2.0 PROPOSED ACTION AND ALTERNATIVES

In this section, we describe the proposed action and alternatives considered. Section 2.1 describes the no-action alternative under which the Project would continue to be operated in accordance with the current license conditions. This alternative represents the existing conditions and is the baseline to which we compare the other action alternatives. Section 2.2 describes Grant PUD's proposed project as described in its license application filed with the Commission on October 29, 2003. Section 2.3 describes a staff alternative consisting of the proposed project, with modifications based on the resource management agencies' required environmental protection measures together with additional measures recommended by Commission staff and interested parties. Section 2.4 discusses other alternatives that have been considered but eliminated from detailed evaluation in this EIS.

2.1 NO ACTION

Under the no-action alternative the project would continue to operate under the terms and conditions of the existing license and no new environmental measures would be implemented. Any ongoing effects of the project would continue. The no-action alternative represents the baseline environmental conditions for comparison with other alternatives.

2.1.1 General Description of Existing Project

The Project includes two hydroelectric developments, Wanapum and Priest Rapids, located on the Columbia River in central Washington. Since the developments went into commercial service in 1964 and 1961, respectively, they have provided over 300 billion kilowatt-hours (kWh) of low cost, renewable energy to the people and industries of the Northwest. The current authorized installed capacity of the Project is 1,768.8 MW.

Each development includes a dam, powerhouse, fishway, spillway, reservoir, 230-kilovolt (kV) transmission lines, water rights, rights-of-way, and structures and lands associated with the operation of the Project. The Project also includes associated switchyards, transmission facilities, a control system, maintenance and safety equipment and other structures, and the Priest Rapids Hatchery.

Both dams have embankment sections extending from the left and right abutments to center concrete sections. The primary purpose of the spillways is to safely release river flows that exceed the turbine capacity. These spillway gates have also been used more recently to spill water for the purpose of aiding downstream fish migration. Both dams are equipped with fish ladders on the east and west banks of the river to provide upstream passage for salmon, steelhead and other anadromous fish.

Wanapum and Priest Rapids powerhouses each have ten turbines with FERC authorized installed capacities of 913.8 MW and 855 MW respectively, for a present installed capacity of 1,768.8 MW. The current maximum hydraulic capacity of each powerhouse is approximately 175,000 cubic feet per second (cfs), assuming all ten units are operating at full capacity.

The total area within the Project Boundary is 34,380 acres, consisting of the lands necessary for the safe operation and maintenance (O&M) of the Project and other purposes, such as recreation, shoreline control and protection of environmental resources. Several small streams and creeks flow into the Columbia River within the Project boundaries. The Wanapum Indian Village is on the west bank of the Columbia River at Priest Rapids dam.

The project has been operating for more than 50 years under the existing license and during this time, the Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the project has been inspected and evaluated every 5 years by an independent consultant and a consultant's safety report has been submitted for Commission review. As part of the relicensing process, the Commission staff evaluates the continued adequacy of the proposed project facilities under a new license. In any new license issued, special articles would be included, as appropriate. The Commission staff would continue to inspect the project during the new license term to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), O&M, and accepted engineering practices and procedures.

2.1.2 Wanapum Development

The Wanapum development, located at river mile (RM) 415 near the I-90 Bridge at Vantage, Washington, has a powerhouse containing the original nine, vertical shaft, Kaplan turbine generator sets with a total authorized generating capacity of 810 MW and one, new advanced design turbine connected to the original generator with a total authorized capacity of 103.8 MW for a total authorized installed capacity of 913.8 MW. The total authorized capacity of the Wanapum development is 1,038 MW based on the Commission's December 14, 2005 license amendment[9], which authorized the replacement of the remaining nine turbines at Wanapum with advanced design turbines.

The total length of Wanapum dam is 8,637 feet, with the axis of the powerhouse being almost parallel with the general direction of river flow. The development has two 'elbows' in its layout and this geometry of the structure is unique on the Columbia River.

[9] 113 FERC ¶ 62,205 (2005)

A Future Units section designed for six additional generating units extends from the powerhouse to the spillway. Wanapum reservoir extends 38 miles upstream to the tailwater of Chelan County PUD's Rock Island dam, and has a surface area of approximately 14,680 acres.

2.1.3 Priest Rapids Development

The Priest Rapids development, located at RM 397, just upstream of the Hanford Reach section of the Columbia River, has a powerhouse containing 10, vertical shaft, Kaplan turbine generator sets with a total generating capacity of 855 MW. The Priest Rapids dam is 10,103 feet long, and is sited essentially perpendicular to the river flow. The Priest Rapids reservoir extends for 18 miles upstream to the tailwater of Wanapum dam, and has a surface area of approximately 7,725 acres.

2.1.4 Project Transmission Lines

The output from the Wanapum Development is connected to the main transmission grid by three 1.5-mile long, 230-kV overhead transmission lines at two switchyards: Grant PUD's Wanapum switchyard and the adjacent Bonneville Power Administration (BPA) Vantage switchyard. From there, one 230-kV transmission line runs north for 31 miles, connecting to BPA's Columbia substation located about 4 miles south of Rock Island dam. Another 230-kV line (the Wanapum-Priest Rapids tie line) runs about 17 miles south from the Wanapum substation to the Priest Rapids substation. The third 230-kV line terminates at the BPA Vantage switchyard. All three transmission lines are primary to the Wanapum Development and are part of the Project.

Power generated from the Priest Rapids Development is stepped up from 13.2 kV to 230 kV by transformers located at the powerhouse. The transformers feed into a common 230 kV bus from which three 230-kV transmission lines extend about 1 mile to the Priest Rapids switchyard and then for about 6 miles to BPA's Midway Substation, which is part of the integrated regional transmission grid.

2.1.5 Project Hatcheries

The Priest Rapids Hatchery was originally a spawning channel developed under a 1963 agreement between Washington DFW and Grant PUD. The Umatilla indicated that the spawning channel was unsuccessful because adult salmon failed to migrate the length of the channel. Beginning in 1972, Washington DFW experimented with raceway culture techniques for fall Chinook at the Priest Rapids Hatchery by modifying sections of the spawning channel and removing the spawning gravels. This test program continued from 1972 through 1978 and produced positive results suggesting that the facility could be converted from a spawning channel to a rearing pond facility. In 1978, Grant PUD funded a study, which determined that the Priest Rapids spawning channel showed

potential for conversion to a conventional pond-rearing hatchery. By agreement between Grant PUD and Washington DFW dated March 4, 1980, a production target of 100,000 pounds of fall Chinook was established for the Priest Rapids Hatchery. Since that time, the hatchery has continued to produce approximately 7 million fall Chinook smolts annually which contribute to the upriver bright run of fall Chinook returning to the Hanford Reach.

2.1.6 Project Recreation Facilities

The Project includes the following 11 recreation facilities, owner in parentheses, associated with the Wanapum development:

- Wanapum dam Picnic Area (Grant PUD)
- Wanapum dam Heritage Center (Grant PUD)
- Wanapum dam Upper Boat Launch (Grant PUD)
- Wanapum dam Overlook (Grant PUD)
- Getty's Cove Campground and Boat Launch (privately owned and operated)
- Ginkgo/Wanapum State Park (Washington SPRC operated/Grant PUD owned)
- Kittitas County Boat Launch (Kittitas County operated/Grant PUD owned)
- Riverstone Resort Campground and Marina (privately operated/Grant PUD owned)
- Frenchman Coulee (Washington DFW; Grant PUD)
- Sunland Estates Boat Launch (Washington DFW operated/BLM owned)
- Crescent Bar Resort (privately operated/Grant PUD owned)

The following three facilities associated with the Priest Rapids development:

- Desert Aire (privately operated/Grant PUD owned)
- Buckshot Ranch (Washington DFW operated/Grant PUD owned)
- Wanapum dam Lower Boat Launch (Grant PUD)

The Priest Rapids and Wanapum reservoir areas and project lands are open for use by the public for recreational purposes subject to the provisions of Grant PUD's draft Shoreline Management Plan, dated August 2003.

2.1.7 Project Cultural Resource Facilities

The Project includes the Wanapum dam Heritage Center that consists of a public museum and repository for information regarding cultural, historical, and archaeological resources of the Wanapum. The Heritage Center consists of three areas: a museum with historical information with an observation deck, a hydroelectric Project interpretive and

viewing area, and a fish ladder viewing site and interpretive facility. All three sites are located at the Wanapum Development, and are accessed via a paved road from Highway 243.

2.1.8 Existing Project Operation

The 1,768.8-MW Project is an integral part of the seven-dam mid-Columbia River Hydroelectric System, which is the single largest coordinated hydroelectric system in the country with a total combined capacity of just under 13,600 MW. The area referred to as the mid-Columbia River extends from Grand Coulee dam, which at 6,809 MW is the largest hydro generating facility in the United States, to the Hanford Reach, nearly 210 miles downstream (see Figure 2).

Each of the seven mid-Columbia dams is operated in accordance with the terms of the Mid-Columbia Hourly Coordination Agreement (HCA)[10] which seeks to maximize electricity generation to satisfy regional customer needs within the constraints of operating criteria designed for non-power, environmental protection purposes.

Exhibit B of the license application contains a detailed description of the complex and interrelated set of laws, treaties and operating agreements that govern the operation of 29 major federal water resource projects and dozens of large non-federal projects, including the Project, that have been developed in the Columbia River Basin since the early 1900s. Table 1 summarizes the major non-power operating agreements that currently govern the operation of the Project, as well as other mid-Columbia Projects.

