# 2005 Water Management Plan

## FINAL – January 31, 2005

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# 1.0 Introduction

## *1.1 Updated Proposed Action and Biological Opinion*

The Action Agencies, consisting of the Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration, operate the projects in the Federal Columbia River Power System (FCRPS) and market the energy generated at those projects. In 2004 the Action Agencies prepared a Final Updated Proposed Action for the FCRPS Biological Opinion Remand (UPA). The UPA was formally transmitted to NOAA Fisheries (NOAA) on November 24, 2004. NOAA released their Revised 2004 Biological Opinion (BiOp) on the Operation of the FCRPS and Upper Snake River flow augmentation on November 30, 2004. The UPA can be found at http://www.salmonrecovery.gov/implementation.shtml. The BiOp can be found at http://www.salmonrecovery.gov/R_biop_final.shtml.

The Revised BiOp and Final UPA were prepared in response to the court remand of the 2000 FCRPS BiOp under National Wildlife Federation vs. National Marine Fisheries Service. The BiOp and UPA were refined in response to comments received on NOAA's draft BiOp and the Action Agencies' draft UPA.

In addition the Action Agencies are engaged in Endangered Species Act (ESA) Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) on the operation of Libby Dam as part of the FCRPS as part of their 2000 BiOp titled "Effects to Listed Species from Operations of the Federal Columbia River Power System".

## *1.2 Preparation of Plans*

The Action Agencies have prepared this Water Management Plan for 2005 as part of the implementation planning process outlined in the 2004 UPA and 2000 USFWS BiOp concerning the operation of FCRPS dams. This plan describes how the FCRPS dams and reservoirs will be operated for the 2005 water year (October 1, 2004 through September 30, 2005) to implement the UPA's water management measures in a manner consistent with the actions proposed in the UPA and called for in the USFWS BiOp, and to make progress towards meeting the biological performance standards specified in the NOAA 2004 BiOp while also meeting non-BiOp related requirements and purposes such as flood control, hydropower, irrigation, navigation, and recreation. The FCRPS hydrosystem performance standards are discussed in section 11.

The Action Agencies will prepare annually a 1-year Water Management Plan that covers FCRPS hydro operations in the upcoming water year. These plans will generally be drafted in July and completed by the end of September. The plan will cover the upcoming water year, which begins on October 1 and ends on September 30 the following year. This 1-year plan will be written when very little information is known about the future year's water supply. Therefore, the annual Water Management Plan will generically describe how the FCRPS will be operated during the year. It will also include any special operations (such as any special tests, flood control procedures planned for the year, etc.) that are known at the time the plan is developed.

The Action Agencies will also develop more detailed in-season action plans to describe how the FCRPS projects will be operated under actual conditions with current water supply forecasts.

The first action plan will be prepared in the fall to address the fall/winter operation of the FCRPS projects. A spring update will be drafted in January and finalized in the March/April time period to address the spring and summer operation of the FCRPS projects. These action plans will take into account changes in the UPA due to water supply or other factors for this time frame.

The Corps of Engineers also prepares a Fish Passage Plan (FPP) each year that provides detailed operating criteria for project fish passage facilities, powerhouses, and spillways to allow for the efficient passage of migratory fish. The FPP contains appendices that describe special operations for studies, the juvenile fish transportation program, operation of units within 1% of best efficiency, spill for fish passage, total dissolved gas monitoring, and dewatering procedures. The plan is coordinated through the Fish Passage Operations and Maintenance Coordination Team (FPOM) and is available on the web at http://www.nwd-wc.usace.army.mil/tmt/documents/fpp/.

## *1.3 BiOp Strategies*

This Water Management Plan addresses strategies to enhance juvenile and adult fish survival through a coordinated set of hydro project management actions to achieve performance standards, and to provide benefits to resident fish. The plan is structured to address water management actions associated with the following strategies and substrategies, as defined for anadromous fish in the UPA and for resident fish in the ESA 2004/2004-2008 Implementation Plan for the FCRPS.

### 1.3.1 Hydro Strategies and Substrategies for Listed Species of Anadromous Fish

Hydro Strategy 2 – Manage water to improve juvenile and adult fish survival

Substrategy 2.1 – Reservoir operations to enhance fish survival: Actions under this substrategy are project operations that benefit fish at or near the project or its reservoir.

Substrategy 2.2 – System flow management to improve fish survival: This substrategy includes coordinated system operations for mainstem flow management and redd protection.

