
ROCKY REACH BULL TROUT MANAGEMENT PLAN

Final Draft

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

July 15, 2005



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

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EXECUTIVE SUMMARY

The relicensing process for the Rocky Reach Hydroelectric Project (Project) brought fisheries agencies, tribes, and interested parties together in a Natural Resources Working Group (NRWG) and provided an opportunity for comprehensive review of current and future management priorities for fish resources potentially impacted by on-going Project operations. The NRWG was established to identify issues, develop study plans, review study reports, and develop long-term management plans for fish and wildlife species. The development of this Rocky Reach Bull Trout Management Plan (BTMP) was an integral part of the relicensing process.

Bull trout are listed as threatened under the Endangered Species Act (ESA). Due to the listing of bull trout under the ESA within the mid-Columbia River Basin, and the possibility that the operation of hydroelectric projects owned and operated by Chelan, Douglas, and Grant PUDs (Mid-Columbia PUDs) may have some effect on them, the Mid-Columbia PUDs decided to evaluate the status of bull trout in the mid-Columbia River Basin. Prior to relicensing studies, little was known about the life-history characteristics (e.g., movements, distribution, habitat use) of bull trout in the mid-Columbia Basin.

A radio telemetry study was initiated in 2001, where radio tags were inserted into adult bull trout collected at Rocky Reach, Rock Island, and Wells dams. These fish were tracked to describe their movements and migration patterns within the mid-Columbia Basin. The radio telemetry study did not detect any adverse effects from operation of those dams on movement or survival of tagged bull trout (BioAnalysts 2002; 2004). There have been no documented cases to date of tagged adult bull trout being injured during upstream or downstream passage through these dams. Relicensing baseline studies did not demonstrate a reduction in suitable habitat or density of forage species used by bull trout to overwinter and grow in the Rocky Reach Reservoir.

The goal of the BTMP is to identify, develop, and implement measures to monitor and address ongoing impacts, if any, on bull trout passage resulting from ongoing Project operations in a manner consistent with the US Fish and Wildlife Service (USFWS) draft Bull Trout Recovery Plan¹. The BTMP goal will be accomplished through implementing measures described in sections 3 and 4. More specifically, sections 3.5, 3.6, and 3.7 identify impact minimization and reasonable and prudent measures required by the USFWS Biological Opinion (USFWS 2004 BO) dated May 12, 2004², on Chelan PUD's Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for the Rocky Reach Project. These measures, to be implemented prior to issuance of the New License, are:

¹ U.S. Fish and Wildlife Service. 2002. Chapter 22, Upper Columbia Recovery Unit, Washington. 113p. *In*: U.S. Fish and Wildlife Service. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Portland, Oregon.

² U.S. Fish and Wildlife Service. Biological Opinion and Conference Opinion for the License Amendments to incorporate the Rocky Reach, Rock Island, and Wells Anadromous Fish Agreements and Habitat Conservation Plans. FWS Ref. No. 04-W0203, submitted to FERC on February 25, 2005 in accordance with Article 411 of the Orders Amending License on June 21, 2004 (107 FERC 61,281).

- 1) Conduct video monitoring and take digital photographs of bull trout in the upstream fishway (fishway counts);
- 2) Conduct radio-telemetry monitoring for continued identification of potential Project-related impacts on upstream and downstream passage of adult bull trout for the purpose of assessing Incidental Take;
- 3) Correlate bull trout passage with the upstream fishway, downstream bypass, and ongoing Project operations;
- 4) Operate upstream fishway in accordance with Chelan PUD's Fish Passage Plan (Grassell 2005) criteria;
- 5) Investigate feasibility of video monitoring adult fish at the downstream bypass adult separator;
- 6) PIT tag sub-adult bull trout to monitor movement past the Dam;
- 7) Assess sub-adult bull trout condition at the downstream bypass sampling facility;
- 8) Investigate the potential stranding and entrapment of sub-adult bull trout in the Project Reservoir (Reservoir);
- 9) Participate in development and implementation of the USFWS Recovery Plan;
- 10) Expand off-season (Nov. 15-Apr. 14) upstream fishway passage counts;
- 11) Consider collection and hauling of woody debris for tributary enhancement;
- 12) Participate in information exchanges with other entities conducting bull trout research and regional efforts to explore methods to monitor upstream and downstream movement of sub-adult bull trout in the mainstem Columbia River; and
- 13) Fund genetic analysis of bull trout tissue samples.

Generally, the above measures focus on Chelan PUD's efforts to monitor bull trout over several years (2005 through 2008 or 2006 through 2009, depending on the activity) to ensure that incidental take does not exceed the allowance set forth in the USFWS 2004 BO.

This BTMP has four objectives: 1) continue operating the upstream fishway and downstream bypass; 2) identify any adverse ongoing Project-related impacts on adult and sub-adult bull trout passage through monitoring; 3) implement reasonable and feasible options to modify the upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified; and 4) participate in the development and implementation of the USFWS Bull Trout Recovery Plan including information exchange and genetic analysis. Measures outlined in section 4 are the continuation of commitments made under the USFWS 2004 BO and are intended to meet the requirement that Chelan PUD monitor and minimize the effect of any incidental take for the term of the New License. To meet the objectives, the BTMP calls for Chelan PUD to implement the following PME's during the term of the New License:

- 1) Continue to provide upstream passage for adult bull trout through the existing upstream fishway and downstream passage of adult and sub-adult bull trout through the existing downstream bypass;
- 2) Continue counting bull trout in the upstream fishway (fishway counts) at Rocky Reach Dam;
- 3) Continue operation of the adult fishways at Rocky Reach Dam in accordance with Chelan PUD's Fish Passage Plan anadromous fish criteria;

- 4) Conduct an adult bull trout telemetry program (every 10 years) to continue monitoring upstream and downstream passage;
- 5) Identify and implement reasonable and feasible options to modify the upstream fishway, downstream bypass, or operations to reduce identified impacts on bull trout passage.
- 6) Participate in development and implementation of the USFWS Recovery Plan;
- 7) Consider woody debris collection and hauling for tributary enhancements;
- 8) Fund collection of bull trout tissue samples and genetic analysis; and
- 9) Participate in information exchanges with other entities conducting bull trout research and regional efforts to explore methods to monitor upstream and downstream movement of sub-adult bull trout in the mainstem Columbia River.

In addition to the four objectives stated previously, this BTMP is intended to satisfy the requirements of the USFWS 2004 BO on operation of the Project, consistent with the HCP, be consistent with USFWS draft (and ultimately final) Bull Trout Recovery Plan, and comprise the minimization measures that are anticipated as necessary to minimize the effect of any incidental take under a New License for the Project.

SECTION 1: INTRODUCTION

The relicensing process for the Rocky Reach Hydroelectric Project (Project) brought fisheries agencies, tribes, and interested parties together in a Natural Resources Working Group (NRWG) and provided an opportunity for comprehensive review of current and future management priorities for fish resources potentially impacted by ongoing Project operations. The NRWG was established to identify issues, develop study plans, review study reports, and develop long-term management plans for fish and wildlife species. The NRWG consisted of representatives from the USDA Forest Service, U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries, Washington Department of Ecology (WDOE), Washington Department of Fish and Wildlife (WDFW), U.S. Bureau of Land Management (BLM), Colville Confederated Tribes (CCT), Yakama Nation (YN), Columbia River Inter-Tribal Fish Commission (CRITFC) and other interested parties.

Technical groups were formed for each comprehensive plan, e.g., resident fish, white sturgeon, bull trout, Pacific lamprey, and wildlife due to the complexity of issues surrounding each species and so that agency experts could focus on meetings pertaining to their specific expertise. A subgroup of the NRWG, the Bull Trout Technical Group, comprised of the USFWS, WDFW, WDOE, USDA Forest Service, and Chelan PUD, completed this Rocky Reach Bull Trout Management Plan (BTMP). Upon the effective date of the New License, the Settlement Agreement's Rocky Reach Fish Forum (RRFF) shall be responsible for meeting to share information, coordinate efforts, and make recommendations regarding the implementation of the BTMP.