Grant PUD says the benefit of coordinated operation is better management of the water resources and hydroelectric facilities of the mid-Columbia River to achieve a diverse set of goals for the region, including flood control, protection and enhancement of fishery resources, power generation at the time of highest electricity demand, load-following, and assuring reliability of the transmission system. To better understand the importance of coordinated operation in achieving these goals, it is important to consider the physical attributes of the mid-Columbia dams, their relationship to each other and their unique position in the Columbia River.

---

[10] In 1966, Congress authorized the expansion of power generation facilities at the federally-owned, Grand Coulee and Chief Joseph dams. Because of concerns about the potential effects of having a much greater turbine discharge capacity at Grand Coulee than at the 5 non-federal, mid-Columbia PUD projects on the river just downstream, the parties agreed to jointly develop a method for coordinating the operation of all 7 of the mid-Columbia River projects. This eventually led to the signing in 1972 of the HCA, which has recently been extended through November 1, 2017. (Grant PUD, final license application, Exhibit B, p. B-5, 2003)

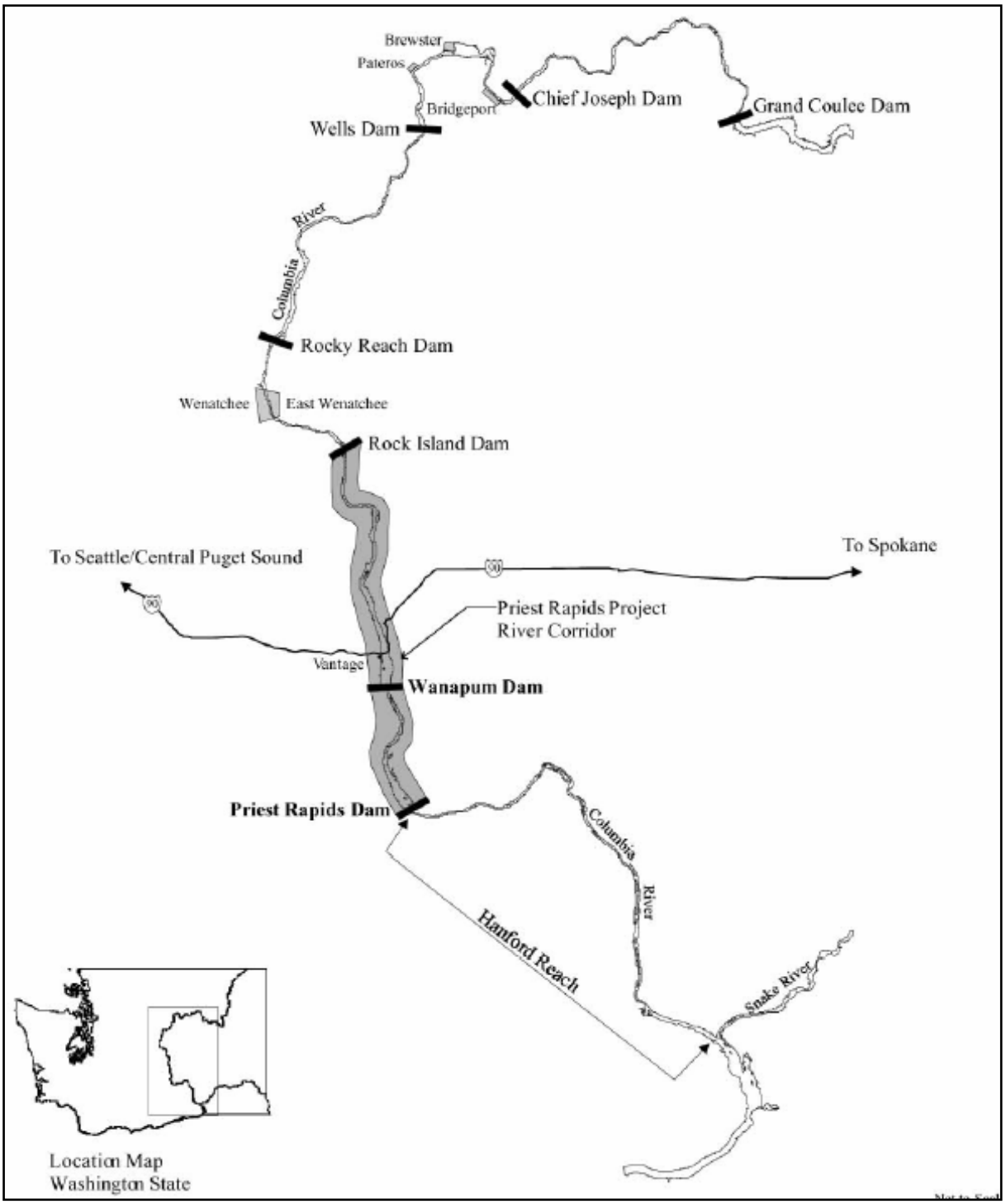

Figure 2. Map showing Mid-Columbia Projects and the Hanford Reach (Source: Grant PUD, 2003).

Table 1. Non-power programs related to Priest Rapids Project and mid-Columbia River operations (Source: Exhibit B, License Application, October 2003).

Development Affected	Non-Power Requirement	Constraint	Approximate Period	Comments[1]
Priest Rapids	License Order	36 kcfs minimum flow	Continuous	Based on downstream nuclear plant cooling water requirements.
Priest Rapids Wanapum	1988 Vernita Bar Settlement Agreement (VBA)	50-70 kcfs daytime maximum flow	Spawning Period, from mid-October to the Sunday prior to Thanksgiving	Reverse load factoring (RLF)
Priest Rapids Wanapum Rocky Reach Wells Chief Joseph Grand Coulee	1988 VBA	50-70 kcfs Protection Level Flow from end of spawning to end of emergence.	From late November to May	Protection level flows are met from GCL, CHJ, and tributary flows. If this is not sufficient, PRD drafts 3 feet (ft), then WAN drafts 2 ft, then RRH drafts 1 foot, and WEL drafts 1 foot, then PRD drafts an additional 0.7 ft. If flows are still not sufficient, operators meet protection level flow through Hourly Coordination.
Priest Rapids Wanapum	1994 FERC Interim Order	Spill to ensure downstream passage of 70% of spring migrants and 50% of summer migrants over 80% of the runs.	Spring; start mid-April, end mid-June. Summer; start mid-June to mid-July, end mid/end of August.	Superseded by 2000 Memorandum of Agreement (MOA), except for 2001.
Wanapum	2000 MOA	Spill to increase downstream passage of spring and summer migrants via non-turbine routes.	Mid-April to mid-June for spring spill; mid-June to mid-August for summer spill.	Spill during both periods is typically limited by Total Dissolved Gas (TDG) levels.
Priest Rapids	2000 MOA	Spill to increase downstream passage of spring and summer migrants via non-turbine routes.	Mid-April to mid-June for spring spill; mid-June to mid-August for summer spill.	Spill during either period may be increased to make up for WAN shortfall.

Priest Rapids	2004 NMFS's Biological Opinion (BO)	Combination of fish passage measures, hatchery programs, and fish habitat enhancements along tributary rivers and streams.		
14 Developments on the Columbia River	2004 Federal Columbia River Power System BO	Modified spill and transportation schedules based on new research for Endangered Species Act-listed salmon and steelhead	Through 2014	
Priest Rapids	2004 Hanford Reach Agreement	Part of Grant PUD's proposal (see section 2.2.3)	See section 2.2.3	
Rock Island Rocky Reach Wells	2004 Anadromous Fish Agreement and Habitat Conservation Plans (HCP)	Combination of fish passage measures, hatchery programs, and funds for habitat improvement of salmon and steelhead	50 years	
Priest Rapids	2006 Salmon Settlement Agreement (SSA)			
Priest Rapids Wanapum Rock Island Rocky Reach Wells Chief Joseph Grand Coulee	Hanford Reach Juvenile Fall Chinook Protection Program	1. When PRD outflow is between 36 and 80 kcfs limit PRD daily delta to no more than 20 kcfs. 2. When PRD outflow is between 80 and 110 kcfs limit PRD delta to no more than 30 kcfs. 3. When PRD outflow is between 110 and 140 kcfs limit PRD flow delta to no more than 40 kcfs. 4. When PRD outflow is between 140 and 170 kcfs limit PRD delta to no more	From late March (start of emergence) to early June (400 TUs after end of emergence).	Implemented by using PRD and WAN to re-shape incoming flow fluctuations according to fluctuation limits. On-peak generation shortfall is made up by upstream Projects using Hourly Coordination.

		than 60 kcfs. 5. When PRD outflow is greater than 170 kcfs, maintain PRD minimum outflow of 150 kcfs.		

[1] Abbreviations used in this table are: GCL-Grand Coulee; CHF-Chief Joseph; PRD-Priest Rapids; WAN-Wanapum; RRH-Rocky Reach; WEL-Wells

Figure 3 is a profile of the mid-Columbia River showing the relationship of the seven dams and the reservoirs created by each. At normal operating water surface elevations, backwater conditions extend from each dam to the tailwaters of the next upstream dam. Because of this, a change of flow at one dam very quickly produces a change of water surface elevation in the forebay of the next downstream dam unless a corresponding (coordinated) change is made in the flow at the downstream dam. By coordinating the operations, the relatively small amount of storage available at each of the PUD projects can be used to make minor (hourly) changes to the shape of the outflows.