Substrategy 2.3 – Spill operations for project passage: This substrategy includes spill operations at individual projects to provide a better project passage for juvenile fish while avoiding high dissolved gas levels or adult fallback problems.

Substrategy 2.5 – Operate to achieve maximum fish benefits in a cost effective manner: This substrategy highlights the Action Agencies' objective to meet biological performance standards in a cost effective manner.

Hydro Strategy 3 – Operate and maintain fish passage facilities to improve fish survival

Substrategy 3.3 – Juvenile fish transport actions to enhance fish survival: This substrategy includes the transportation of juvenile fish around FCRPS dams.

### 1.3.2 Strategy and Substrategies for Listed Species of Resident Fish

Strategy 1 – Promote the reproduction and recruitment of Kootenai River white sturgeon (KWS).

Substrategy 1.1 – Create conditions below Libby Dam that facilitate KWS natural reproduction and juvenile survival: This substrategy includes operations at and below Libby Dam that aid in KWS recovery.

Strategy 2 – Determine the impacts of the FCRPS on bull trout and mitigate for those impacts.

Substrategy 2.2 – Operate and modify FCRPS dams to protect, provide, and reconnect bull trout habitats: This substrategy includes actions to improve conditions for bull trout.

## 1.4 Non-BiOp Operations

Each year the Action Agencies implement water management actions that are not part of our ESA obligations, but are aimed at meeting other project requirements and purposes such as flood control, power generation, irrigation, navigation, recreation, and fish and wildlife not listed under the ESA. The table below includes fish and wildlife related non-ESA water management actions that may be implemented and the time of year such actions typically occur. These actions are further described in section 12.

| **Action** | **Time of Year** |
|---|---|
| Keenlyside Dam (Arrow) - mountain whitefish actions | December - January |
| Keenlyside Dam (Arrow) - rainbow trout actions | April - June |
| Libby - burbot actions | December - February |
| Dworshak – flow increase for hatchery release | March |
| Grand Coulee – kokanee | September - October |
| Hanford Reach Protection Flows | March - June |
| Vernita Bar Protection Flows | November - April |
| McNary - waterfowl nesting | March - May |
| McNary - waterfowl hunting enhancement | October - January |
| John Day - goose nesting | March - May |
| John Day - waterfowl hunting enhancement | October - January |
| Bonneville - Tribal fishing | April - September |
| Bonneville - Spring Creek Hatchery release | March |

## 1.5 Changes From Last Year's Plan

This is the fourth annual water management plan developed under the USFWS 2000 BiOp and the first under the 2004 UPA and NOAA BiOp. Notable changes in hydrosystem operations that will be detailed in the plan are a change in the initiation of juvenile transportation on the Snake River and an extension of summer draft at Dworshak into September.

# 2.0 Hydro System Operation

## *2.1 Priorities*

The UPA and USFWS BiOp list the following strategies for flow management:

- Limit the winter/spring drawdown of storage reservoirs to increase spring flows and the probability of reservoir refill.
- Draft from storage reservoirs in the summer to increase summer flows.
- Provide minimum flows in the fall and winter to support mainstem spawning and incubation flow below Bonneville Dam.

The Action Agencies have reviewed these strategies and other actions called for in the UPA and BiOp and developed the following priorities (in order) for flow management and individual reservoir operations:

1. Operate storage reservoirs (Hungry Horse and Libby) to meet minimum flow and ramp rate criteria for resident fish.
2. Refill the storage projects by June 30 to provide summer flow augmentation. A late snowmelt runoff may delay refill in order to avoid excessive spill.
3. Operate storage projects to be at their April 10 flood control elevations to increase available flows for spring flow management.
4. Provide fall and winter flows for chum salmon spawning and incubation.

The Action Agencies implement several independent FCRPS project operations to benefit fish at or near each project or its reservoir. Reservoirs are to be operated to meet project minimum outflows, to reduce outflow fluctuations to avoid stranding fish and degrading fish habitat and productivity, to reduce cross sectional area to speed juvenile passage, and to make specific temperature releases to improve water temperatures for fish. These operations are generally the highest priority and not likely to change.

In an operating year that begins on October 1, the flow needs are not encountered in the same order as the BiOp priorities (e.g. the first decision to be made is for chum spawning flows which ultimately have a lower priority than summer flows). Therefore, the Action Agencies will attempt to operate chronologically during the year as follows.

