areas (Beak and Rensel Associates, 1999; Parametrix and University of Idaho, 2000; DES, 2001a). In the 1993 predator assessment, fish composed 87 percent of the smallmouth bass diet, with salmonids consisting of 11 percent of the prey fish.

2.2.2 Walleye

Walleye (*Stizostedion vitreum*) are a cool-water, piscivorous game fish that are believed to have moved downstream into the mid-Columbia River reach from a population that was originally established for recreational fishing in Lake Roosevelt in the late 1950s (Zook, 1983). However, they were the least abundant predator species captured in the mid-Columbia River in 1993 (Burley and Poe, 1994). They are listed as a priority species in Washington state because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW, 2002a).

Walleye occur throughout the mainstem reservoirs but are not typically found in the tributaries. Although suitable spawning habitat appears to be plentiful in the mid-Columbia River, evidence

of successful reproduction has not been observed (Zook, 1983). Recruitment of walleye into the mid-Columbia River reservoirs is suspected to result from the entrainment of young fish through Grand Coulee Hydroelectric Project during spring runoff (Zook, 1983).

2.2.3 Largemouth Bass

Largemouth bass (*Micropterus salmoides*) were widely introduced in Washington state in the late 1800s (Wydoski and Whitney, 1979). They are listed as a priority species in Washington state because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW, 2002a). They prefer clear water habitat with mud and sand substrates, which is best suited for aquatic vegetation production (Wydoski and Whitney, 1979). Largemouth bass are captured infrequently in the Project reservoir, and little is known about their populations in this area (Beak and Rensel, 1999; DES, 2001a; Parametrix and University of Idaho, 2000; Burley and Poe, 1994).

2.2.4 Channel Catfish

Channel catfish (*Ictalurus punctatus*) is a non-native species that is found most often in clear lakes, reservoirs and streams. In streams, this species is usually found in moderate to swift currents over sand, gravel and rubble substrate. However, little is known about their habitat preferences in lakes and reservoirs (Wydoski and Whitney, 1979). Channel catfish are listed as a priority species in Washington state because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW, 2002a). Channel catfish are infrequently captured in the Project reservoir, and little is known about their populations in this area (DESa, 2001; Parametrix and University of Idaho, 2000; Burley and Poe, 1994).

2.2.5 Rainbow Trout

Rainbow trout (*Oncorhynchus mykiss*) are an inland (remains in freshwater) form of steelhead. However, some rainbow trout remain in fresh water for a significant portion of their lives then undergo a physiological change to a smolt and migrate to the ocean late in life. In contrast to the potential for rainbow trout to become anadromous, the progeny of steelhead are believed to have the potential to become resident rainbow (Peven, 1990). Inland rainbow and juvenile steelhead are not distinguishable from each other until the steelhead undergo smoltification. The mid-Columbia River tributaries contain a mixture of resident rainbow and ocean-migrating steelhead. The ability of the species to alternate life-history strategies is an adaptive mechanism to variable environmental conditions.

2.2.6 Mountain Whitefish

Mountain whitefish (*Prosopium williamsoni*) are a native species and are assumed to occur in all small-order tributaries to the Wenatchee, Entiat, Methow and Okanogan rivers and in connecting larger lake systems. They are also believed to occur in the mainstem reservoirs, although their behavior patterns are not known. They mostly inhabit riffles in summer and large pools in winter (Wydoski and Whitney, 1979). Spawning typically occurs from October through December, generally in riffles but also on gravel shoals of lake shores. Mountain whitefish feed primarily on instar forms of benthic aquatic insects, although they also occasionally eat crayfish, freshwater shrimp, leeches, fish eggs and small fish. In lakes, they feed extensively on zooplankton, particularly cladocerans.

2.2.7 Northern Pikeminnow

Northern pikeminnow (*Ptychocheilus oregonensis*) (formerly northern squawfish) are a native species to the Columbia River. They are slow-growing, long-lived predators. In summer, adult northern pikeminnow prefer shallow, low-velocity areas in cool lakes or rivers. During the winter, they use deeper water and pools (Scott and Crossman, 1973). Spawning occurs during the summer, in shallow water areas with gravel substrate.

Northern pikeminnow are the most abundant predator species in the Columbia River system, and they account for over 75 percent of the total catch of predator fish in the mid-Columbia River (Loch, et al., 1994). They tend to concentrate in tailrace areas downstream of mainstem dams during the juvenile salmonid migration period, holding in relatively slow-moving water areas (less than about 3 feet per second) near passage routes. They also occur in tributary streams where slow-moving water occurs.

Northern pikeminnow are considered a nuisance species because of their tendency to prey upon desirable native and sport fish species. Therefore, efforts have been made to remove numbers of northern pikeminnow from the Rocky Reach Hydroelectric Project area. Between 1994 and 2001, the predator abatement programs resulted in the removal of 33,110 northern pikeminnow at Rock Island Hydroelectric Project dam, 44,882 at Rocky Reach Hydroelectric Project dam, and 32,250 at Wells Hydroelectric Project dam (Chelan PUD, 1999a; Douglas PUD, 1999; Bickford, 2002 personal communication). In addition, over 7,700 northern pikeminnow were removed during fishing derbies conducted between the Rock Island and Chief Joseph Hydroelectric Projects from 1998 through 2001 (West, 2002).

SECTION 3: CRITICAL UNCERTAINTIES

3.1 Project Affects

The Natural Sciences Working Group identified the following issues regarding resident fish populations in the Rocky Reach Hydroelectric Project area:

- Project effects on resident fish;
- Effects of Project operations on the recreational fishery; and
- Effectiveness of predator control on pikeminnow populations.