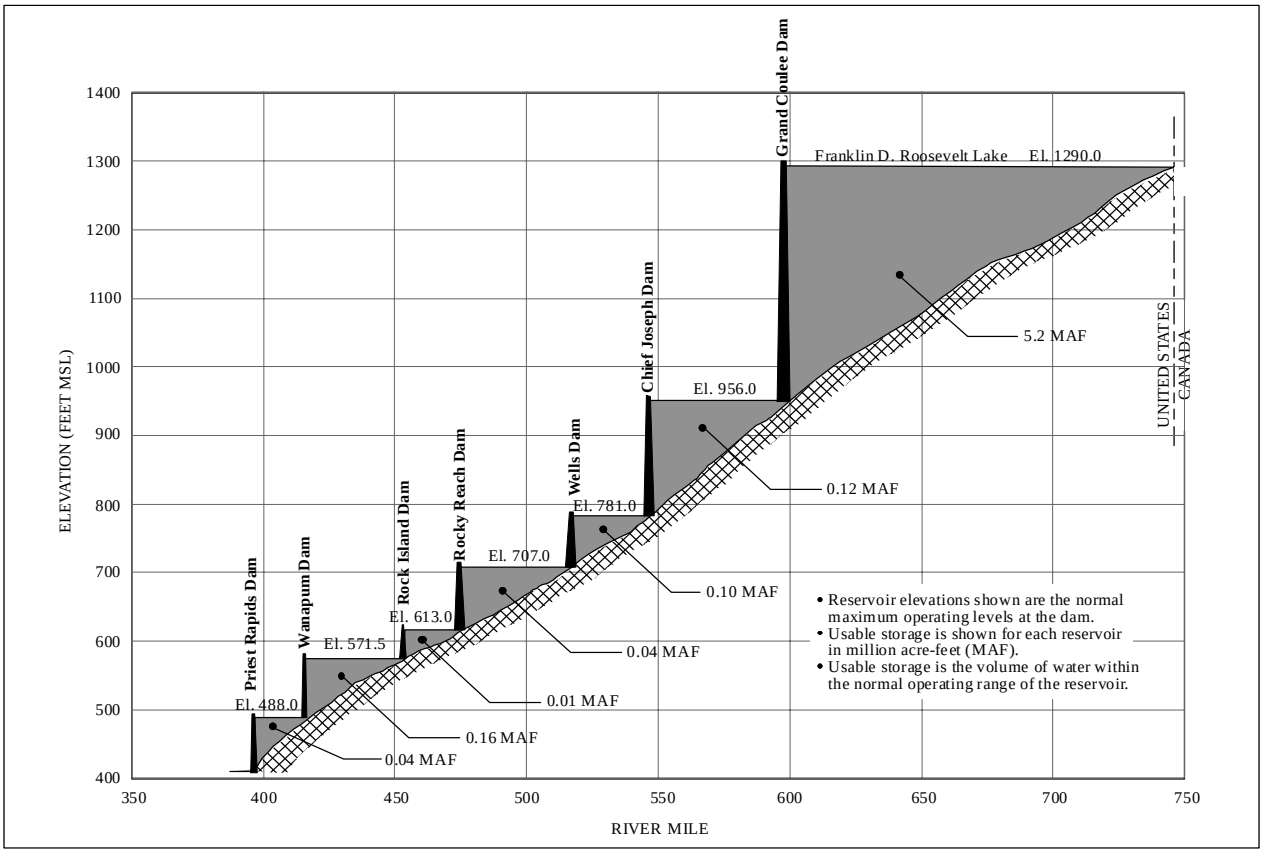

Figure 3. Mid-Columbia River profile and useable storage volumes (Source: Grant PUD, Exhibit B, License Application, October, 2003).

Table 2 shows the travel time (defined as the time required for changes in the water surface elevation at the forebay of a downstream dam in response to a flow change at the next upstream dam) through each of the reservoirs downstream from Grand Coulee. The travel times range from 45 minutes for the smaller reservoirs to 2 hours and 45 minutes for the larger ones. The travel time is 1 hour and 30 minutes for Wanapum and

45 minutes for Priest Rapids. The total time required for a flow change at Grand Coulee to begin to affect reservoir elevation at Wanapum dam would be about 9 hours with no flow shaping by the intervening projects. Normal operating practice, however, includes some re-shaping at each of the reservoirs in accordance with the requirements of their respective power demands and non-power operating requirements.

Table 2. Reservoir length and travel time for mid-Columbia Projects below Grand Coulee (Source: Exhibit B, License Application, October 2003).

Project	**Reservoir Length**	**Travel Time**
Chief Joseph	52 miles	2 hr 45 min
Wells	29 miles	1 hr 15 min
Rocky Reach	38 miles	2 hr 45 min
Rock Island	21 miles	45 min
Wanapum	38 miles	1 hr 30 min
Priest Rapids	18 miles	45 min

Another physical attribute of the mid-Columbia projects that necessitates a coordinated approach to their operation is the hydraulic capacity of the respective project turbines to handle the maximum generating output capability of Grand Coulee. Grand Coulee and Chief Joseph are primarily used to satisfy on-peak demand. With the addition in 1975 of a third powerhouse at Grand Coulee dam, the turbine hydraulic capacity at Grand Coulee exceeds that of the downstream PUD projects (Table 3). Without a coordinated approach to operation, this imbalance, together with the short response (travel) times, would result in a significant amount of unplanned spill (wasted energy) at the downstream projects.

Table 3. Maximum turbine hydraulic capacity of mid-Columbia Projects (Source: Exhibit B, License Application, October 2003).

Project/Development	**Maximum Hydraulic Capacity (cfs)**
Grand Coulee	280,000
Chief Joseph	213,000
Wells	220,000
Rocky Reach	220,000
Rock Island	220,000
Wanapum	180,000 (188,000[1])
Priest Rapids	175,000 (185,000[1])

[1] Estimated station hydraulic capacity after replacement with advanced design turbines.

The HCA provides a framework for coordinating the operation of the mid-Columbia projects to make efficient use of the water resource for power, while protecting non-power resource benefits by incorporating project specific environmental operating constraints. This EIS considers recommendations by agencies, tribes and other parties to the licensing proceeding for changes to the current non-power operating requirements at the Project. Because implemented through the HCA, the following section describes the HCA in greater detail and the current non-power operating requirements and agreements.

Mid-Columbia Hourly Coordination Agreement (HCA)

The HCA was originally signed for a one-year experimental period from July 1, 1972 to June 30, 1973. Twelve parties representing the federal government, the three mid-Columbia PUDs, and all of the power purchasers at that time signed the original agreement. Several one-year agreements were signed covering subsequent periods until a ten-year contract was signed on July 1, 1977. At the end of that term, another 10-year contract was signed, extending the arrangement through June 30, 1997. A new 20-year renewal agreement has been signed extending the term to November 1, 2017.

In general, the parties to the HCA have agreed to coordinate the operation of the projects to achieve the following objectives:

1. Coordinate the hydraulic operation of the projects for the purpose of optimizing the amount of energy from the available water consistent with the need (1) to adjust the total actual generation to match the total requested generation, and (2) to operate within all power and non-power requirements.
2. Provide flexibility and ease of scheduling project generation through centralized, coordinated scheduling and the use of composite scheduling and accounting procedures.
3. Minimize unnecessary changes in project generation to avoid frequent unit starts and stops.
4. Reduce the amount of fluctuation in river flow that could otherwise occur without such coordination.

Grant PUD has been designated to coordinate the scheduling activities and dispatching at its headquarters (Central) in Ephrata. Communications were established between Central and the dispatching centers controlling the seven dams.

Each day the non-federal Hourly Coordination participants provide an estimated schedule of desired generation from the lower five projects. The federal project operators provide an estimate of water expected to be discharged from Grand Coulee and Chief Joseph. Central then determines an estimated operation schedule for the following day

based on anticipated flows from the federal projects, reservoir levels and load. Central sends the schedule to each of the five lower projects. Each project then pre-schedules its operation, including hourly generation, for the following day based on Central's estimated operation schedule.

During real-time operation each non-federal project sends Central an uncoordinated load request signal every four seconds. Based on the sum of these load requests, Central's computer system determines the actual allocation of generation required to meet load demand and non-power constraints for the system. Central operators use power generation characteristics and reservoir target elevations to set desired generation and discharges at each of the developments.

After Central establishes the coordinated generation by sending a coordinated request signal back to each of the non-federal projects, the coordinated generation signal is also sent to the federal projects in the form of a "bias," defined as the difference between coordinated and uncoordinated generation. A significant change in load requests, which might, for example, be driven by power market prices, can result in significant bias. Therefore, the federal projects have established limits on the amount of bias they would accept. Under certain conditions, the federal projects can elect to have zero bias, during which Central has no ability to control generation at the federal projects. During these periods the federal projects are considered to be "off" coordinated operation and they operate for maximum power which typically results in larger flow fluctuations. This occurs about 10% of the time and can also result in spill at the lower five projects.

Power operations at the Priest Rapids and Wanapum Developments are designed primarily to meet daily load requirements through the assignment of "allocated generation" by Central Control at Grant PUD. Automatic control logic is used to maintain preset reservoir levels in order to meet load requirements and prevent inadvertent spill due to unscheduled changes in flows from upstream projects. The typical daily power operations of both Wanapum and Priest Rapids include a drawdown of approximately 1 to 3 ft below the normal maximum pool elevation. Depending on river flow conditions and load requirements, drafting of the reservoirs may begin at the start of each daily cycle to sustain generation during peak demand until releases from Chief Joseph reach Priest Rapids. The reservoirs are typically restored to maximum reservoir elevation overnight and may be drafted again the following morning.

During periods when one or more turbines are out of service for maintenance, the reservoir levels at Wanapum or Priest Rapids may be lowered by approximately 2 to 3 ft to capture daily generation flows released from Chief Joseph without spilling. The reservoirs are typically refilled overnight and drafted the next morning until the outage is over.