The initial objective is to operate the storage reservoirs (Dworshak, Hungry Horse, Libby, and Grand Coulee) to be at flood control levels by early April. This level varies by runoff forecast. Reaching early April flood control levels will be affected by how much water was released for flood control, power generation, and fishery flows to support both lower Columbia chum and Hanford reach fall Chinook spawning, and to meet Columbia Falls minimum flow requirements.

The next objective is to refill the storage reservoirs by about June 30 without spill (unless required for flood control), in order to maximize available storage of water for the benefit of summer migrants. The June 30 refill in general has priority over spring flow (April, May, June) objectives, while attempting to meet the spring flow objectives and other fish needs.

The final objective is the management of available storage to augment summer (July and August) flows to attempt to meet flow objectives and for water temperature moderation. The storage reservoirs will be drafted to their specified August 31 draft limits to augment summer flows and/or moderate river temperatures. At Dworshak the summer draft limit will be reached in September. Draft limits are a higher priority than the summer flow objectives in order to meet other project uses and reserve water in storage for the following year.

These objectives are intended as general guidelines in overall system operations. The UPA and BiOp also embrace the concept of adaptive management. Adaptive management is the concept that the operation of the system should be adjusted based on acquired knowledge about current conditions in the system and effects of our management actions on it, as opposed to following a rigid set of rules. Some items to be considered are current information on fish migration, stock status, biological requirements, biological effectiveness, and hydrologic and environmental conditions. System managers recognize that there is often insufficient water to meet all the actions specified in the UPA and BiOp while meeting other system uses such as flood protection, power system reliability, irrigation, recreation, and navigation needs. The use of water for any one fish species or project purpose will most likely affect the amount of water available for other fish species or project purposes. Therefore, the Action Agencies, in coordination with regional parties through the TMT, endeavor to consider the multiple uses of the system, while providing, as a high priority, the measures to benefit listed species.

## *2.2 Conflicts*

As stated above, there often is not enough water available in the Columbia River basin to meet every action item stated in the UPA and BiOp while providing for other project purposes. Below are some of the main conflicts that may occur.

### 2.2.1 Flood control draft versus project refill

One way to maximize flood control is to provide abundant storage space in the event a large flood occurs. Conversely, the UPA and BiOp specify that the storage projects be as full as possible to increase the likelihood of refill and provide flows for spring flow management and summer flow augmentation.

Flood control procedures specify the amount of storage needed to provide flood protection. The space is provided to reduce the risk of forecast and runoff uncertainty. In an effort to reduce forecast error and to better anticipate the runoff timing or water supply for a given year, the BiOp calls for the Action Agencies to study system flood control requirements and forecast procedures to determine if they can be improved.

### 2.2.2 The provision of spring flows versus project refill and summer flow augmentation

Again, because water supply and runoff forecasts are not 100 percent accurate, it is difficult to estimate how much water is available for spring flows and still assure refill at the storage

projects by June 30. If too much water is allowed to flow through the storage reservoirs in the spring, there is an increased risk of not refilling the projects. This will reduce the water supply available for summer flow augmentation. On the other hand, if the reservoirs fill too early in the spring, late season rain or snowmelt may cause flood damage downstream, or cause excessive spill and produce higher dissolved gas levels.

### 2.2.3 Chum tailwater elevations versus refill/spring flows

Setting the Bonneville tailwater elevation level for chum spawning and incubation in recognition of the spring refill priority is one of the decisions that the Action Agencies, in consultation with the interagency Technical Management Team (TMT), have to make with the least amount of reliable information. Decisions about the tailwater elevation level for chum spawning and incubation are made in the October/November time period, long before the Action Agencies have reliable information on the coming year's expected water supply. The early season Southern Oscillation Index (SOI) provides an indication of the upcoming year's water supply. If the tailwater elevation level selected is too high (causing higher flows), there is a risk of refill failure. Conversely, choosing to refill runs the risk of reducing the tailwater elevation that can be supported through the spawning season and dewatering chum redds. A chum seining project will be in place below BON for 2005. This program will move chum salmon into Duncan Creek and provide fish to the Washougal hatchery. This will ensure chum production in the unlikely event that chum flows cannot be provided. The area below Bonneville Dam is also utilized by fall chinook and coho (non-listed species) that spawn when water is provided to the spawning grounds.

### 2.2.4 Sturgeon pulse versus summer flow augmentation

Water released from Libby Dam for spring sturgeon flows (pulse) during April -through July may reduce the water available for summer flow augmentation from Libby, although VARQ has been implemented to minimize that possibility. If the pulsed water cannot be stored in Grand Coulee, spring flows will be provided, potentially at the expense of summer flows.