3.1.1 Effects on Resident Fish

The continued operation of the Rocky Reach Hydroelectric Project will have minimal effects on resident fish species as they exist under the current operating conditions. Results from a study on effects of pool fluctuations on natural resources in the Rocky Reach Hydroelectric Project area concluded that reservoir fluctuations do not strand fish, affect predation on anadromous fish, or affect migrations (BioAnalysts, 2000c). In addition, the stable pool levels have increased soil moisture and have enhanced riparian habitat.

Non-game fish such as suckers, chubs, Northern pikeminnow, stickleback and shiners make up the majority of the reservoir resident fish population (DES, 2001a). The introduced species (walleye, centrarchids, catfish and carp) are common, but not abundant. Walleye, smallmouth bass and carp recruitment is probably limited by the low temperatures in the Rocky Reach Hydroelectric Project pool in spring and early summer (Bennett, 1991; Mullan, et. al.,1986). An initial “explosion” of non-game fish after inundation was followed by a reduction and, over the last decade, an eventual leveling off of non-game species. Mullan, et. al., (1986) theorized that the mid-Columbia reservoirs are dominated by trophic generalists, such as cyprinids, in part because of minimal predation. The reservoirs lack a substantive population of highly piscivorous keystone predators such as walleye (Burley and Poe, 1994).

Although an adverse effect of Project operations to resident fish has not been identified, Chelan PUD will continue to monitor resident fish populations during the course of the new license term. In addition, there is an interest by the Natural Sciences Working Group to continue ongoing measures that were provided as compensation for lost recreational fishery opportunities under the existing license. These measures are intended to address potential impacts to burbot, mountain whitefish and other resident fish species.

3.1.2 Effects on Recreational Fisheries

Under the original license, Chelan PUD implemented a rainbow trout hatchery program to address impacts to the recreational fishery. This program produced 90,000 adult-sized rainbow trout annually originally for placement in tributaries. Due to concerns about interactions between rainbow trout and native fish in the tributaries, the program was modified to place 90,000 adult-sized rainbow trout in local area lakes.

3.1.3 Effectiveness of Predator Control

Chelan PUD has been conducting, and will continue to conduct, a predator control program in an effort to reduce predation-related mortality of juvenile salmon and steelhead. Northern pikeminnow angling is conducted daily during the juvenile salmon and steelhead spring and summer migration periods to remove northern pikeminnow from the Project waters. Avian predation reduction measures are also implemented as part of the program. The efforts are designed to reduce predation in the Project area, and coordinated through the Rocky Reach Habitat Conservation Plan.

Chelan PUD has documented the effectiveness of the northern pikeminnow predator control program through monitoring the number and size structure of fish caught near Rocky Reach Hydroelectric Project. Since 1994, the number and size (length) of pikeminnow caught through the program has decreased (West, 2000, 2001, 2002). These data indicate that the removal program is reducing the number of large predatory pikeminnow in the Project vicinity, which is precisely the goal of the program. The increase in juvenile salmonid survival passing the dam is not quantifiable, but the assumption upon which the program is based is that reducing the number of large pikeminnow will increase overall juvenile salmonid migration survival.

SECTION 4: PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

4.1 Plan Goal

The goal of the Rocky Reach Comprehensive Resident Fish Management Plan is: To protect and enhance resident fish and habitat in the Rocky Reach Project area by mitigating any specific adverse impacts demonstrated to be caused by continued operation of the Project.

4.2 Protection, Mitigation, and Enhancement Measure Development Guidelines

PME measures were developed using the following criteria:

- Is the impact directly caused by the Project facilities or operation?
- Is the measure an enhancement?
- Is the measure a Chelan PUD responsibility?
- Is the measure consistent with or a result of relicensing studies?
- Has the issue been previously addressed?
- Is the measure reasonable, attainable, or measurable?

4.3 Protection, Mitigation, and Enhancement Measures

Specific adverse impacts of continued operation of the Rocky Reach Hydroelectric Project were not identified through relicensing studies. Ongoing impacts carried over from the existing license include the ongoing lost whitefish sport fishery. Therefore Chelan PUD will implement the following measures to address these impacts.

- (a) Fish stocking: To address potential effects to the recreational fishery, Chelan PUD will continue its current stocking program which produces 90,000 rainbow trout for planting in local area lakes. The estimated cost of this measure is \$100,000 per year for each year of the license term.
- (b) Lake Chelan spawning channel: Chelan PUD will continue the 25-Mile Creek spawning channel program, which originally was developed as part of the original Rocky Reach Hydroelectric Project license to raise kokanee as mitigation for lost sport fishing opportunities on the Columbia River. The Natural Sciences Working Group discussed options including reworking the channel to improve kokanee spawning; reconfiguring the channel to support production of Westslope cutthroat trout; combinations of both objectives. Decisions for future operation of the spawning channel will be made jointly by the Lake Chelan Fishery Forum (LCFF) and Rocky Reach Fishery Forum (RRFF). Chelan PUD will provide funding not to exceed \$50,000 for reconfiguration and maintenance of the channel. Other agencies and interested organizations will share the remainder of costs of the effort.
- (c) Fish monitoring and evaluation: To address potential effects to resident fish, Chelan PUD will provide \$6,000 per year (\$60,000 every 10 years) for each year of the

license term to complete periodic monitoring and evaluation studies as described in the comprehensive plan.

- (d) Predator control: Predator control of northern pikeminnow is covered within the Habitat Conservation Plan.

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