Daily drafts of the reservoir averaging about 2 to 3 ft at the Priest Rapids Development also occur when flows below the dam must be adjusted to accommodate downstream barging activity or to permit groundwater testing in the Hanford Reach. These activities typically occur in the spring or fall when load demand is relatively low. Impoundment levels are lowered so that daily generation flows received by the Project from upstream can be stored and re-regulated. Barging requires flows between 40,000 and 140,000 cfs, and the Hanford Reach groundwater testing requires 60,000 cfs or less discharge from the Priest Rapids Development. Similar to reservoir drawdowns to accommodate turbine outages, the reservoirs are typically refilled each night and redrafted the next day until the associated activity is completed.

Fluctuations of the Wanapum and Priest Rapids reservoirs typically occur during fall implementation of the VBA. During a 40-day period beginning in mid-October until the last Sunday prior to Thanksgiving, the Project is used to re-shape flows to the Hanford Reach. This is termed Reverse Load Factoring (RLF) and may result in daily reservoir fluctuations of several feet. To sufficiently control flows, the Wanapum reservoir may be drafted overnight to regulate next day inflows from upstream storage released for daytime generation. During this operation, both the Wanapum and Priest Rapids reservoirs are used to re-regulate generation flows to maintain lower daytime flows below the Project.

Vernita Bar Settlement Agreement (VBA)

The VBA was filed with FERC on July 16, 1988, and approved on December 9, 1988 (45 FERC 61,401; Grant PUD et al. 1988). The agreement ensures that the operation of the mid-Columbia River system provides adequate flow for salmon eggs and fry in the Vernita Bar area located approximately four miles below the Priest Rapids Development. Parties to the agreement include three mid-Columbia PUDs (Grant, Chelan, and Douglas), the BPA, NMFS, the Washington Department of Fisheries (now known as the Washington DFW), the Oregon Department of Fish and Wildlife, and the Umatilla, the Confederated Tribes of the Colville Indian Reservation (Colville), and the Yakama. The current VBA is set to expire concurrently with the term of the existing Project license although the signatories agreed that it is to continue for the term of any annual licenses.

The VBA stipulates that operations under the Agreement provide acceptable protection for fall Chinook salmon at Vernita Bar, and that all requirements are satisfied with respect to existing laws and regulations, including the FPA. The agreement also satisfied the Vernita Bar Phase of the mid-Columbia Proceeding. The agreement describes the manner in which Grant, Chelan, and Douglas PUDs and the BPA will cooperate to provide the required flow regimes. The VBA also defines special conditions that apply in cases of impossibility of performance and adverse water conditions.

In order to minimize the formation of redds above water levels corresponding to a flow of 70 kcfs, flows are managed in a unique manner. The agreement provides that Grant PUD will operate the Project to the extent feasible to produce Priest Rapids outflows during daylight hours that equal 68% of the daily average Wanapum inflow. This obligation is in effect during the spawning period (defined as initiation of spawning typically in late October through the last Sunday prior to Thanksgiving) for inflows between 80 and 125 kcfs and is termed RLF. However, in practice, Grant PUD makes every effort to maintain daytime flows below 70 kcfs, regardless of the inflow in order to accomplish the goal of limiting spawning to areas below 70 kcfs. Under the VBA, BPA has no obligation to limit fall flows; however the VBA contemplates BPA cooperation in managing fall flows.

Following the spawning period, a monitoring team determines a protection level flow (minimum flow) by counting redds in the Vernita Bar index area. The protection level flow is set using the following criteria:

- If 31 or more redds are located above the 65 kcfs elevation, the Critical Elevation will be the 70 kcfs elevation
- If there are 15 to 30 redds above the 65 kcfs elevation, the Critical Elevation will be the 65 kcfs elevation
- If there are fewer than 15 redds above the 65 kcfs elevation, then the Critical Elevation will be the first 5 kcfs elevation above the elevation containing the 16th highest redd within the survey area on Vernita Bar (Table B-8 for examples of the application of these counts)

To maintain the protection level flow below Priest Rapids dam, the VBA describes operating obligations for Grant PUD, Chelan PUD, Douglas PUD and BPA. During non-holiday weekdays, BPA is required to provide flow from Chief Joseph dam (less side inflow) that is not less than the protection level flow. On Saturdays, BPA can reduce Chief Joseph flows so that the difference of Chief Joseph flow and side inflows compared to the protection level flow does not exceed 38.5 kcfs for that day. On Sundays, BPA can reduce Chief Joseph flows so that the difference of Chief Joseph flow and side inflows compared to the protection level flow does not exceed 35.6 kcfs for that day.

When necessary to make up for the difference between Chief Joseph outflow, side inflows and protection level flows, Grant, Chelan and Douglas PUDs are obligated to make up the deficiency by drafting according to the following schedule as necessary, to maintain the protection level flow:

1. Grant PUD drafts up to 3 ft from Priest Rapids reservoir
2. Grant PUD drafts up to 2 ft from Wanapum reservoir
3. Chelan PUD drafts up to 1 ft from Rocky Reach reservoir
4. Douglas PUD drafts up to 1 ft from Wells reservoir

5. Grant PUD will draft up to 0.7 ft from Priest Rapids

The VBA allows Grant, Chelan and Douglas PUDs to draft their reservoirs in an alternative manner as long as the alternative provides an equivalent volume and also provides a mechanism to provide additional water through use of the HCA. Drafts are limited to levels within the applicable reservoir operating elevations. Whenever a reservoir is within 1 ft of minimum elevation, reservoir refill is to be accomplished in reverse order of draft or alternative manner by agreement of Grant, Chelan and Douglas PUDs.

Under the VBA, a team of biologists monitors salmon spawning activities and establishes the protection level flow, which is the minimum flow required to keep redds fully watered through the incubation and emergence period. The VBA establishes a cap of 70 kcfs on the protection level flow. The monitoring team also tracks temperature data, and uses this information and the redd counts to determine dates of spawning, hatching, emergence and end of emergence. The protection level minimum flow ceases following completion of emergence. This typically occurs in mid-May, although under the VBA it has been as early as April 21 (in 1992) and as late as June 22 (in 1996).

Fish Spill Operations

In May 1994, FERC issued an Interim Order (58 FERC 63,022) requiring Grant PUD to spill water at both Wanapum dam and Priest Rapids dam to achieve non-turbine downstream passage of 70% of the spring migrants over 80% of the run, and 50% of summer migrants over 80% of the run. This order was based on an initial ruling under the Mid-Columbia Proceeding. Grant PUD has operated under this Interim Order since 1994, although the level of spill has been increased as a result of informal consultation under the Endangered Species Act (ESA). With the listing of Upper Columbia steelhead as an endangered species in 1997 (62 FR 43,937) and Upper Columbia spring Chinook in 1999 (64 FR 14,308), Grant PUD filed an Interim Protection Plan with FERC that called for spring spill of 43% of river flow at Wanapum dam and 61% at Priest Rapids dam to cover 95% of the spring out-migration of juvenile steelhead and spring Chinook. During most years, total dissolved gas (TDG) limits prevented spill up to target levels at Wanapum dam. Beginning in 1999, Grant PUD agreed to a corresponding increase in spill at the Priest Rapids Development to make up for this shortfall at Wanapum. From 1998 to 2001, Grant PUD operated under these Interim Protection Plan spill levels.

Grant PUD provided summer spill operations under the Interim FERC Order from 1994 to 1999. In the summer of 2000, a Memorandum of Agreement (MOA) between Grant PUD and the Joint Fisheries Parties (JFP) that set a summer spill at 49% for Wanapum and 39% for Priest Rapids was filed with FERC. Again, in the event that TDG limited Wanapum spill, Grant PUD agreed to make a corresponding increase in Priest

Rapids spill. This MOA governed summer spill operations in 2000 and 2002. During the 2001 energy emergency and drought, Grant PUD reduced summer spill to Interim Order levels.

Under these operating orders and agreements, fish spills have increased steadily from 1995 to 2002. However, variable hydraulic conditions and authorized experiments to test the effectiveness of various fish passage alternatives have led to variability in year to year spill rates. At Priest Rapids dam, spring spill has ranged from a low of 22% in 1995 to a high of 68% in 1999, with summer spill ranging from a low of 18% in 1995 to a high of nearly 55% in 2002.

Hanford Reach Juvenile Fall Chinook Protection

In 1997, concerns were raised about the effects of flow fluctuations from the mid-Columbia River system on fall Chinook fry rearing in the Hanford Reach of the Columbia River. Grant PUD and BPA jointly funded a multi-year study undertaken by the Washington DFW to evaluate the impacts of flow fluctuations on fall Chinook fry. During high flows in 1997, very little fry impact was observed. During the average flow year of 1998, Washington DFW researchers sampled over 30,000 newly emerged fry from isolated pools along the river margin. In the fall of 1998, the Washington DFW approached BPA and Grant, Chelan and Douglas PUDs about potential operational modifications to address the issue. Starting in 1999, the mid-Columbia operators provided an experimental re-shaping program to limit flow fluctuations in the Hanford Reach which has continued to evolve. The basic approach of the program is to develop an allowable flow fluctuation band that varies according to defined criteria. The period of time affected is generally mid-March through June.