### 2.2.5 Fish operations versus other project uses

In addition to flood control operation, there are other project purposes that may conflict with operations carried out for the purpose of enhancing fish survival. For example, keeping the flow steady below a project for resident and anadromous fish needs conflicts with the ability to use a project to follow electrical load changes; spilling water for juvenile fish passage reduces the amount of power that can be generated to meet demand; and augmenting flows during fish migration periods may conflict with the shape of power demand. Additionally, irrigation demands and recreation elevations at headwater reservoirs may impact the amount of water available for spring flows. The development of the BiOps for the FCRPS included consultations with the federal operating agencies on hydrosystem operations and the impact on listed species. These consultations included consideration of the multiple uses of the FCRPS. The multiple uses of the FCRPS are part of the foundation of the UPA and BiOp.

### 2.2.6 Conflicts and priorities

The conflicts described above pose many challenges to the Action Agencies in meeting the multiple uses of the hydrosystem. Given these challenges, the priorities for flow management

and individual reservoir operations outlined in section 2.1 will guide the Action Agencies in their operational decision-making when conflicts arise. Discussion of conflicts between operational requirements and alternatives for addressing such conflicts will occur in TMT with disputes taken to IT and at times to the Federal Executives.

## 2.3 Emergencies

The UPA and 2000 BiOp acknowledge that emergencies and other unexpected events occur and may cause deviations from fish operations. Such deviations may be short in duration, such as a deviation to respond to an unexpected unit outage or power line failure, or longer in duration, such as experienced in 2001 in response to the low water conditions and unprecedented power market conditions. The TMT has developed Emergency Protocols to be followed to respond to short-term emergencies. (See Appendix 1 or see TMT homepage at http://www.nwd-wc.usace.army.mil/TMT for current version of protocols.) Coordination of longer term emergencies may include the involvement of regional executives.

## 2.4 Research

Research studies sometimes require special operations that differ from routine operations otherwise described in the UPA and BiOp. These studies are generally developed through technical workgroups of the Regional Forum (e.g., System Configuration Team (SCT)) and the Corps' Anadromous Fish Evaluation Program Fish Facilities Design Review Work Group (FFDRWG) and Studies Review Work Group (SRWG). They are further described in the Action Agencies' Implementation Plans. In most cases, operations associated with research entail relatively minor changes from routine operations and are coordinated in technical forums (e.g., TMT and FPOM). In some cases, the nature or magnitude of operational changes for research may require further coordination and review in policy forums (e.g., Implementation team (IT)). Generally, research planning and coordination occurs throughout the late fall and winter, with final research plans established by late winter/early spring. In extraordinary events such as extreme low runoff conditions or an emergency, planned research may be modified prior to implementation to accommodate anticipated unique circumstances and/or to reallocate resources to obtain the greatest value given the circumstances. The Northwest Power and Conservation Council's recommended changes in mainstem hydro operations will require the development of specific experimental designs that may be implemented in the future. These experiments are under development and may be incorporated into experimental protocols for special operations when they become available.

# 3.0 Decision Points and Water Supply Forecasts

## *3.1 Decision Points*

Table 1 below lists the key water management decisions/actions and when they need to be made. Some decision points, such as setting flow objectives, are clearly articulated in the UPA and BiOp. Other decision points, such as setting weekly flow augmentation levels, require much discussion and coordination. The decision points given below are spelled out in the UPA or BiOp, or are based on experience. These decisions are made by the Action Agencies in consideration of actions called for in the UPA and BiOps, and input received through the Regional Forum (TMT, IT, Regional Executives).