This BTMP contains sections highlighting the background of the species (section 2); relicensing and other studies conducted to determine on-going Project-related impacts, if any, on the species, for the purpose of monitoring and minimizing the effect of any incidental take prior to New License issuance (section 3); goals and objectives of the management plan, which were developed in conjunction with the Bull Trout Technical Group and are based upon study results (section 4); and Protection, Mitigation and Enhancement measures (PMEs) developed for achieving the goals and objectives to be implemented through the term of the New License and any subsequent annual licenses (section 4).

1.1 Relationship Between the HCP Biological Opinion for Bull Trout and Relicensing

On June 10, 1998, the USFWS listed bull trout (*Salvelinus confluentus*) within the Columbia River basin as threatened under the ESA (63 Fed. Reg. 31,647). Later (November 1, 1999), the USFWS listed bull trout within the coterminous United States as threatened under the ESA (64 Fed. Reg. 58,910).

Following listing of bull trout, the USFWS initiated the development of a Bull Trout Recovery Plan. In developing the draft Recovery Plan, the USFWS identified habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, and grazing; blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced

non-native species as major factors affecting the distribution and abundance of bull trout. It noted that dams (and natural barriers) may isolate population segments, resulting in a loss of genetic exchange among these segments (63 Fed. Reg. at 31,657). The USFWS believes many populations are now isolated or fragmented.

On June 21, 2004, the FERC license for the Project was amended to incorporate the Rocky Reach Anadromous Fish Agreement and Habitat Conservation Plan (HCP) to protect mid-Columbia anadromous salmon and steelhead. Benefits to other aquatic species, such as bull trout, are expected to occur through implementation of measures required in the HCP.

At the conclusion of its ESA section 7 consultation on operating the Project consistent with the HCP, the USFWS issued a biological opinion (USFWS 2004 BO) analyzing any potential effects of such operations on bull trout, a species not covered by the HCP. The USFWS concluded in the USFWS 2004 BO that operation of the Project consistent with the HCP is not likely to jeopardize the continued existence of the Columbia River distinct population segment of bull trout, and is not likely to destroy or adversely modify then-proposed critical habitat for bull trout. Subsequent to this action (September 22, 2004), the USFWS declined to designate the mid-Columbia Basin in the final rule establishing critical habitat for the Columbia River bull trout Distinct Population Segment (DPS). Currently, the USFWS is documenting its administrative record regarding its reasons for excluding the mid-Columbia basin from its critical habitat designation. In addition to the USFWS 2004 BO, it issued an accompanying incidental take statement that includes reasonable and prudent measures and terms and conditions designed to minimize incidental take at the Project. The USFWS 2004 BO's reasonable and prudent measures, the USFWS terms and conditions, and the impact minimization measures formed the basis for developing this BTMP.

While the USFWS 2004 BO discusses the development of the BTMP through relicensing, it also requires implementation of certain monitoring measures in advance of the issuance of the New License, since the HCP license amendment for which the USFWS 2004 BO was approved by FERC in 2004. The relationship between the USFWS 2004 BO and this BTMP are fully described in section 3.

In addition to the four objectives, this BTMP is intended to satisfy the requirements of the USFWS 2004 BO on operation of the Project, consistent with the HCP, be consistent with USFWS draft (and ultimately final) Bull Trout Recovery Plan, and comprise the minimization measures that are anticipated as necessary to minimize the effect of any incidental take under a New License for the Project.

SECTION 2: BACKGROUND

2.1 Geographic Range and Biology

Bull trout are native to northwestern North America, historically occupying a large geographic range extending from California north into the Yukon and Northwest Territories of Canada, and east to western Montana and Alberta (Cavender 1978). They are generally found in interior drainages, but also occur on the Pacific Coast in Puget Sound and in the large coastal drainages of British Columbia.

Bull trout currently occur in lakes, rivers and tributaries in Washington, Montana, Idaho, Oregon, Nevada, two Canadian Provinces (British Columbia and Alberta), and several cross-boundary drainages in extreme southeast Alaska. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta, and the McKenzie River system in Alberta and British Columbia (Cavender 1978; McPhail and Baxter 1996; Brewin and Brewin 1997). The remaining distribution of bull trout outside of these geographic areas is highly fragmented.

Bull trout are members of the char group, within the family Salmonidae. Bull trout closely resemble Dolly Varden (*Salvelinus malma*), a related species. Genetic analyses indicate, however, that bull trout are more closely related to an Asian char (*Salvelinus leucomaenis*) than to Dolly Varden (Pleyte et al. 1992). Bull trout are sympatric with Dolly Varden over part of their range, most notably in British Columbia and the Coastal-Puget Sound region of Washington State.

2.2 Life History

Bull trout exhibit four distinct life history types: resident, fluvial, adfluvial, and anadromous. The fluvial, adfluvial, and resident forms exist throughout the range of the bull trout (Rieman and McIntyre 1993). These forms spend their entire life in freshwater. The anadromous life history form is not known to occur outside the Coastal Puget Sound region within the coterminous United States (Volk 2000; Kraemer 1994; Mongillo 1993), and does not occur in the Columbia River. Multiple life history types may be expressed in the same population, and this diversity of life history types is considered important to the stability and viability of bull trout populations (Rieman and McIntyre 1993). For adfluvial bull trout, growth and maturation occurs in lakes or reservoirs, and for fluvial bull trout, it occurs in large river systems. Resident bull trout populations are generally found in small headwater streams, where these fish remain their entire lives.

For migratory life history types, sub-adults tend to rear in tributary streams for one to four years before migrating downstream into a larger river or lake to mature (Rieman and McIntyre 1993). In some lake systems, fish less than one year old may migrate directly to lakes (Riehle et al. 1997). Sub-adult and adult bull trout in streams frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1993), and areas with cold hyporheic zones or groundwater upwellings (Baxter and Hauer 2000).

Bull trout are believed to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Growth, survival, and long-term persistence are dependent upon habitat characteristics such as cold water, complex instream habitat, a stable substrate with a low percentage of fine sediments, high channel stability, and stream/population connectivity. Stream temperature and substrate type, in particular, are critical factors for the sustained long-term persistence of bull trout. Spawning is often associated with the coldest, cleanest, and most complex stream reaches within basins. However, bull trout may exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1995), and should not be expected to occupy all available habitats at the same time (Rieman et al. 1997).

Bull trout are present in the Rocky Reach, Rock Island and Wells reservoirs, including the Wenatchee, Entiat, and Methow rivers. Three life history forms, adfluvial, fluvial, and resident, are believed to occur in the mid-Columbia basin. Both adult³ and sub-adult⁴ bull trout are routinely observed and counted by Chelan PUD employees while passing through the upstream fishways at Rocky Reach and Rock Island dams. Sub-adult bull trout have been observed in the juvenile fish sampling facilities at both dams as well, although infrequently. Sub-adult bull trout were sampled in the Rocky Reach Dam prototype downstream bypass in 1998, 1999, 2000, 2001, and 2002, with 23, 30, 8, 4, and 5 fish observed, respectively. In 2003 and 2004, no sub-adult bull trout were sampled at the new Rocky Reach Dam downstream bypass sampling facility, likely because sampling periods were greatly reduced (down to two hours per day), compared to much longer periods for the previous prototype bypass.