In 1999, the program allowed for 40 kcfs fluctuations below Priest Rapids dam when no fish spill was occurring and 60 kcfs fluctuations below Priest Rapids dam during fish spill when weekly average flows were below 170 kcfs. When flows were greater than 170 kcfs, a 150 kcfs minimum flow was applied. In addition, a re-wetting program was attempted in 1999; however this was abandoned after two weekends when sampling revealed higher numbers of stranded or entrapped fish. In 2000, the program was continued without the re-wetting operation. During 2001, the program was further modified with 40, 60, and 80 kcfs fluctuation limits when weekly flows were less than 170 kcfs (flows never exceeded 170 kcfs in 2001 so the 150 kcfs minimum operation was not used). Modifications in 2002 provided smaller fluctuation limits of 20 kcfs when flows at Priest Rapids dam were less than 80 kcfs, 30 kcfs when Priest Rapids flows were from 80 to 110 kcfs, 40 kcfs fluctuations when Priest Rapids flows were 110 to 140 kcfs and 60 kcfs fluctuation limits when Priest Rapids flows were from 140 to 170 kcfs. When weekly flows were greater than 170 kcfs, the 150 kcfs minimum flow constraint was in effect.

This operation to minimize stranding has been accomplished through use of the HCA and available active storage in Priest Rapids and Wanapum reservoirs. This results in a reduction of peak generating capacity at the Priest Rapids Development and Wanapum Development. Peak generation requirements are then shifted to upstream projects under Hourly Coordination operations. The primary difficulty in implementing this operation results from excessive upstream flow fluctuations that occur in the spring at Grand Coulee and Chief Joseph dams. Grant PUD says the limited storage available at the Project often results in the inability to stay within program fluctuation limits. Coordinated operations involving upstream projects and operators under the HCA allows the reduced on-peak generation and increased off-peak generation at the Project to be balanced by generation from upstream projects.

2.2 GRANT PUD'S PROPOSAL

Grant PUD proposes to continue to operate and maintain the Project, including existing environmental protection facilities and programs; to replace existing generation equipment with more efficient and, potentially, environmentally improved (fish friendly) equipment; and to implement a number of new environmental protection, mitigation, and enhancement measures.

2.2.1 Proposed Turbine Replacement

On July 23, 2004, the Commission issued an order[11] amending Grant PUD's license and authorizing the replacement of the 10 turbines at the Wanapum development with ten new, upgraded turbines over a period of about 8 years. The order authorized the replacement of one turbine, followed by a study to test the effect of the advanced turbine design on fish passage survival. Replacement of the remaining 9 turbines would be allowed to proceed only after the Commission informed the licensee that test results were satisfactory.

On October 11, 2005, Grant PUD filed a report[12] on fish survival through the first installed turbine and, subsequently, on December 14, 2005, the Commission issued an order[13] authorizing the installation of the remaining nine advanced design hydro turbines. Upon completion of the replacement of all 10 turbines, the total capacity at the Wanapum

---

[11] 108 FERC ¶ 62,075 (2004).

[12] Quantitative Evaluation of the Performance of the New Advanced Hydro Turbine System (AHTS) at Wanapum dam, Columbia River, Washington, prepared for Public Utility District No. 2 of Grant County, by John R Skalski, et al, August 16, 2005.

[13] 113 FERC ¶ 62,205 (2005)

development would increase from 900 MW to 1,038 MW, and the total hydraulic capacity would increase from 178,000 cfs to 188,000 cfs.

In its license application, Grant PUD proposes to replace the 10 existing turbines at the Priest Rapids development with the same advanced design turbines beginning in 2017 and extending through 2023, assuming the existing turbines have reached the end of their useful life. Upon completion of the replacement of all 10 turbines, the total capacity at the Priest Rapids development would increase from 855 MW to 955.6 MW, the rated capacity of the existing generators. Upon completion of the proposed turbine replacement upgrades at both developments, the total Project capacity would increase from the existing authorized installed capacity of 1,768.8 MW to 1,993.6 MW, an increase of 224.8 MW.

2.2.2 Proposed Project Operations

Grant PUD proposes to continue to operate the Project in coordination with the other mid-Columbia hydroelectric projects to meet its own and its utility customers' needs for electric power and ancillary services within the constraints of non-power requirements and agreements for the protection and enhancement of water quality, fish, and flood control (see section 2.1.8). The resulting operation would continue the use of project storage to reshape the inflow hydrograph to help meet hourly changes in electricity demands. Because of Grant PUD's proposed improvements in the efficiency of generation equipment and proposed methods for meeting downstream fish passage goals with reduced spill flow, project generation would increase under the proposed operation. In a mean water year, Grant PUD estimates the project would generate 9,754,000 MWh compared to 8,609,000 MWh under current conditions. Power losses associated with non-power water releases for fish would be reduced under the proposed operation from 1,366,000 MWh under the current operation to 527,000 MWh under the proposed operation after completion of proposed project modifications.[14]

2.2.3 Proposed Environmental Measures

Grant PUD proposes to develop and implement a Resource Integration and Coordination Program, whereby management of the environmental, recreation, and cultural resource protection, enhancement and mitigation measures will be coordinated to achieve a balanced integration of sometimes competing and complementary resource goals for Project lands and waters.

Subsequent to filing the license application for the Project, Grant PUD filed two

[14] Energy estimates by Grant PUD based on mean water year as represented by 1998 hydrology. (Exhibit B, Final License Application, Grant PUD, 2003)

settlement agreements that modified the proposed environmental measures for relicensing the project. On April 19, 2004, Grant PUD filed an offer of settlement that included the Hanford Reach Fall Chinook Protection Program Agreement (Hanford Reach Agreement).[15] Signatories to the Hanford Reach Agreement include Grant PUD, Chelan PUD, Douglas PUD, BPA, NMFS, Interior[16], Washington DFW, and the Colville. The measures included in the Hanford Reach Agreement are described below in the Aquatic Resources section and evaluated in section 3.5.2.

On February 10, 2006, Grant PUD filed a second offer of settlement that included the Priest Rapids Salmon and Steelhead Settlement Agreement (SSA).[17] This agreement encompasses the Hanford Reach Agreement as well as new measures to address project effects on salmon and steelhead. Signatories to the SSA include Grant PUD, NMFS, Interior, Washington DFW, Yakama[18], and the Colville. The measures included in the SSA are described below in the Aquatic Resources section and evaluated in section 3.5.2.

Grant PUD proposes to implement the following environmental resource protection and enhancement measures.

Geology and Soils Resources

- Continue to monitor the project impoundment rims for indications of instability and erosion.
- Develop and implement erosion and sediment control measures related to project land-disturbing activities.

---

[15] The Hanford Reach Agreement is intended by the parties to replace the 1988 VBA effective with the issuance of a new license to Grant PUD for the Priest Rapids Project.
[16] Interior did not initially sign the Hanford Reach Agreement; however, their signature was added to the agreement on December 16, 2005.
[17] In filing their SSA on February 10, 2006, Grant PUD effectively modified their licensing proposal. However, Grant PUD did not specify which measures from the original license application proposal should be removed, modified, or replaced by measures included in the settlement. Therefore, in describing Grant PUD's proposal for aquatic resources, we have: 1) added any new measures; 2) retained all aspects of the original proposal that we concluded were not in conflict with the measures included in the SSA; and, 3) deleted or modified measures from the original proposal that we concluded were inconsistent with measures from the SSA.
[18] The Yakama did not initially sign the SSA; however, their signature was added to the agreement on August 10, 2006.

Water Quantity and Quality

- Implement a Water Quality Monitoring Plan (401 Application) that includes:
  - Continued reservoir management and maintenance operations, and monitoring of spill patterns to minimize ambient total dissolved gas levels.
  - A water temperature monitoring plan at four fixed sites.
  - Monitor dissolved oxygen (DO), turbidity, and pH at the four fixed monitoring sites during the non fish-spill season (September 15 through April 1).
  - Operating according to the terms of the Hanford Reach Agreement.
  - A plan for managing nuisance aquatic plant species at key recreation sites within the Project area, including information and signage and assessing aquatic macrophyte density at eight transects within the Project every four years, and incorporating aerial photos into GIS maps of macrophyte coverage through the reservoirs; as well as continuing to monitor for zebra mussels cooperatively with Washington DFW (see also Terrestrial Resources section).
  - Addressing potential short-term water quality impacts associated with construction activities at the Project, emergency situations, and routine maintenance activities.
  - Developing additional details for calibrating its four water quality monitoring sites following issuance of the 401 certificate.
- Coordinate the spill program for the project with the spill activities of other projects through the Priest Rapids Coordinating Committee (see also Aquatic Resources section).
- Continue to operate each Taintor gate at Wanapum dam (see also Aquatic Resources section).
- Continue to identify and implement experimental spill regimes as may be warranted to test opportunities for improving fish survival with less spill flow and/or reducing TDG levels at either Priest Rapids or Wanapum Dams (see also Aquatic Resources section).
- Provide biological monitoring to determine the incidence of gas bubble disease (GBD) symptoms in downstream migrating juvenile salmonids and continue development of its “real-time” TDG monitoring system at the fixed monitoring sites.
- Provide tailrace pumping to replace gravity fishway attraction water supply.

Aquatic Resources

- Implement and assess anadromous fish measures using an adaptive management process that would include establishment of a Priest Rapids Coordinating Committee (PRCC), various technical committees (includes hatchery and habitat subcommittees), and a dispute resolution process. This measure is part of the SSA.