**Table 1.** Water Management Decision Points/Actions

| | Early October | November | Winter (December – March) | Early April | Early May | June | Early July |
|---|---|---|---|---|---|---|---|
| ***Operations*** | • Assess potential of providing tailwater elevations/flows for chinook populations below Bonneville Dam *(Non-BiOp Action)*<br>• Assess potential tailwater elevations / flow levels to support chum spawning below Bonneville Dam<br>• Preliminary discussions of flood control/ project refill strategy<br>• Albeni Falls fall/winter drawdown strategy discussion | • Early season forecast using SOI<br>• Evaluate VARQ rule curves<br>• Evaluate likely tier for sturgeon water volume<br>• Consider Kootenai burbot operations | • Determine winter/spring chum flow levels below Bonneville Dam<br>• Determine flood control and refill strategies, including any available flood control shifts<br>• Minimum flows from Hungry Horse Dam and minimum Columbia Falls flows are set by April-August forecast<br>• Begin discussing spring operations<br>• Spring Creek Hatchery release –March *(Non-BiOp Action)*<br>• Begin spring transport discussions<br>• Hanford Reach operations *(non-BiOp action)* discussed, beginning in January. Perform analysis to determine amount of flexibility Dworshak has to operate above minimum flow and still reach spring refill targets. Prepare outlook for meeting flow | • Spring flow objectives are set by the April final volume forecasts<br>• Determine spring flow management strategy including priority for refill<br>• Determine start dates and levels by project for spring spill<br>• Determine start date for MOP at Lower Snake River projects<br>• Determine John Day forebay elevations | • Use May final forecast to calculate the appropriate volume of the sturgeon tiered flow release from Libby using new, coordinated formula<br>• Determine required outflow from Libby for bull trout. | • Summer flow objective at Lower Granite determined by June final volume forecast<br>• Determine summer flow augmentation strategy (early June)<br>• Complete Dworshak temperature modeling and determine release strategy<br>• Decision on McNary juvenile fish transportation (late June)<br>• Switch to 30% spill 24 hours a day at John Day. | • Grand Coulee summer reservoir draft limit determined by July Final April – August volume forecast |

| | Early October | November | Winter (December – March) | Early April | Early May | June | Early July |
|---|---|---|---|---|---|---|---|
| | • Hanford Reach /Vernita Bar flows set *(Non-BiOp Action)* | | objectives.<br>• Determine end of December flood control elevation at Libby, using December SOI –based forecast | | | | |
| ***Plans*** | Develop fall/winter update to the annual water management plan | | Preliminary work on spring/summer update to the annual water management plan | Start operational plans for Libby and Hungry Horse Dams | Libby and Hungry Horse operational plans due | | |
| ***Forecasts*** | | | January, February, and March volume forecasts released by the RFC | April final forecast released by RFC | May final forecast released by RFC | June final forecast released by RFC | |

## 3.2 *Water Supply Forecasts*

Water supply forecasts serve as a guide to how much water is available for fish and other operations. Flow projections are provided to the TMT regularly during the flow management season (April 3 – August 31).

The National Weather Service's Northwest River Forecast Center, USACE Northwestern Division Hydrologic Engineering Branch, Reclamation, and others prepare water supply forecasts to manage the Columbia River. Table 2 below lists the forecasts used to implement actions referenced in the UPA and BiOps.

**Table 2**. Water Supply Forecasts Used to Implement UPA and BiOp Actions

| Forecast Point | Forecast period | Forecast | UPA actions determined |
|---|---|---|---|
| Hungry Horse | April – August | January, February, and March Final provided by Reclamation | Columbia Falls and Hungry Horse minimum flows |
| The Dalles | April – August | April Final | Spring flow objective at McNary Dam |
| Lower Granite | April – July | April Final | Spring flow objective at Lower Granite |
| Lower Granite | April – July | June Final | Summer flow objective at Lower Granite |
| The Dalles | April – August | July Final | Grand Coulee summer draft limit |
| Libby | April – August | Not Specified | Volume of water for sturgeon flow at Bonners Ferry and minimum bull trout flows between sturgeon and salmon flows |

Table 3 summarizes the major fish-related reservoir and flow operations by project. More detailed descriptions of each of these operations follow.

**Table 3**. Major Reservoir and Flow Operations for ESA-listed fish species.

| Project | Flood Control & Refill | Sturgeon | Bull Trout | Spring Anadromous | Summer Anadromous | Chum |
|---|---|---|---|---|---|---|
| **Libby** | Winter: Operate to VARQ flood control rule curve and achieve appropriate elevation by April 10<br><br>Spring: Refill by June 30 and operate to meet flow objectives | April – July Augment flows at Bonners Ferry for sturgeon pulse | Year Round: Operate to minimum flows and project ramping rates to minimize adverse affects of flow fluctuations | Operate to meet flow objectives and June 30 refill if possible without excessive spill | July/August: Draft for summer flow augmentation, not to exceed reservoir draft limit of 2,439 feet | Fall/winter storage may be used to support chum flows |
| **Hungry Horse** | Winter: Operate to VARQ flood control by April 10<br><br>Spring: Refill by June 30 if possible without excessive spill and operate to meet flow objectives | | Year Round: Operate to Columbia Falls minimum flows and project ramping rates to minimize adverse affects of flow fluctuations | | July/August: Draft for summer flow augmentation, not to exceed reservoir draft limit of 3,540 feet | Fall/winter storage may be used to support chum flows |
| **Albeni Falls** | Winter: Operate to flood control rule curve<br><br>Spring: Refill by June 30 and operate to meet flow objectives | | Fall/Winter: Reach 2055' by November 20 and maintain this elevation until kokanee fry emergence (approximately end of April) | | | Fall/winter storage may be used to support chum flows |