Chelan PUD began counting bull trout using the upstream fishway in 1998. A total of 83 bull trout passed Rocky Reach Dam between May 3 and July 31 that year (Chelan PUD, 2002a unpublished data). In 1999, 2000, and 2001, counts of bull trout using the fish ladder from May 1 and July 31 were 93, 183, and 176, respectively. In 2000 and 2001, counts of bull trout using the fish ladder from April 14 through November 14 were 212 and 204, respectively (BioAnalysts 2004). In 2002, a total of 204 bull trout passed Rocky Reach Dam from April 14 to November 14, with the most (177) passing from May 1 to July 31. In 2003 (April 14 – November 14), 248 bull trout passed Rocky Reach Dam during the normal anadromous counting period. Experimental off-season fish counts conducted between November 15 and December 27, 2003 recorded another 70 bull trout passing Rocky Reach Dam, for a total count of 318 bull trout in 2003. (April 14 – December 27). In 2004, 161 bull trout passed Rocky Reach Dam during the normal anadromous counting period (April 14 – November 14). Experimental off-season fish counts, conducted between November 15 and December 27, 2004, recorded another 7 bull trout passing Rocky Reach Dam, for a total count of 168 bull trout in 2004. (April 14 – December 27). In all years on record (1998-2004), the majority of the bull trout passed the Project in May and June (75 to 90 percent). Although the full extent of bull trout passage at other times of the year is unknown, bull trout do use the upstream fishway to pass Rocky Reach Dam in September through December. The general anadromous fish counting season ends around November 15 each year.

³ Adult bull trout for this document refers generally to fish 305 mm (12 in) or greater in length.

⁴ Sub-adult bull trout for this document refers to fish less than 305 millimeters (12 inches) in length. Sub-adult is a term used by the USFWS to describe bull trout that are juveniles.

2.3 Upstream Fishway Operations

The Rocky Reach Dam upstream fishway is operated continuously for adult fish passage from approximately 1 March to the last week of December. The only exceptions to this continual operation would be unanticipated mechanical/electrical breakdown in the fishway requiring an immediate outage (dewatering may also be necessary), or removal of excessive milfoil/debris from attraction water system (AWS) pump intake screens/trashracks (dewatering is not required; however pumps must be shut off from four to six hours). A buildup of milfoil on the AWS intake screens/trashracks will reduce the pumping efficiency and prevents the fishway from maintaining the required operational criteria. Two to three AWS pump outages may occur over the months of August and September (depending on milfoil production).

Between the last week of December and 1 March, the fishway undergoes an annual maintenance period to keep the fishway operating in an optimum and prescribed manner. During the maintenance period, 1) the entire fishway is inspected and cleaned by fishway attendants; 2) worn or broken equipment is replaced and/or repaired by mechanics and wiremen; and 3) critical operating equipment (e.g. AWS pumps, motorized operating valves, etc.) are thoroughly evaluated to confirm their readiness for the upcoming fish season. In some instances, depending on the maintenance schedule and operational demands, an overhaul of this critical equipment may be necessary.

SECTION 3: STUDIES & EVALUATION OF ON-GOING PROJECT EFFECTS

Due to the listing of bull trout under the ESA within the mid-Columbia River Basin, and the possibility that operation of hydroelectric projects owned and operated by the mid-Columbia PUDs may have some effect on them, the mid-Columbia PUDs decided to evaluate the status of bull trout in the mid-Columbia River Basin. Prior to these relicensing studies, little was known about the life-history characteristics (e.g., movements, distribution, habitat use) of bull trout in the mid-Columbia Basin.

3.1 Relicensing Studies

A radio telemetry study was initiated in 2001 where radio tags were inserted into adult bull trout collected at Rocky Reach, Rock Island, and Wells dams. These fish were tracked to describe their movements and migration patterns within the mid-Columbia Basin (Figure 1) (BioAnalysts, 2002, 2004). The goal of the study was to assess the operational effects of hydroelectric projects on adult bull trout and adult bull trout migratory behavior in the mid-Columbia Basin.

The objectives for this three-year study were to: (1) describe the movements and migration patterns of adult bull trout in the mid-Columbia Basin; and (2) assess the on-going effects, if any, of hydroelectric operations on the movement and migration patterns of adult bull trout in the mid-Columbia River.

As part of the study, a total of 79 bull trout were tagged in 2001 and 2002 (15 fish at Rock Island Dam, 45 fish at Rocky Reach Dam and 19 fish at Wells Dam). Approximately half of the fish were released upstream of the dam where they were captured, and the other half were released downstream of the respective project.

3.1.1 Movement and Migration Patterns

Study results indicate that some bull trout reside for considerable periods of time in the Columbia River mainstem reservoirs, and then pass upstream through the upstream fishway in late spring and early summer to enter tributaries. All of the tagged fish, regardless of their release location, migrated into the Wenatchee, Entiat, or Methow rivers, presumably to spawn. Only one fish entered the Okanogan River for a brief period. It exited, swam downstream and entered the Methow River. Most of the tagged bull trout had entered tributaries by mid to late June in both years (BioAnalysts, 2002, 2004). Of the 79 bull trout tagged during the study, nine fish moved downstream past the Dam (5 fish in 2002 and 4 in 2003) after being released, and 10 fish moved downstream past Rock Island Dam after an extended stay in tributaries (BioAnalysts, 2004).

After exiting tributaries in late fall, a few of the tagged bull trout moved downstream of Rocky Reach Dam through the turbines. One fish passed downstream through the turbines at both Rocky Reach and Rock Island dams, after exiting the Entiat River in November 2001. This fish over-wintered downstream of Rock Island dam, then migrated back through upstream fishways at Rock Island and Rocky Reach in May of 2002. Again, it entered the Entiat River in mid-June 2002, three days later than it did in 2001.

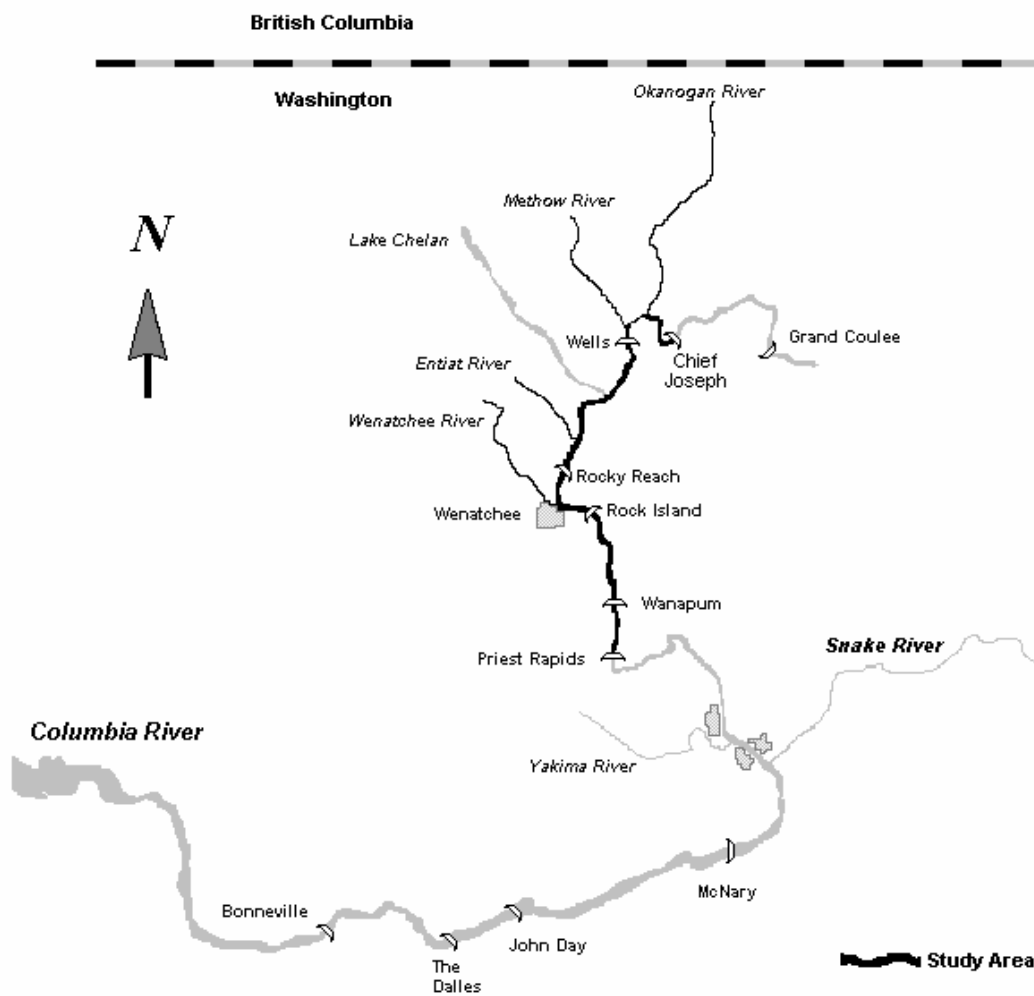


Figure 1: Study Area for Assessing Migration Patterns of Bull Trout in the Mid-Columbia River.