- Make steady progress towards achieving a minimum 91 percent combined adult and juvenile salmonid survival performance standard at the project. This measure is part of the SSA.
- Develop and annually revise a downstream passage alternatives action plan (DPAAP) to contribute to achievement of the applicable performance standards at Wanapum and Priest Rapids dams. This measure is part of the SSA.
- Develop and implement a performance evaluation program to assess the hatchery program, habitat program, and improvements to juvenile and adult passage survival. This measure is part of the SSA.
- Produce annual progress and implementation plans to describe the implementation activities for spring-run Chinook salmon and steelhead. Prepare a performance evaluation report that assesses the ability of each program to meet program objectives and contribute to achievement of performance standards. This measure is part of the SSA.
- To provide near-term compensation for annual juvenile salmonid survival that is less than the performance standard, Grant PUD would contribute to a No Net Impact (NNI) Fund. The NNI Fund would be used to undertake measures to improve juvenile salmonid survival. This measure is part of the SSA.
- Evaluate modifications to the spill regime and spill pattern at each dam to improve juvenile salmonid survival while remaining within applicable TDG limits. This measure is part of the SSA.
- Continue to operate and maintain two adult fishways at each dam according to Fishway Operating Plans and investigate methods for improving hydraulic conditions in the fishway collection channels, junction pools, and entrance pools. This measure is part of the SSA.
- Use the spill and bypass programs for juvenile downstream passage to provide fallback passage routes for adult spring and summer Chinook salmon. Operate the sluiceways at both Priest Rapids and Wanapum dams to provide fallback routes for steelhead and fall Chinook salmon. This measure is part of the SSA.
- Construct, operate, and maintain an off-ladder adult trapping facility in the left-bank fishway at Priest Rapids dam. This measure is part of the SSA.
- Operate and maintain PIT-tag detection equipment at the Priest Rapids fishways. This measure is part of the SSA.
- Fund fish counting at Priest Rapids and Wanapum dams and provide daily fish counts for both facilities. Develop video monitoring capability for counting adults in fishways at both dams. This measure is part of the SSA.

- Modify diffusion chambers on both fishways at Priest Rapids to improve adult lamprey passage. Modify the design of the fish count stations at Priest Rapids and Wanapum dams to improve adult lamprey passage and enumeration. If appropriate, reduce fishway flows at night to improve adult lamprey passage.
- Continue to study possible ways to improve downstream juvenile salmonid survival at Priest Rapids dam, including alternative application of top-spill concepts. This measure is part of the SSA.
- Continue to provide spill (61 percent of river flow in spring and 39 percent in summer) for downstream passage at Priest Rapids dam until a better downstream passage alternative is designed, tested, and implemented. This measure is part of the SSA.
- Continue to provide spill (43 percent river of flow in spring and up to TDG limits in summer) for downstream passage at Wanapum dam until a better downstream passage alternative is designed, tested, and implemented. This measure is part of the SSA.
- To improve turbine passage survival at Priest Rapids and Wanapum dams, develop and implement operating criteria to avoid settings that have been shown to result in poor survival and, in the future, install new Advanced Design Turbines. This measure is part of the SSA.
- To prevent smolts from entering the emergency wheelgate or bulkhead slots in Priest Rapids and Wanapum dams, install gatewell exclusion screens.
- Construct a downstream fish bypass at Wanapum dam consisting of an ogee-crested weir through the center of Unit 11 and a submerged tailrace chute. This measure is part of the SSA.
- If the proposed downstream bypass for Wanapum dam fails to achieve 95 percent dam passage survival, consult with the joint fisheries parties to improve survival through additional operational or structural modifications.
- Fund a northern pikeminnow removal program to improve smolt passage survival through the reservoirs and tailraces of Priest Rapids and Wanapum dams. This measure is part of the SSA.
- Fund and implement an avian hazing and control program to improve smolt passage survival through the tailraces of Priest Rapids and Wanapum dams. This measure is part of the SSA.
- As part of anadromous fish monitoring and evaluation studies, use radiotelemetry or other techniques to evaluate upstream and downstream route-specific survival at Priest Rapids and Wanapum dams.

- As part of anadromous fish monitoring and evaluation studies, conduct survival studies using PIT-tag technology or other suitable study methods to obtain dam and project passage survival estimates.
- Develop and implement a Hatchery and Genetic Management Plan (HGMP) for spring, summer, and fall Chinook salmon, steelhead, and sockeye salmon. This measure is part of the SSA.
- To help recover natural populations to self-sustaining and harvestable levels and to mitigate for 7 percent unavoidable losses for each development, fund and develop the hatchery facilities necessary to annually produce 600,000 yearling spring Chinook salmon, 833,000 yearling summer Chinook salmon, 1,143,000 sockeye salmon smolts, and 100,000 steelhead smolts. Upgrade and renovate the Priest Rapids Hatchery and continue to annually produce 6,000,000 fall Chinook salmon smolts and 1,000,000 fall Chinook salmon fry. Consult on options to develop equivalent alternative mitigation programs if annual production of 1,143,000 sockeye salmon smolts is unattainable. This measure is part of the SSA.
- Annually provide $1,096,552 to the Priest Rapids Project Habitat Fund to mitigate for a 2 percent per development unavoidable loss of upriver stocks. Develop a habitat plan to identify goals, objectives, a process for coordination, and a process by which habitat projects would be identified and implemented. This measure is part of the SSA.
- Investigate the feasibility of habitat modifications in the Wanapum dam tailrace to increase the amount of high quality fall Chinook salmon habitat.
- Implement operating agreements with the BPA, Douglas County PUD, and Chelan County PUD to address the cumulative effects of operations at the seven main stem dams (Priest Rapids to Grand Coulee) that control flows and result in flow fluctuations in the Hanford Reach. This measure is part of the Hanford Reach Agreement.
- Provide a minimum flow of 55 to 70 thousand cubic feet per second (kcfs) in the Hanford Reach during the fall Chinook salmon spawning period. This measure is part of the Hanford Reach Agreement.
- Through monitoring of redd locations on Vernita Bar within the Hanford Reach, annually establish a Critical Flow for protection of fall Chinook salmon during the pre-hatch, post-hatch, and emergence periods. Flows within the Hanford Reach would be maintained at or above the Critical Flow subject to the constraints of the 3.7 foot draft limit for the Priest Rapids reservoir and the 2 foot draft limit for the Wanapum reservoir. Additional water beyond Grant PUD's ability to maintain the Critical Flow would need to be obtained from upstream operators, which could be

coordinated as part of the operating agreements described above. This measure is part of the Hanford Reach Agreement.

- Within the constraints of the HCA, limit fluctuations in outflow from Priest Rapids dam during the fall Chinook rearing period within the Hanford Reach. This measure is part of the Hanford Reach Agreement.
- Maintain a minimum flow of 36 kcfs in the Hanford Reach during all times outside the fall Chinook salmon spawning, pre-hatch, post-hatch, and emergence periods. This measure is part of the Hanford Reach Agreement.
- Continue to use Standard Operating Procedures at both dams to provide operators with turbine operating criteria, spill patterns for use during downstream passage operations, fishway operation criteria, and other criteria pertaining to upstream and downstream passage of salmon and steelhead.
- To address the effect of the Project on white sturgeon, construct a white sturgeon conservation facility at the Priest Rapids Hatchery. Broodstock would be obtained from the Hanford Reach or Wanapum reservoir and the conservation facility would be designed to produce yearling white sturgeon for stocking into the Project reservoirs. This effort would include experimentation with hatchery supplementation to develop optimal rearing and release strategies and to monitor and evaluate the effectiveness of hatchery releases.
- To address continuing project effects on recreational fisheries, provide funding for upgrades, improvements, and operating costs at the Columbia Basin Hatchery which currently raises 1.4 million fish for stocking in roughly 140 lakes throughout the region (the majority of the lakes are within Grant County, Washington).
- Enhance and improve fish habitat in the lower five miles of Crab Creek (a tributary that enters the Columbia River in the project area).

Terrestrial Resources

- Enhance riparian/wetland habitat within the lower five miles of Crab Creek and the Priest Rapids Wildlife Area; provide funding in the amount of $30,000 per year to support operations and maintenance related to the enhancement measures and capital funding in the amount of $7.2 million over the course of the license term.
- Develop a transmission line avian collision protection plan; provide capital funding in the amount of $500,000 over the course of the license to support the measures including marking transmission lines, over-head ground wires at specific crossings.
- Enhance wildlife habitat in the Colockum, Whiskey Dick, and Quilomine Wildlife Areas;[19] provide annual O&M funding of $70,000, $1 million for land acquisitions,

[19] In a letter filed January 14, 2005, from Laurel Heacock, Manager, Licensing and

and capital funding over the term of the license of $2 million to support:

- Development of the plan.
- Noxious weed control on big-game winter range.
- Re-activation of agriculture program in the Colockum area and/or rehabilitation of agricultural lands to native bunch grasses.
- Improvements to riparian/wetland areas at West Bar Slough.
- Development of mountain meadows and maintenance of existing meadows.
- Fertilization of summer and winter ranges.
- Development of water sources.
- Land acquisitions to consolidate land holdings.

- Continue current programs of installation and maintenance of: 48 wood duck nest boxes around the project shoreline; maintenance of 12 raptor nesting, roosting, and perching structures; and installation of 50 waterfowl nesting platforms (mallard nest baskets and goose nesting tubs).
- Provide $60,000 per year to Washington DFW to support a fire suppression program in the Colockum, Quilomene, Whiskey Dick, Priest Rapids, Crab Creek, and Buckshot Wildlife Management Areas. Any unused funds at the end of the year would be allocated for habitat rehabilitation.

Rare, Threatened and Endangered Species

- Fund a rare, threatened and endangered botanical species protection plan that includes:
  - Budgeting $7,000 per year to defray operations and maintenance expenses to address potential habitat disturbances resulting from maintenance activities within the project transmission line corridor and any future modifications or additions in the number and/or configuration of transmission lines and structures.
  - A provision for developing a construction schedule of any future projects to avoid disturbance of rare species.
  - A provision for conducting pre-construction surveys.
  - A provision for identifying measures to protect any species found during the surveys.
  - A provision for developing an implementation schedule for protective measures.
  - A provision for developing a monitoring plan to evaluate the effects on rare species and habitat.