| Project | Flood Control & Refill | Sturgeon | Bull Trout | Spring Anadromous | Summer Anadromous | Chum |
|---|---|---|---|---|---|---|
| **Grand Coulee** | Winter: Operate to 85% confidence of meeting April 10 flood control elevation<br><br>Spring: Refill by June 30 and operate to meet flow objectives | | | | July-August: Draft for summer flow augmentation, not to exceed reservoir draft limit of 1,280 feet (>/= 92 maf forecast at The Dalles) or 1,278 feet (< 92 maf forecast at The Dalles) | Fall/winter storage may be used to support chum flows |
| **Grand Coulee (continued)** | | | | | July/August: Operate Banks Lake at elevation 5 feet less than full to provide more water for summer flow augmentation | |
| **Dworshak** | Winter: Operate to flood control rule curve by April 10<br><br>Spring: Refill by June 30 and operate to meet flow objectives | | | | Draft for summer flow augmentation and water temperature reduction, not to exceed reservoir draft limit of 1,520 feet in September | Fall/winter storage may be used to support chum flows |
| **Lower Granite** | | | | Flow objective of 85-100 kcfs<br><br>Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Flow objective of 50-55 kcfs<br><br>Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | |
| **Little Goose** | | | | Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | |

| Project | Flood Control & Refill | Sturgeon | Bull Trout | Spring Anadromous | Summer Anadromous | Chum |
|---|---|---|---|---|---|---|
| **Lower Monumental** | | | | Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | |
| **Ice Harbor** | | | | Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Operate within 1 foot of MOP to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | |
| **McNary** | | | | Flow objective of 220-260 kcfs<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Flow objective of 200 kcfs<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | |
| **John Day** | | | | Apr 10-Sep 30<br><br>Operate within 1.5 feet of minimum level that provides irrigation pumping to reduce juvenile travel time<br><br>Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Apr 1 – Oct 31<br><br>Operate within 1% of best efficiency<br><br>Operate within 1.5 feet of level that will allow irrigation to reduce juvenile travel time | |
| **The Dalles** | | | | Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Apr 1 – Oct 31<br>Operate within 1% of best efficiency | |

| Project | Flood Control & Refill | Sturgeon | Bull Trout | Spring Anadromous | Summer Anadromous | Chum |
|---|---|---|---|---|---|---|
| **Bonneville** | | | | Apr 1 – Oct 31<br>Operate within 1% of best efficiency | Apr 1 – Oct 31<br>Operate within 1% of best efficiency | If hydrologic conditions indicate system can likely maintain minimum flow below BON of 125 kcfs Nov 1 - April, implement mainstem chum flows. If not, provide flows below BON to enable access to creeks for spawning. |

# 4.0 Sub-Strategies: Hydrosystem Substrategy 2.1: Reservoir operations to improve fish survival

## *4.1 Lower Snake Projects (Lower Granite, Little Goose, Lower Monumental, and Ice Harbor)*

### 4.1.1 Reservoir Passage

All Lower Snake projects will operate within 1 foot of Minimum Operating Pool (MOP) from approximately April 3 until small numbers of juvenile migrants are present. This normally occurs in late August. Lower Granite Dam shall not return to normal operating pool until enough natural cooling has occurred in the fall, generally after October 1. The purpose of this action is to provide a smaller reservoir cross section to reduce juvenile salmon travel time and reduce flow fluctuations. Elevations may be modified to maintain the minimum navigation channel requirements.

### 4.1.2 Turbine Operations

To enhance juvenile passage survival, turbines at all Lower Snake projects will be operated within 1% of peak efficiency during the juvenile and adult migration seasons (April 1 through October 31). (See appendix C, Corps of Engineers 2005 Fish Passage Plan)

## *4.2 Lower Columbia Projects (McNary, John Day, The Dalles, Bonneville)*

To enhance juvenile passage survival, turbines at all the Lower Columbia projects will be operated within 1% of peak efficiency during the juvenile and adult migration seasons (April 1 through October 31). A test of operating above the 1% peak operating efficiency is scheduled to be conducted at McNary Dam during the 2005 juvenile migration.