The frequency, timing, and route of downstream passage by sub-adult bull trout through Rocky Reach Dam are not known because sub-adults cannot be radio-tagged with existing technology. Sub-adult downstream passage may occur any time, and the routes available to sub-adult fish is dependent on the time of year. From results of telemetry studies, adult bull trout in the Reservoir are more likely to move downstream of the Dam in the mid to late fall, after spawning and re-entering the mainstem Columbia River from tributaries. Because Columbia River migratory bull trout are present in very low densities compared with other fish species, and they have relatively unpredictable migration behavior (especially sub-adults), effective study methods to evaluate downstream passage have not been developed. As described in Section 3.6.3.2 below, however, Chelan PUD will participate in information exchanges and regional efforts to explore effective study methods.

3.1.2 Project Effects on Movement

The radio telemetry study identified no apparent adverse effects on movement or survival of tagged bull trout. (BioAnalysts, 2002, 2004). It appears that none of the tagged adult bull trout were injured during upstream or downstream passage through Rock Island, Rocky Reach, or Wells dams, even when they passed through the turbines. Of the 79 bull trout tagged in 2001 and 2002, only one mortality was verified to have occurred in the mainstem Columbia, and it was not related to Project operations.

Downstream passage routes available to bull trout include: 1) passage over spillways during spill periods (generally between April 20 and August 15); 2) the downstream bypass, comprised of one surface collector entrance (6 kcfs flow) and screened turbine units number 1 and 2 (generally operated April 1 to August 31); 3) one adult fish ladder; and 4) turbine units 3 through 11. Upstream passage is provided by a single fish ladder with three separate entrances in the tailrace, and a single exit in the forebay.

3.1.3 Project Effects on Habitat

Age, length, and weight measurements taken during the study suggest that fish captured at Rocky Reach Dam are large for their age relative to other Columbia River bull trout populations, and their condition factor ($\text{weight}/\text{length}^3$)⁵ is high. These data strongly suggest that the bull trout forage base is adequate in the Reservoir. Digital photographs of bull trout passing by the counting windows at Rocky Reach Dam in 2003 and 2004 also confirm that these fish are in excellent condition (Chelan PUD, unpublished data, 2003, 2004).

The mainstem Columbia River does not contain all of the necessary habitat elements to sustain the entire life history of bull trout. Based on life history requirements, it is unlikely that the mainstem Columbia River ever contained spawning habitat for bull trout. The Reservoir does provide other important habitat features, such as a productive forage base, a migration corridor, and a more stable, deep-water environment for safe over-wintering. Therefore, it is important that these habitat elements be maintained through the term of the New License.

⁵ This formula is the Fulton's Condition Factor Formula.

3.2 Findings to Date

The following key findings were developed based on data collected during relicensing studies and from other information sources:

- Radio-tagged migratory adult bull trout move successfully both upstream and downstream past the Project. Total upstream fishway counts at Rocky Reach Dam in 2003 were 318 bull trout (April 14 – December 29). From the 79 bull trout radio tagged in 2001 and 2002, four bull trout passed downstream through turbines at Rocky Reach Dam with no mortalities. Eight downstream passage events occurred at Rock Island Dam through turbines from 2001 to 2003, with no mortalities observed.
- Adult bull trout make migrations upstream through Rocky Reach Dam from April through December, with peak movement in May and June. Upstream fishway counts have not been conducted in January and February due to required annual fishway maintenance. Extended fishway counts in November and December 2003 and March 2004 identified movement of bull trout during November and December, but not in March 2004.
- Median travel times (from the tailrace to the top of the upstream fishway) during the telemetry study for Rocky Reach in 2001-2003 were 3.79, 4.66, and 4.68 days, respectively. For comparison, travel times at Rock Island Dam for the same years were 2.28, 5.90, and 5.10 days, respectively. Median travel times (from fishway entrance to fishway exit) for bull trout at Rocky Reach were 1.92, and .28 days respectively in 2001 and 2002. In 2003 the upstream fishway entrance was not monitored, but the median time for dam passage (from the tailrace to top of the fishway) was 4.68 days.
- Radio-tagged adult bull trout that pass upstream through the Rocky Reach upstream fishway arrive at spawning areas from June through October (BioAnalysts 2002, 2004). Ninety-two percent (84 of 91 total events, 2001-2003) of the bull trout that entered the tributaries did so before July 1. These observations are consistent with other migratory populations reported for the Columbia River Basin (Fraleay and Shepard, 1989; Goetz, 1989, 1991; Pratt and Houston, 1993).
- Sub-adult bull trout use the Rocky Reach Dam upstream fishway to move upstream past the Project.
- Bull trout move downstream through the downstream bypass at Rocky Reach Dam. Sub-adult bull trout were sampled in the prototype downstream bypass from 1998 through 2002 with 23, 30, 8, 4, and 5 fish sampled, respectively. No bull trout were observed in 2003 and 2004, possibly because sampling frequency was greatly decreased from previous years to reduce incidental take of listed anadromous species.
- A correlation appears to exist between the number of bull trout passing Rocky Reach Dam in May through July and the number of bull trout redds counted in the Mad River, a tributary to the Entiat River. The highest redd counts in the Mad River occurred in 2000 (45 redds) and 2003 (52 redds) (USFS, unpublished redd count reports, 2003), corresponding to the highest

bull trout upstream fishway counts (May through July) of 198 and 186, respectively, at Rocky Reach (Chelan PUD unpublished fishway counts, 2000, 2003).

- Adult and sub-adult bull trout utilize the reservoirs during all seasons (Rocky Reach Dam upstream fishway observations April – December; radio telemetry detections 2001-2004).
- No radio tagged bull trout mortality was documented at Rocky Reach Dam or in the Reservoir during telemetry monitoring in 2001, 2002, and 2003.

3.3 Relationship of this Plan to the May 12, 2004 USFWS Biological Opinion

On May 12, 2004, the USFWS issued a biological opinion (USFWS 2004 BO) analyzing any potential effect of operating the Project consistent with the HCP on bull trout, which are not covered by the HCP. The USFWS concluded that such operations are not likely to jeopardize the continued existence of the Columbia River distinct population segment of bull trout, and are not likely to destroy or adversely modify proposed critical habitat for bull trout. The USFWS 2004 BO, as part of the proposed action, included impact minimization measures for bull trout to be implemented by Chelan PUD. In addition to the USFWS 2004 BO, the USFWS issued an accompanying incidental take statement that includes reasonable and prudent measures and terms and conditions designed to minimize any incidental take of bull trout at the Project.