Regulatory Compliance, Grant PUD revised its proposal for development and implementation of a single habitat management plan instead of two separate plans for the Upper Wanapum and Lower Crab Creek areas.

- Develop a long-term plan to monitor rare, threatened and endangered plants within the project area that includes:
  - A description of the methods to be employed.
  - A provision to map and quantify population trends.
  - An implementation schedule.
  - A provision and schedule for reporting and consulting with appropriate agencies regarding the monitoring results.
  - Providing $13,500 per year to the Washington DNR's Natural Heritage Program for funding and management of research information to further the knowledge of the ecology of rare plants in the project area.
- Develop a bald eagle perching and roosting tree enhancement and protection program.
- Develop a northern wormwood conservation plan to protect and monitor populations within the Project area that would include: continuing annual demographic monitoring for 10 years; working with BOR to maintain 5,000 feet of fencing to eliminate vehicular access; and funding of ongoing noxious weed control, access control, data management, taxonomic investigations, and research to support long-term conservation of the species in the amount of $40,000 per year.

Cultural Resources

- Continue its commitments to the Wanapum reflected in the agreement entered on January 8, 1957, and subsequently modified, and through any future modifications agreed to by the parties.
- Develop a multiple property documentation format for National Register of Historic Places evaluation.
- Implement a proposed schedule for determining National Register eligibility and assess/address adverse effects on remaining cultural resource properties so far inventoried.
- Within one year of license issuance and in consultation with the established Cultural Resource Working Group (CRWG), finalize and implement a Historic Properties Management Plan (HPMP).

Recreation and Land Use

- Finalize its draft Recreation Resource Management Plan (Recreation Plan) that defines the management of existing and future recreation resources associated with the project, including O&M costs; recreation monitoring; interpretation and education (includes interpretive displays/kiosks); integration of recreation resources with other resource management plans; and review. The plan would be guided by an adaptive management strategy.

- Provide funding for one full-time law enforcement (FTE) officer to Washington DFW and one FTE to be divided equally between Grant County and Kittitas County Sheriff's Offices; continue to provide a boat at Wanapum dam for use by local law enforcement officers.
- Concentrate new recreation development in suitable areas that is compatible with the draft Shoreline Management Plan.
- Finalize its draft Shoreline Management Plan and manage lands accordingly; protect the scenic quality of the mid-Columbia River and its surrounding landscape.

2.3 STAFF ALTERNATIVE

Pursuant to the REA notice issued March 28, 2005, various resource agencies and other interested parties provided comments and formal recommendations (see section 1.3). Grant PUD responded with reply comments in letters dated July 8, 2005. Based on our analysis of the project proposed by Grant PUD and the recommendations made by resource agencies and others, Commission staff recommends the alternative of issuing a new license to Grant PUD as proposed by Grant PUD in its license application, with some modifications and additions. We refer to this alternative as the staff alternative. The staff alternative adopts some, but not all, of the recommendations and preliminary mandatory conditions made by parties to this proceeding. The following sections summarize the agencies' mandatory license conditions and the license conditions staff recommends in the staff alternative.

2.3.1 Mandatory Conditions

Any license issued for the Project may be subject to the mandatory conditioning authority of state and federal agencies. The following describes the source of such authority and the status of conditions filed or to be filed for the Project. Agencies with mandatory conditioning authority may modify their conditions after the draft EIS is issued. In the final EIS the staff analyzes any "preliminary" mandatory conditions filed and in the comprehensive development section summarizes its reasons for not including some of the mandatory conditions in the staff alternative.

Water Quality Certification

Section 401(a)(1) of the Clean Water Act (CWA) requires an applicant for a federal license or permit for any activity that may result in any discharge into navigable waters to provide to the licensing or permitting agency a certification from the state in which the discharge originates that any such discharge will comply with certain sections of the CWA. On September 17, 2003, prior to the October 30, 2003, filing of its license application with the Commission, Grant PUD requested a section 401 water quality

certificate from the Washington DOE. At the request of Washington DOE, Grant PUD withdrew and refiled its request on October 8, 2004, October 4, 2005, and again on October 3, 2006. A decision by Washington DOE on the certification request is pending.

Section 18 of the Federal Power Act—Authority to Require Fishways

Section 18 of the FPA, 16 USC § 811, states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of the U.S. Department of Commerce and Interior may prescribe. In a letter filed on May 27, 2005, NMFS provided preliminary fishway prescriptions for salmon and steelhead at the Project. On June 22, 2006, NMFS provided modified fishway prescriptions for salmon and steelhead at the Project. These modified prescriptions specify that Grant PUD shall:

- Develop and implement a comprehensive Fall Chinook Protection Program that includes an adaptive management based passage program, the Hanford Reach Agreement, 2 percent compensation through the habitat program, and a Fall Chinook Artificial Propagation Program.
- Develop and implement a comprehensive Summer Chinook Protection Program that includes making steady progress towards achieving Passage Survival Performance Standards, an adaptive management based passage program, 2 percent compensation through the habitat program, a Summer Chinook Artificial Propagation Program, and a variable NNI Fund.
- Develop and implement a comprehensive Spring Chinook Protection Program that includes making steady progress towards achieving Passage Survival Performance Standards, an adaptive management based passage program, 2 percent compensation through the habitat program, a Spring Chinook Artificial Propagation Program, and a variable NNI Fund.
- Develop and implement a comprehensive Steelhead Protection Program that includes making steady progress towards achieving Passage Survival Performance Standards, an adaptive management based passage program, 2 percent compensation through the habitat program, a Steelhead Artificial Propagation Program, and a variable NNI Fund.
- Develop and implement a comprehensive Sockeye Salmon Protection Program that includes making steady progress towards achieving Passage Survival Performance Standards, an adaptive management based passage program, 2 percent compensation through the habitat program, a Sockeye Salmon Artificial Propagation Program, and a variable NNI Fund.
- Review the performance of the Fall, Summer, Spring Chinook, and Steelhead and Sockeye Salmon Protection Programs from time-to-time and determine the ability to achieve each program's performance standards.

- Make steady progress towards achieving a minimum 91 percent combined adult and juvenile salmonid survival performance standard.
- Develop fish passage programs and operational measures to achieve the passage survival standards for spring, summer, and fall Chinook salmon, sockeye salmon, and steelhead.
- Annually revise a DPAAP for Wanapum dam designed to test, evaluate, and implement capital and operational measures implemented to improve juvenile passage survival while remaining within applicable TDG limits.
- Complete the construction of the Wanapum dam future unit top spill facility for operations starting with the 2007 juvenile downstream migration season.
- Conduct biological testing of the Wanapum powerhouse to determine if the new turbines are performing as expected with respect to juvenile survival.
- Continue to implement an interim spill program at Wanapum dam that includes a spring spill level of 43 percent of average daily total river flow and summer spill up to the TDG limits. Subject to approval by NMFS, the licensee may replace the interim spill program at Wanapum dam if more biologically efficient and effective measures are designed, tested, and implemented.
- Attempt to identify and eliminate sources of potential fish injury at the Wanapum spillway.
- Implement the 2000 TDG Abatement Plan for Wanapum dam.
- Optimize juvenile survival through the Wanapum dam turbines.
- Annually revise a DPAAP for Priest Rapids dam designed to test, evaluate, and implement capital and operational measures implemented to improve juvenile passage survival while remaining within applicable TDG limits.
- Explore downstream passage designs at Priest Rapids dam focusing on alternative application of top spill concepts.
- Continue to implement a spill program at Priest Rapids dam that includes a spring spill level of 61 percent of average daily total river flow and summer spill up to 39 percent. Subject to approval by NMFS, the licensee may replace the interim spill program at Priest Rapids dam if more biologically efficient and effective measures are designed, tested, and implemented.
- Evaluate further modifications the spill regime and spill pattern at Priest Rapids dam to improve juvenile passage survival.
- Investigate alternatives for reducing TDG production in the Priest Rapids spillway.
- Optimize juvenile survival through the Priest Rapids dam turbines.
- Maintain PIT tag detection capability in the right and left bank fishways at Priest Rapids dam.

- Complete construction of the off-ladder adult trap in the left-bank fishway at Priest Rapids dam.
- Continue to investigate methods implemented for improving hydraulic conditions in the Project fishway collection channels, junction pools, and entrance pools.
- Maintain video monitoring equipment for counting adults migrating through the right and left bank fishways at Priest Rapids and Wanapum dams.
- Operate the sluiceways at both dams continually from the end of summer spill until November 15 to provide a safer passage route for adult fallbacks.
- Produce annual Progress and Implementation Plans that describe implementation activities required by the SSA. These plans will report the status of actions performed during each calendar year, the schedule for future actions and studies, and the results of monitoring, modeling, or other analyses.
- Prepare a Performance Evaluation Report that assesses the ability of each program element to meet its program objectives.
- Coordinate the design of the Performance Evaluation Program with development of relevant parallel monitoring or evaluation systems by other hydropower operators.
- Implement the protection, mitigation, and enhancement measures contained in the SSA according to the principals of adaptive management.
- Develop and implement monitoring and evaluation programs designed to evaluate the success of measures in the SSA.