### 4.2.1 John Day

**Pool level**

John Day pool shall operate within a 1½-foot range of the minimum level that provides irrigation pumping from April 10 to September 30. The purpose of this action is to provide a smaller reservoir cross section to reduce juvenile salmon travel time.

# 5.0 Hydrosystem Substrategy 2.2: System flow management to improve fish survival

## *5.1 Flow Objectives*

The purpose of the flow objectives is to aid in achieving the hydro system biological performance standards by providing better instream flow to aid in juvenile salmon and steelhead migration and enhance water quality. However, as recognized in the UPA and BiOp, it is not possible to achieve the flow objectives in many water years because there is limited water and

reservoir storage. This Water Management Plan strives to achieve the best possible mainstem passage conditions, recognizing the priorities established in this document and the need to balance the limited water and storage resources available in the region.

### 5.1.1 Lower Granite

**Spring anadromous fish**
The April final runoff volume forecast at Lower Granite Dam for April to July determines the spring flow objective at Lower Granite Dam. When the forecast is less than 16 million acre-feet (maf) the flow objective will be 85 kcfs. If the forecast is between 16 maf and 20 maf the flow objective will be linearly interpolated between 85 kcfs and 100 kcfs. If the forecast is greater than 20 maf the flow objective will be 100 kcfs. The planning dates for the flow objective are from April 3 to June 20.

**Summer anadromous fish**
The June final runoff volume forecast at Lower Granite Dam for April to July determines the summer flow objective at Lower Granite Dam. When the forecast is less than 16 maf the flow objective will be 50 kcfs. If the forecast is between 16 maf and 28 maf the flow objective will be linearly interpolated between 50 kcfs and 55 kcfs. If the forecast is greater than 28 maf the flow objective will be 55 kcfs. The planning dates for the flow objective are from June 21 to August 31.

### 5.1.2 Priest Rapids—Spring anadromous fish
The spring flow objective at Priest Rapids Dam is 135 kcfs. The planning dates are from April 10 to June 30. There is no summer flow objective for Priest Rapids Dam.

### 5.1.3 McNary

**Spring anadromous fish**
The spring flow objective at McNary Dam is set according to the April final runoff volume forecast at The Dalles Dam for April to August. When the forecast is less than 80 maf the flow objective will be 220 kcfs. If the forecast is between 80 maf and 92 maf the flow objective will be linearly interpolated between 220 kcfs and 260 kcfs. If the forecast is greater than 92 maf the flow objective will be 260 kcfs. The planning dates for the flow objective will be from April 10 to June 30.

Weekend flows are often lower than weekday flows due to less electrical demand in the region. During the spring and summer migration period (April through August), the Action Agencies will strive to maintain MCN flows during the weekend at a level which is at least 80% of the previous weekday average.

**Summer anadromous fish**
The summer flow objective at McNary Dam is 200 kcfs. The planning dates for the flow objective will be from July 1 to August 31.

## *5.2 All Storage Projects*

The purpose of the following actions is to refill FCRPS storage projects as much as possible for spring flows, summer flow augmentation and to cool water temperatures.

The FCRPS dams will be operated during the winter season in order to achieve a high probability of water surface elevations within 0.5 foot of the flood control rule curve by April 10, and to refill by June 30, except as specifically provided by the TMT. The Action Agencies, in consideration of recommendations of the Technical Management Team, will determine the availability and amount of any additional FCRPS storage draft beyond the flood control rule curve for the purpose of flow augmentation, consistent with refill by June 30 for summer flow augmentation.

During the spring, the Action Agencies shall operate the FCRPS to meet the flow objectives and refill the storage reservoirs (Albeni Falls, Dworshak, Grand Coulee, Hungry Horse, and Libby) by approximately June 30. (See Grand Coulee Section 5.9 for special operations this year) If both these objectives cannot be achieved, the TMT will make an in-season recommendation, weighing considerations unique to each particular year. Because research results indicate that increased flows have more direct survival benefits for summer migrants than for spring migrants, modest reductions in spring flows to facilitate reservoir refill would generally be preferable to refill failure.