In response to FERC's requirement that Chelan PUD submit a BTMP in accordance with the USFWS 2004 BO, Chelan PUD submitted a draft BTMP to FERC on February 25, 2005.⁶ The draft BTMP was approved on April 19, 2005.⁷ The purpose of that draft BTMP was to describe the measures Chelan PUD is or will be implementing for bull trout under the current license as amended by the HCP (i.e. prior to the issuance of a New License for the Project). Generally, those measures focus on Chelan PUD's efforts to monitor bull trout over several years (2005 through 2008 or 2006 – 2009, depending on the activity) to ensure that incidental take does not exceed the allowance set forth in the USFWS 2004 BO.⁸

As anticipated in the USFWS 2004 BO, however, Chelan PUD and the USFWS continued to work together through the relicensing process to further refine the BTMP for the purposes of a new long-term license for the Project.⁹ Measures outlined in section 4 are the continuation of commitments made under the USFWS 2004 BO for the term of the New License, and are intended to comprise the PME's and measures necessary to monitor and minimize the effect of any incidental take under a New License.

This BTMP has been further refined to describe, as clearly as possible, the relationship between measures implemented under the USFWS 2004 BO, and measures that are herein being proposed under a New License for the Project. To that end, sections 3.5, 3.6, and 3.7 list those measures that are currently being implemented under the USFWS 2004 BO; and section 4 list those

⁶ See footnote 2.

⁷ Order approving Bull Trout Management Plan under Article 411, April 19, 2005.

⁸ See pages 84 – 87 of the USFWS 2004 BO for a description of the incidental take allowance for the Rocky Reach Project.

⁹ The February 25, 2005 draft BTMP reflects some of these early discussions in section 4 of that version.

measures proposed under the New License. Where appropriate, measures that appear in more than one section are appropriately cross-referenced.

3.4 Summary of Measures Included in the USFWS May 12, 2004 Biological Opinion

The USFWS 2004 BO included six impact minimization measures, two reasonable and prudent measures, and four terms and conditions (which implement the reasonable and prudent measures) in the USFWS 2004 BO¹⁰, including:

Impact minimization measures (Section 3.5)

- 1) Document sub-adult fish condition during passage;
- 2) Complete a Bull Trout Management Plan¹¹;
- 3) Implement a bull trout monitoring and evaluation program upon completion of a signed and executed Settlement Agreement for relicensing of the Rocky Reach Project¹²;
- 4) Monitor adult passage, including:
 - Continued upstream fishway counts,
 - Maintenance of the upstream fishway in accordance with anadromous fish criteria, experimentally expand video counts to the off-season, and
 - Investigate the feasibility of providing video monitoring of the adult separator at the Rocky Reach Project downstream bypass¹³.
- 5) Participate in development and implementation of the USFWS recovery plan; and
- 6) Consider collecting and hauling woody debris from Rocky Reach Dam for use in tributaries under the HCP Tributary Conservation Plan.

Reasonable and prudent measures (RPM) (Section 3.6)

- 1) Develop and implement appropriate measures to reduce upstream and downstream passage impediments for adult and sub-adult bull trout at Rocky Reach Dam and its associated reservoir;
- 2) Monitor any adverse effects resulting from the proposed action; assess the actual level of incidental take and detect exceedences; and determine the effectiveness of reasonable and prudent measures and terms and conditions.

Terms and conditions (Section 3.7)

¹⁰ See pages 22, 87 and 88 of the USFWS 2004 BO, respectively.

¹¹ This measure is fulfilled by the development of the February 25, 2005 BTMP.

¹² This refers to the implementation of this BTMP and its components.

¹³ Chelan PUD did investigate the feasibility of providing video monitoring of the adult fish separator at the downstream bypass in 2003 and determined that it is infeasible due to extremely low light and poor visibility.

- 1) To implement RPM 1, develop a list of prioritized monitoring efforts necessary to evaluate the effects of the Project on the upstream and downstream passage needs of bull trout at Rocky Reach Project by February 28, 2005; then initiate studies to assess Project impacts and, if necessary, implement modifications to the upstream fishway, downstream bypass, or operations to reduce the take of bull trout;
- 2) To implement RPM 1, develop a prioritized list of monitoring efforts necessary to determine the extent of bull trout entrainment through Rocky Reach Dam turbines by February 28, 2005; then initiate studies to assess the extent of bull trout entrainment through the turbines at Rocky Reach Dam and, if entrainment is determined to be significant, explore techniques to minimize entrainment.
- 3) To implement RPM 2, develop and implement a bull trout monitoring program that includes sufficient radio-tagged bull trout to enable monitoring of bull trout utilizing Rocky Reach Dam and Reservoir system and tracking of incidental take;
- 4) Implementation of interim measures.¹⁴

3.5 Specific Actions to Implement the Impact Minimization Measures

To implement the measures described in the USFWS 2004 BO (if not already completed by the February 28, 2005 BTMP submission), Chelan PUD and the USFWS agreed to implement the following specific actions under the original license¹⁵.

3.5.1 Sub-adult Fish Condition Monitoring

Chelan PUD shall document age-group, year-class, length-weight information, and degree and frequency of descaling for all sub-adult bull trout that are observed in the downstream bypass sampling facility for years 2005 through 2008. Results of observations will be reported annually, as described in section 3.6.2.

3.5.2 Adult Passage Monitoring

Chelan PUD shall implement a monitoring program to identify potential Project-related impacts on upstream and downstream passage of adult bull trout through the Rocky Reach Dam for the purpose of identifying any incidental take of bull trout.

¹⁴ These measures were implemented prior to the approval of the February 28, 2005 plan per agreement between USFWS and Chelan PUD in a February 19, 2004 meeting. These measures included 1) a one-year extension of the upstream fishway monitoring period to assess adult bull trout utilization of existing fishways outside of the traditional migratory timeframes; 2) continued coordinated telemetry monitoring of radio-tagged bull trout; 3) compilation of Project operational data linked to timeframes when adult migratory bull trout pass the Project powerhouse and/or spill gates; 4) cost-shared funding with the USFWS for analysis of genetic samples from fluvial bull trout sampled during the first year of the Mid-Columbia Bull Trout Study; and 5) participation in a coordinated effort with the USFWS to increase the informational database for adult bull trout that utilize the Methow/Twisp River system. Reports on these actions were included in the 2005 annual report summary required by the USFWS 2004 BO, and will be included, as appropriate, in the 2006 report.

¹⁵ As amended by Article 411.

3.5.2.1 Upstream Fishway Counts

Chelan PUD shall conduct video monitoring in the upstream fishway, except during the annual fishway maintenance period, at Rocky Reach Dam to count fish species passing through the ladder and take digital photographs of bull trout to provide information on the size, age, and condition of bull trout that move upstream via the upstream fishway.

3.5.2.2 Upstream Fishway Operations Criteria

Chelan PUD shall continue to operate the upstream fishway at Rocky Reach Dam in accordance with anadromous fish criteria described in the Chelan PUD's annual Fish Passage Plan.

3.5.2.3 Off-season Passage Counts

Chelan PUD will determine off-season (November 15 – April 13, except for upstream fishway maintenance period) bull trout passage¹⁶ (numbers and passage dates) at Rocky Reach for an experimental period 2003 – 2006. Specifically, for an experimental three-year period, from November 2003 through March 2006, Chelan PUD will implement off-season video counts of the Rocky Reach Dam upstream fishway for the purpose of determining bull trout passage. Video counts will be conducted between November 15 and April 13 of each year, except during upstream fishway maintenance periods. Count results will be evaluated by Chelan PUD to determine whether passage trends exist and to identify when upstream fishway maintenance would have the least impact on bull trout passage. If trends are identified, Chelan PUD will investigate the most reasonable and feasible times for upstream fishway maintenance activities during low-usage periods for bull trout that do not conflict with adult anadromous fish passage.

The estimated cost for section 3.5.2.3 is \$45,000 for the three years.