In a letter filed on May 26, 2005, Interior provided preliminary fishway prescriptions for salmon, steelhead, bull trout, and Pacific lamprey at the Project. These preliminary prescriptions specify that Grant PUD shall:

- Operate the Project to provide effective upstream and downstream fish passage over the full range of river flows.
- Develop a fishway O&M plan.
- Develop plans for and conduct periodic evaluations of fishway effectiveness.
- Continue to construct, operate, maintain, and monitor all project structures, facilities, and devices contained in the existing license for upstream and downstream passage of salmon.
- Construct, operate, and maintain the future unit 11 downstream bypass at Wanapum dam.
- Construct, operate, and maintain the proposed spillbay 22 bypass at Priest Rapids dam, subject to Interior and NMFS approval.
- Construct, operate, and maintain the unit 8 fish-friendly turbines at Wanapum dam and the potential 9 additional fish-friendly turbine units.

- Conduct improvements to the Wanapum and Priest Rapids fish ladders to improve fish passage efficiency for adult salmon and steelhead.
- Make steady progress towards achieving the 91 percent combined adult and juvenile salmonid standard.
- Operate the project's upstream and downstream fish passage facilities as prescribed for salmon and steelhead to provide safe, timely, and effective upstream and downstream passage for bull trout.
- Complete the formulation of the upstream passage elements of the Pacific Lamprey Management Plan (Pacific Lamprey Plan).
  - Complete modeling and conceptual design work to determine the most appropriate designs for improving upstream adult lamprey passage.
  - Examine and incorporate successful techniques for improving adult lamprey passage in the existing fishways.
  - Conduct more detailed adult radio-telemetry studies of adult lamprey upstream passage.
  - Conduct a hydraulic study of the fish ladders.
  - Develop and implement specific procedures for salvaging lamprey from fishways during dewatering and maintenance.
  - Evaluate the feasibility of a capture-and-haul program for adult lamprey.
  - Conduct post-improvement radio-telemetry studies to determine the effects of structural and operational improvements on adult lamprey passage.
  - Continue enumerating adult lamprey upstream passage.
  - Assess the effectiveness of modifications made to improve adult lamprey upstream passage.
  - Implement an interim capture-and-haul program for adult lamprey if adult lamprey passage improvements do not achieve passage similar to the best passage rates found at other Columbia River projects.
  - Implement and annual adult lamprey salvage program.
  - Complete preliminary design work and develop a plan to install additional or new adult lamprey volitional passage facilities.
  - Continue to monitor and evaluate the effectiveness of all adult lamprey passage improvements.
  - Install additional or new adult lamprey volitional passage facilities if passage improvements and the interim capture-and-haul program do not achieve passage similar to the best passage rates found at other Columbia River projects.
  - Continue to monitor and evaluate the effectiveness of all adult lamprey passage improvements.

Energy Policy Act of 2005

In accordance with the Energy Policy Act of 2005, Grant PUD filed a request for trial-type hearing with Interior on December 19, 2005. Grant PUD also provided alternative conditions and prescriptions in response to section 18 fishway prescriptions filed by FWS.[20]

In its filing, Grant PUD disputes three issues of material fact, including: 1) whether bull trout passage at the Project is an impediment to healthy bull trout populations, 2) whether the survival performance standards for listed salmon and steelhead are factually or rationally relevant to bull trout at the project, and 3) whether there is a need to conduct additional modeling and design work, environmental measures, and intensive monitoring and evaluation for adult lamprey passage at the Project. In addition, Grant PUD proposed alternatives to six measures prescribed by Interior under section 18 of the FPA. Alternatives prescriptions proposed by Grant PUD include reservations of authority and the measures included in the license application that would benefit Pacific lamprey.

In a letter filed on March 17, 2006, Interior indicated that it would file its answer to Grant PUD's request for hearing on January 5, 2007.

2.3.2 Staff Recommended Operation and Environmental Measures

The Commission staff recommends including most of the operation and environmental measures proposed by Grant PUD in section 2.2.3 above in any license issued for this project. The following environmental measures, proposed by Grant PUD, are *not* recommended by the Commission staff:

- Contribution to the NNI Fund for annual juvenile salmonid survival.
- Installation of gatewell exclusion screens to prevent smolts from entering the emergency wheelgate or bulkhead slots in Priest Rapids and Wanapum dams.
- Provide funding for upgrades, improvements, and operating costs at the Columbia Basin Hatchery to address continuing project effects on recreational fisheries.
- Enhance and improve fish habitat in the lower five miles of Crab Creek.
- Provide funding for law enforcement officers.

Staff also recommends the following additions and/or modifications to

[20] On January 12, 2006 and March 30, 2006, Grant PUD filed two amendments to its original filing. Grant PUD deleted two disputed issues of material fact and deleted alternatives to Interior's 4(e) conditions, which had been withdrawn on March 24, 2006.

Grant PUD's proposed environmental, protection, mitigation and enhancement measures:

Aquatic Resources

- Develop a detailed fishery operations plan.
- Investigate the gate seals at Wanapum dam as a source of juvenile salmonid mortality.
- Study the effects of gatewell exclusion screens on juvenile salmonid and lamprey passage.
- Develop and implement a bull trout monitoring plan to document occurrences of bull trout in the project area.
- Add components to the Pacific Lamprey Management Plan.
- Develop and implement a White Sturgeon Management Plan.
- Prepare a final White Sturgeon Conservation Aquaculture Plan.
- Establish a Priest Rapids Fishery Forum.
- Develop a Crab Creek/Burkett Lake Enhancement Plan.

Terrestrial Resources

- Develop a Wildlife Habitat Management Plan (Wildlife Plan) that fully describes the actions that would be implemented in the first five years of any license and includes provisions for updating the plan every five years thereafter. The plan should identify the projects that would be implemented, where they would be implemented, how they would be implemented, how they will be maintained and monitored to ensure their continued success, and a schedule for their implementation—habitat improvement projects should identify and give priority to projects that address shrub steppe, riparian, and wetland habitats within and immediately adjacent to the project and should consider access controls.
- Develop and implement a Wildlife Habitat Monitoring and Information & Education Program to monitor the indirect effects of project-related recreation on wildlife and sensitive wildlife habitats. The wildlife monitoring and information and education program, coordinated with the Shoreline Management Plan and the Recreation Plan, should describe the methods that would be employed to educate the recreating public about the potential adverse affects of dispersed recreation on sensitive habitats and a detailed methodology for assessing recreation impacts on wildlife habitats and identifies potential corrective actions.
- Implement an aquatic invasive species (AIS) plan (same as nuisance aquatic plan proposed by Grant PUD) with three additional components:
  - Provisions for identifying and recommending any additional measures for detecting future AIS infestations;

- A detailed information and education program that includes identifying boat access points and distributing education material during peak boating season (May 1 – October 30 each year), conducting voluntary boat inspection demonstrations to explain the AIS program and proper methods of cleaning boats, and distributing voluntary boater surveys prepared by Washington DFW; and
- An implementation schedule.

Cultural Resources

- File with the Commission a Memorandum of Agreement between Grant PUD and the Wanapum, which may include any relevant portions of past agreements, to protect cultural resources of significance to the Wanapum.
- Provide DAHP with the missing and incomplete information associated with the submitted site record and determination of eligibility forms.
- Develop and implement protection/mitigation measures for 20 archeological sites (listed in Table 27, section 3.8) and all other archeological sites within the Project APE known to contain human remains.
- Determine National Register eligibility for all remaining inventoried archeological sites and other cultural resources located within the Project APE.
- Identify site-specific project-related effects on all National Register-eligible cultural resources and implement measures to protect such sites within the Project APE.
- Reconvene a committee similar to the Hanford Reach National Monument Federal Planning Advisory Committee to address shoreline-related effects on archeological sites in the Hanford Reach.

Recreation and Land Use

- Conduct recreational use monitoring on project lands, including BLM lands, every 6 years rather than every 12 years as proposed by Grant PUD.
- Provide additional signage at identified recreation sites.
- In a final Recreation Plan, include a provision (*e.g.*, signs) at Quilomene Dune and Bay to address wake size by boaters.
- Dredge and lengthen the Kittitas County boat launch at Vantage.
- In a final Shoreline Management Plan, manage Crescent Bar Island under the land classifications proposed as planned development and conservation, but no further development should occur beyond the existing disturbed footprint; delineate a shoreline buffer zone on the island.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Other alternatives to the relicensing proposal were considered and eliminated from detailed study because they are not reasonable in this case. They are: (1) federal takeover; (2) issuance of a non-power license; and (3) project retirement. The following sections give our reasons for not undertaking a detailed analysis of these alternatives.

2.4.1 Federal Government Takeover of the Project

Federal takeover and operation of the project is not considered to be a reasonable alternative. Grant PUD is a municipal entity, and therefore, federal takeover of the project was barred by Congress in the Act of August 15, 1953, 67 Stat.587. Moreover, no party has suggested that Federal takeover would be appropriate, and no Federal agency has expressed an interest in operating the Project.

2.4.2 Issue Non-Power License

A nonpower license is a temporary license the Commission would terminate whenever it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the nonpower license. At this time, no government agency has suggested a willingness or ability to take over the project. No party has sought a nonpower license, and we have no basis for concluding that the Project should no longer be used to produce power. Thus, we do not consider a nonpower license a reasonable alternative.

2.4.3 Project Retirement

Project retirement could be accomplished with or without dam removal. Either alternative would involve denial of a license application and surrender or termination of the existing license with appropriate conditions. Dam removal has not been recommended by any party, and we have no basis for recommending it or studying it as an alternative.

The second project retirement alternative would involve retaining the dam and disabling or removing equipment that generates power. Project works would remain in place and could be used for historic or other purposes. This would require identifying another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has advocated this alternative for the project. Because the power supplied by the project is needed in the region, a source of replacement power would have to be identified. The 1,768.8-MW Project serves an important role in meeting both daily and seasonal peaks in power demand in the region

and contributes to the reliability and stability of the regional electric system. These benefits would be lost if the project were retired.