3.5.3 Participate in the USFWS Recovery Plan

Chelan PUD is a member of the Upper Columbia River Bull Trout Recovery Unit Team. Chelan PUD will continue to attend meetings of this team, as scheduled by the USFWS, to participate in developing and finalizing the USFWS Bull Trout Recovery Plan.

3.5.4 Tributary Enhancement

Chelan PUD shall consider the feasibility of collecting and hauling large woody material that is captured at Rocky Reach Dam for placement in tributaries for use as fish habitat in projects funded by the Tributary Conservation Plan contained in the Rocky Reach Anadromous Fish Agreement and Habitat Conservation Plan.

3.5.5 Genetics Analysis¹⁷

To assist the USFWS in identifying the core areas and local populations of bull trout affected by Rocky Reach Dam, Chelan PUD will collect and fund genetic analysis of tissue samples taken from up to 30 adult bull trout per year for three years (up to 90 samples total) at Rocky Reach

¹⁶ Chelan PUD will record information for both adult and sub-adult bull trout under this measure.

¹⁷ While genetic sampling was not included as a measure in the USFWS 2004 BO, Chelan PUD voluntarily agreed to include it as a conservation recommendation in the BTMP per a subsequent request by the USFWS. The measure also appears in section 4.4.3 as a proposed PME during the term of the New License.

Dam, 2005 through 2007. Samples will be submitted to the USFWS Central Washington Field Office in Wenatchee, WA.

Chelan PUD will collect and fund analysis of tissue samples taken from sub-adult bull trout that are PIT tagged at the Rocky Reach downstream bypass, and at smolt and broodstock traps funded by Chelan PUD (four sites, up to 10 fish per site, 2005 - 2007), under 3.6.3.1 of this plan. Up to 40 genetic samples per year for three years will be the combined total for the Rocky Reach BTMP. Genetic samples will be submitted to the USFWS Central Washington Field Office in Wenatchee, WA.

The estimated cost of the genetic analyses described in this section is \$11,000 for the three year period.

3.6 Specific Actions to Implement the Reasonable and Prudent Measures and Terms and Conditions

To implement the reasonable and prudent measures and terms and conditions described in the USFWS 2004 BO (if not already completed by the February 28, 2005 BTMP submission), Chelan PUD and the USFWS agreed to implement the following specific actions under the original license¹⁸.

3.6.1 Adult Bull Trout Upstream and Downstream Passage Evaluation (Adult Bull Trout)

Between May 2005 and July 2007, Chelan PUD will capture and insert active tags (2 year radio tags, plus PIT tags) in 30 adult bull trout annually (representing about 23% of the average annual ladder count May through July, 1998-2003) from May 2005 through July 2007 (three years of tagging for a total of 90 fish for the three-year period). All tagged fish will be released upstream of Rocky Reach Dam, and each fish will be counted as one successful upstream fishway passage event for the year it is tagged. Because of variable tag retention times in individual fish, and inherent inconsistencies in transmitter battery life, take levels will be calculated using data from only the first year (365 days) of tag life for each tagged fish. Tag detections occurring outside of this period will not be used for take monitoring, but will continue to be compiled (through July 2008) to assist the USFWS in characterizing movements of bull trout in the Columbia River mainstem.

Chelan PUD will use appropriate tracking methods to monitor tagged adults, including installation and maintenance of receiver arrays necessary to adequately monitor upstream and downstream passage through Rocky Reach Dam for a three-year period, 2005 – 2008. The receiver arrays will include fixed receiver sites at the dam and tributary entrances to monitor passage routes through turbines, spillway, and downstream bypass, as well as tributary entrances. Additional mobile tracking methods may include aircraft, boat, and/or vehicle surveys.

Utilizing these tracking methods, Chelan PUD will monitor monthly movements of tagged fish for a three-year period from May 2005 through July 2008 while such fish are within the Project Boundary until the tagged fish enter a tributary. Tracking will continue for all fish that re-enter the Reservoir.

¹⁸ As amended by Article 411.

Tag detection and tracking data from May 2005 through July 2008 will be compiled and evaluated by Chelan PUD to determine the status and location of tagged adult bull trout, tag status, and any need to engage in tag recovery operations. Chelan PUD shall report any Project-related bull trout incidental take within the Project Boundary to the USFWS within 48 hours of detection by Chelan PUD, under this section and in subsequent monitoring described in section 4.1.6.

Chelan PUD will participate in information exchanges and regional efforts to coordinate radio-tag frequencies for bull trout monitoring. Such coordination will provide consistency between monitoring efforts conducted in the Mid-Columbia River Basin.

The total cost of these studies is estimated to be \$480,100.

3.6.2 Passage Results and Incidental Take Reporting for Adult Bull Trout

Chelan PUD shall submit an annual summary report by April 15 of the year following each one-year study period for the purpose of updating the USFWS on the results of adult bull trout monitoring under section 3.6.1. In these reports, Chelan PUD will include an examination of whether a correlation exists between Project operations and upstream and downstream passage times.

By December 31, 2008, Chelan PUD will prepare a final report on the passage survival and level of incidental take of adult bull trout for each passage route at the Project during this three-year monitoring period. An annual summary report was prepared by April 15 for year 2005 and will be prepared by April 15 of 2006 and 2007. The upstream and downstream passage results will be analyzed to determine the number of tagged fish known to have passed through each of the four possible routes: the turbines, spillway, downstream bypass, and upstream fishway. Authorized take levels for passage through the spillway, downstream bypass, and upstream fishway are 2 percent, respectively, and 5 percent through turbines per year. Allowable take resulting from pikeminnow predator control activities is two fish per year. The incidental take for each passage route, if any, will be estimated by the number of observed mortalities to tagged fish that are attributable to that passage route divided by the total number of tagged fish known to have passed through that route.

The pooled passage data from the three-year study conducted in 2005 through 2008, and additional data from previous studies conducted in 2001 through 2004, will be statistically analyzed to detect if the level of incidental take for each passage route exceeds the anticipated incidental take level authorized in the USFWS 2004 BO's incidental take statement. The statistical analysis will be a one-tailed test of the hypothesis that the anticipated incidental take level is not exceeded. The passage survival and level of incidental take of bull trout will be assessed annually for each passage route at the Rocky Reach Project. A statistical analysis will be used to detect if the level of incidental take for each passage route exceeds the anticipated incidental take level anticipated in the USFWS 2004 BO.

The statistical analysis will be a one-tailed significance test of the hypothesis that the anticipated incidental take level is not exceeded. The anticipated take level for the turbine passage route is

that no more than five percent of radio-tagged bull trout passing through turbines will be killed by turbine operation. A one-tailed test for significance will be used to determine the probability that the observed incidental take is different from what could be occurred by chance if the true take level is \leq five percent. For example, if 20 fish were observed to have passed through the turbines in the first year, incidental take by the turbines would not be exceeded statistically until four fish are killed by turbine operation (binomial probability, test of hypothesis $H_0 \leq 5\%$, 95% significance level, p -value for 1, 2, 3, or 4 fish being killed is .64, .26, .075, and .015, respectively, significant value is bolded). Thus, an experimental result of three fish killed out of 20 passing through the turbines would not exceed the anticipated incidental take level of five percent ($\alpha + 0.05$).

Upon locating any dead, injured or sick bull trout within the Project Boundary, Chelan PUD will report the finding to the USFWS Central Washington Field Office within 48 hours.

3.6.2.1 Correlation Analysis

Chelan PUD will analyze tag detection and tracking data, passage results, and Project operation data from May 2005 through July 2008 to determine whether correlations exist between Project operations and adult bull trout upstream and downstream passage times. The analysis will include a compilation and characterization of Project operations (e.g., spill, turbines, and pool elevations) and upstream fishway operations during times of upstream and downstream passage for tagged adult bull trout. Chelan PUD will provide results of the correlation analysis as part of the annual reports described in Section 3.6.2.

3.6.3 Sub-Adult Bull Trout Monitoring Measures

One objective of this BTMP for sub-adult bull trout is to investigate potential Project-related impacts on upstream and downstream passage of sub-adult bull trout through the Rocky Reach Dam and Reservoir. The stakeholders participating in the RRFF (including USFWS), however, agree that it is not feasible to fully assess sub-adult passage at the Project because of an inability to collect a sufficient sample size. However, Chelan PUD will implement the following measures to address this objective of the BTMP by: (1) PIT tagging of sub-adult bull trout when incidentally collected at the Project or in tributary traps; (2) participating in information exchanges and regional efforts to develop effective monitoring methods; and (3) determining off-season, sub-adult bull trout passage through the upstream fishway (see section 3.5.2.3).

3.6.3.4 PIT Tagging

The stakeholders to the HCP and Rocky Reach relicensing process agree that because of the inability at this time to collect a sufficient sample size of sub-adult bull trout, it is not feasible to assess sub-adult passage or take at Rocky Reach. However, when collected incidentally at the Project, or in tributary traps, sub-adult bull trout will be PIT tagged.

- Chelan PUD will provide up to 80 PIT tags per year for three years (combined total for both Rocky Reach and Rock Island Plans), equipment and facilitate training to enable PIT tagging of sub-adult bull trout when these fish are collected incidentally during certain fish sampling operations. Fish sampling operations that could have incidental captures of sub-adult bull trout include the Rocky Reach upstream fishway trap during operations for capture of other species, the Rocky Reach downstream bypass, the Rock Island bypass trap, the adult

collection traps at Tumwater Dam, Dryden Dam, and the Chiwawa broodstock trap, and at juvenile fish tributary traps on the Chiwawa River, below Lake Wenatchee, lower Wenatchee River, Entiat River, and Peshastin Creek. Different entities conduct these fish sampling operations, thus the provision of tags, equipment and methodology should be standardized. Chelan PUD will also provide up to 20 PIT tags per year for tagging sub-adult bull trout at the USFWS Entiat and Peshastin smolt traps, 2005 – 2007 (combined total for both the Rocky Reach and Rock Island Bull Trout Plans). Chelan PUD will provide the following for selected sites: 10 PIT tags (or more if appropriate) and tagging syringes and a list of standardized methods developed in consultation and coordination with the USFWS. Chelan PUD will facilitate an annual pre-season coordination meeting with the fish sampling entities. Three years after completion of the Rocky Reach Dam upstream fishway PIT tag detection system, the number of fish tagged and tag recovery data from these sub-adult tagging operations will be reviewed with the USFWS to evaluate whether or not to continue the program.

- Chelan PUD will install a PIT tag detection system in the upstream fishway at Rocky Reach Dam in early 2006 and monitor upstream movements for PIT tagged, sub-adult (and adult) bull trout at Rocky Reach Dam for an experimental period 2006 through mid-2009. Three years after completion of the detection system, Chelan PUD will review the number of fish tagged and tag recovery data from these sub-adult tagging operations with the USFWS to evaluate whether or not to continue the program.
- Monitor upstream movements for PIT tagged sub-adult bull trout at Rocky Reach Dam for an experimental period 2006 through 2009.

The cost of these PIT tag programs is estimated to be \$15,000 annually.

3.6.3.5 Information Exchange and Regional Monitoring Efforts

Chelan PUD will participate in information exchanges with other entities conducting bull trout research and regional efforts to explore methods to monitor upstream and downstream movement of sub-adult bull trout in the mainstem Columbia River. If new methodologies become available, Chelan PUD will evaluate them in conjunction with the RRFF. Upon the recommendation of the RRFF, Chelan PUD will implement reasonable and feasible methods for monitoring sub-adult bull trout at Rocky Reach Dam.

3.6.4 Implement Reasonable and Feasible Options to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull Trout are Identified

Chelan PUD shall continue to operate upstream fishway at Rocky Reach Dam in accordance with anadromous fish criteria described in the annual Chelan PUD Fish Passage Plan (Grassell 2005). However, if upstream or downstream passage problems for bull trout are identified (as agreed to by the USFWS and Chelan PUD), Chelan PUD will identify and implement, in consultation with the RRFF, reasonable and feasible options to modify the upstream fishway, downstream bypass, or operations in order to monitor or minimize the effect of any incidental take resulting from such impacts to bull trout passage.

3.7 Specific Actions to Implement Terms and Conditions

Measures identified under Terms and Conditions in the USFWS 2004 BO are part of the ongoing studies described in sections 3.5 and 3.6, which will be conducted in years 2005 through 2008.

3.8 Specific Actions to Implement Additional Measures

Measures described in this section are not included in the USFWS 2004 BO. However, Chelan PUD, in consultation with the USFWS through the Rocky Reach relicensing process, has agreed to implement the following measures:

3.8.1 Investigate Reservoir Stranding

Chelan PUD will investigate Rocky Reach inflow patterns, reservoir elevations, and backwater curves for a three-year period (2005 through 2007) to determine if stranding or entrapment of bull trout, primarily sub-adults, may occur. More specifically, the investigation will include: (1) a review of the Rocky Reach forebay elevations, back-water curves, and historical discharges (daily, hourly) from Wells Dam to determine Rocky Reach Reservoir surface water elevations during low flow periods; (2) a determination of whether backwater locations exist that could lose connectivity to the river during low flows hours; and (3) a determination of backwater area elevations to identify flow scenarios that could result in de-watering or isolation that could result in incidental take.

In the event the evaluation identifies locations that may be dewatered or isolated, Chelan PUD will undertake a reasonable and feasible fish sampling effort to determine if sub-adult bull trout are using the identified areas during low flow hours. If sampling results show that incidental take of sub-adult bull trout occurs due to stranding or de-watering, Chelan PUD will report study results in the annual report described in section 3.6.2. Chelan PUD will develop, in consultation with the USFWS and the RRFF, a plan to minimize the effect of such incidental take of sub-adult bull trout.

The cost of these studies is estimated to be \$60,000.

3.8.2 HCP Implementation

Implementation of the HCP may benefit bull trout by: 1) providing a safe passage route (the downstream bypass) through the Project; 2) providing tributary habitat enhancement, thereby increasing stream productivity; and 3) implementing the hatchery plan, which will increase density of historically important bull trout prey species.

SECTION 4: PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

In addition to the measures that Chelan PUD will implement through the USFWS 2004 BO described in sections 3.3 through 3.8, Chelan PUD will implement the following PME during the term of the New License to satisfy the goals of identifying, developing, and implementing measures to monitor and address ongoing impacts on adult and sub-adult bull trout passage resulting from ongoing Project operations. Through monitoring and implementation of these PMEs, the BTMP for the Rocky Reach Project is designed specifically to meet the following objectives:

Objective 1: Continue operating the upstream fishway and downstream bypass;

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage through monitoring;

Objective 3: Implement reasonable and feasible options to modify the upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified; and

Objective 4: Participate in the development and implementation of the USFWS bull trout Recovery Plan.

The measures proposed in this section are intended to be consistent with recovery actions as outlined in the USFWS draft Bull Trout Recovery Plan. Moreover, this section of the BTMP is intended to be an adaptive approach, where strategies for meeting the goals and objectives may be re-worked under a collaborative effort by the RRF, based on new information and ongoing monitoring results.

The commitments described in this section are intended to serve both as PMEs for bull trout through the term of the New License and to adequately monitor and minimize any incidental take of bull trout consistent with Section 7 of the ESA.

4.1 Objective 1: Continue Operating Upstream Fishway and Downstream Bypass

4.1.1 Provide Upstream and Downstream Passage for Adult and Sub-Adult Bull Trout

Continue to provide upstream passage for adult bull trout through the existing upstream fishway and downstream passage of adult and sub-adult bull trout through the existing downstream bypass;

4.1.2 Upstream Fishway Counts

Chelan PUD shall continue to conduct video monitoring in the upstream fishway, except during the annual fishway maintenance period, at Rocky Reach Dam to count bull trout passing through the fishway to provide information on the size, age, and condition of bull trout that move upstream via the upstream fishway.

4.1.3 Upstream Fishway Operations Criteria

Chelan PUD shall continue to operate the upstream fishway at Rocky Reach Dam in accordance with anadromous fish criteria described in the annual Chelan PUD Fish Passage Plan (Grassell 2005).

4.2 Objective 2: Identify Any Adverse Project-related Impacts on Adult and Sub-adult Bull Trout Passage

Chelan PUD will implement a program to identify potential Project-related impacts on upstream and downstream passage of adult bull trout through the Rocky Reach Dam and any incidental take of bull trout.

4.2.1 Adult Bull Trout Upstream and Downstream Passage Evaluation

Chelan PUD will implement an adult bull trout telemetry program to continue to monitor adult upstream and downstream passage through the Dam and Reservoir and implement appropriate measures to monitor any incidental take of bull trout (see also sections 3.5.2 and 3.6.1). Specifically, beginning in year 10 of the New License, and continuing every ten years thereafter during the term of the New License, Chelan PUD will conduct a one-year monitoring program for the purpose of determining whether Chelan PUD remains in compliance with the Project's allowable level of incidental take of bull trout due to upstream and downstream passage, as authorized in the incidental take statement issued as part of the New License. The same study protocols used in monitoring described in section 3.6.1 will be employed for these monitoring studies.

The estimate cost of a one-year study is \$144,000.

Chelan PUD shall prepare an annual report by April 15 of the year following each of the one-year study periods for the purpose of updating the USFWS on the results of monitoring under this section.¹⁹ Chelan PUD shall report any Project-related bull trout incidental take within the Project boundary to the USFWS within 48 hours of detection by Chelan PUD. If the authorized incidental take level is exceeded during any one year period, Chelan PUD will conduct additional monitoring in the succeeding year. If the authorized incidental take level is exceeded in the second year, Chelan PUD will develop a plan, in consultation with the RRFF, to address the identified factors contributing to exceedence of the allowable level of incidental take.

Chelan PUD will analyze tag detection and tracking data, passage results, and Project operation data to determine whether correlations exist between Project operations and adult bull trout upstream and downstream passage times. The analysis will include a compilation and characterization of Project operations (e.g., spill, turbines, and pool elevations) and upstream fishway operations during times of upstream and downstream passage for tagged adult bull trout. Chelan PUD will provide results of the correlation analysis as part of the annual reports described in Section 3.6.2.

¹⁹ This report shall be similar in scope to the final report described in section 3.5.2, though the report associated with section will reflect only one year of monitoring and will not average incidental take over three years.

4.2.2 Sub-Adult Bull Trout Monitoring Measures

While an objective of this BTMP for sub-adult bull trout is to identify potential ongoing Project-related impacts on upstream and downstream passage, the stakeholders participating in the RRFF (including the USFWS) agree that it is not feasible to assess sub-adult passage at Rocky Reach Dam, because of an inability to collect a sufficient sample size. Nevertheless, for a one-year period beginning in year 10 of the New License and continuing every 10 years thereafter, upon the recommendation of the RRFF, Chelan PUD will implement reasonable and feasible methods for monitoring sub-adult bull trout at Rocky Reach Dam. Specifically, Chelan PUD may continue to provide PIT tags and equipment, and facilitate training, to enable fish sampling entities to PIT tag sub-adult bull trout when these fish are collected incidentally during certain fish sampling operations (see also section 3.6.3). If PIT tagging is continued under this section during the term of the New License, then protocols described in section 3.6.3.1 of this Chapter will be implemented.

If PIT tagging programs are continued, the cost is estimated to be \$5,000 annually.

4.3 Objective 3: Implement Reasonable and Feasible Options to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull Trout are Identified

Chelan PUD shall continue to operate the upstream fishway at Rocky Reach Dam in accordance with anadromous fish criteria described in the annual Chelan PUD Fish Passage Plan (Grassell, 2005). However, if upstream or downstream passage problems for bull trout are identified (as agreed to by the USFWS and Chelan PUD), Chelan PUD will identify and implement, in consultation with the RRFF, reasonable and feasible options to modify the upstream fishway, downstream bypass, or operations to reduce the identified impacts to bull trout passage.

4.4 Objective 4: Participate in the Development and Implementation of the USFWS Bull Trout Recovery Plan

4.4.1 Participate in the Development and Implementation of the USFWS Recovery Plan

Chelan PUD is a member of the Upper Columbia River Bull Trout Recovery Unit Team. Chelan PUD will continue to attend meetings of this team, as scheduled by the USFWS, until completion of the Bull Trout Recovery Plan. Chelan PUD will participate, as appropriate, in implementation of such Recovery Plan once it is completed by the USFWS.

4.4.2 Tributary Enhancement

Chelan PUD shall consider the feasibility of collecting and hauling large woody material that is captured at Rocky Reach Dam for placement in tributaries for use as fish habitat in projects funded by the Tributary Conservation Plan contained in the Rocky Reach Anadromous Fish Agreement and Habitat Conservation Plan.

4.4.3 Funding Collection of Tissue Samples and Genetic Analysis

Beginning in year 10 of the New License, and continuing every 10 years thereafter for the term of the New License, Chelan PUD shall, if recommended by the RRFF, collect up to 30 adult bull trout and up to 40 sub-adult bull trout tissue samples over a period of one year and fund their genetic analysis. If genetic analysis is conducted, the annual cost is estimated to be \$3,700. Samples will be submitted to the USFWS Central Washington Field Office in Wenatchee, WA.

4.4.4 Information Exchange and Regional Monitoring Efforts

Chelan PUD may continue to participate in information exchanges with other entities conducting bull trout research and regional efforts to explore methods to monitor upstream and downstream movement of sub-adult bull trout in the mainstem Columbia River (see also section 3.6.3.2). If new monitoring methodologies become available, Chelan PUD shall, in consultation with the RRF, implement reasonable and feasible methods for monitoring sub-adult bull trout at Rocky Reach Dam.

[TABLES still under development] Table 1: Criteria for Achievement of Objectives for Bull Trout

Use/Action	Objective	Measured Parameter	Schedule	Actions if Objective Achieved	Alternative Management Actions
Adult Bull trout	Adult upstream passage	Radio-telemetry study and monitor incidental take	Every 10 years	Maintain Action. No additional action needed.	In consultation with the RRFF, develop and implement a plan to address the identified problems as defined in Section 4.1.3.
	Adult upstream passage	Correlate passage and ongoing Project operations	Every 10 years	No additional action needed.	Pursue feasibility of Project operations or fishway/bypass if passage problems are identified as defined in Section 4.1.3.
	Verify that Incidental Take does not exceed allowances for adult bull trout	5% of bull trout passing through turbines; 2% passing through spillways; 2% through the downstream bypass; 2% through the upstream fishway; (All of the above will be three year binomial probability analysis for each route); and 2 bull trout (not percent) for the fish predator control program/year (no statistics).	2005-2008	Maintain Action. No additional action needed.	Collaborate with stakeholders of the RRFF to develop and implement a plan to address the identified problems.
Sub-adult Bull trout	Sub-adult downstream passage	PIT tagging sub-adults where captured; monitor passage through adult fishway	As recommended by RRFF	Maintain Action. No additional action needed.	Pursue feasibility of Project operations or fishway/bypass if passage problems are identified as defined in Section 4.1.3.
	Measure Incidental Take (sub-adult)	Measure potential reservoir stranding or entrapment	2005-2008	Maintain Action. No additional action needed.	Collaborate with stakeholders of the RRFF to develop and implement a plan to address the identified problems as defined in Section 4.1.3.

SECTION 5: LITERATURE CITED

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