During the summer, the Action Agencies draft mainstem storage reservoirs (Libby, Hungry Horse, Dworshak, Grand Coulee, Banks Lake) within the NOAA BiOp's specified draft limits, based on flow recommendations provided by TMT. TMT considers a number of factors when developing its flow recommendations, such as: the status of the migration, attainment of flow objectives, water quality, and the effects that reservoir operations will have on other listed and resident fish populations.

## *5.3 Libby*

### 5.3.1 Flood Control

The Corps plans to use the new SOI forecast procedure in December to determine the December 31 flood control elevation. In below average water years the end of December draft elevation may be higher than 2411 feet.

Libby will be operated during the winter season in order to achieve a high probability of water surface elevations within 0.5 foot of the VARQ flood control elevation by April 10 and to refill by June 30 and avoid the risk of filling too quickly and having to spill, except as specifically provided by the TMT.

During the spring, the Action Agencies shall operate Libby to refill by approximately June 30 while contributing to meeting the flow objectives and the pulse for sturgeon.

### 5.3.2 Summer anadromous fish

During the summer (July and August) the Action Agencies shall operate Libby to help meet the flow objectives for juvenile salmon out-migration in the lower Columbia. The summer reservoir draft limit is 2,439 feet, which determines the maximum draft available for summer flow

augmentation from Libby. Retention of July/August water in Lake Koocanusa is possible under a Libby-Canadian storage water exchange, but is not guaranteed. This exchange agreement also reduces the second flow peak created by July/August salmon flow through Kootenay Lake July and August. The purpose of this action is to reduce or eliminate the second peak in the Kootenai River, thus protecting bull trout and sturgeon. Additionally, the exchange agreement reduces the draft of Lake Koocanusa and increases upstream benefits (Note: This type of exchange is allowed under the current Libby Coordination Agreement, which was signed February 16, 2000. Because the operation must have mutual benefit and the magnitude of the water year is not known earlier, the operation, if any, for a given water year is not finalized until June or July of that year.)

The Northwest Power and Conservation Council mainstem amendments call for an evaluation of the relative risks posed to resident fish versus the benefits provided to anadromous fish by drafting the reservoir to 2439' by September 30 in the lowest 20% of volume runoff years and to elevation 2449' by September 30 in all other years. The TMT will consider implementation of this plan during the fall season.

## *5.4 Hungry Horse*

### 5.4.1 Flood Control

Hungry Horse began operating using VARQ starting January 1, 2001. The purpose of this action is to provide more water for flow augmentation.

Hungry Horse will be operated during the winter season to achieve a high probability of water surface elevations within 0.5 foot of the flood control rule curve by April 10 and to refill by June 30, except as specifically provided by the TMT.

### 5.4.2 Refill

During the spring, the Action Agencies shall operate Hungry Horse to contribute to meeting the flow objectives and refill by approximately June 30.

### 5.4.3 Summer anadromous fish

During the summer (July and August) the Action Agencies shall operate Hungry Horse to help meet the flow objectives. The summer reservoir draft limit is 3,540 feet. This limit determines the maximum draft available for summer flow augmentation from Hungry Horse.

The Northwest Power and Conservation Council mainstem amendments call for an evaluation of the relative risks posed to downstream resident fish versus the benefits provided to anadromous fish by drafting the reservoir to 3,540 feet by September 30 in the lowest 20% of volume runoff years and to elevation 3550' by September 30 in all other years. The TMT will consider implementation of this plan during the fall season.

## *5.5 Albeni Falls*

### 5.5.1 Fall draft for fish

The reservoir will be drafted by November 20$^{th}$ to elevation 2055 for Kokanee spawning. This elevation will be maintained as a minimum until Kokanee emergence ends.

### 5.5.2 Flood Control Draft

Albeni Falls will be operated during the winter season using standard flood control criteria.

### 5.5.3 Refill

During the spring, Albeni Falls will be refilled in accordance with standard flood control criteria. The Action Agencies shall operate Albeni Falls to meet the flow objectives and refill by approximately June 30.

## *5.6 Upper Snake River Reservoir Operation for Flow Augmentation*

The purpose of this action is to provide water from the upper Snake Reservoirs for flow augmentation.

Reclamation will attempt to provide 487 kaf of flow augmentation from the Reclamation projects in the upper Snake River basin consistent with its Proposed Action as described in the November 2004 Biological Assessment for O&M of its projects in the Snake River basin above Brownlee. Reclamation's flow augmentation program is dependent on willing sellers and must be consistent with Idaho State law. Due to low reservoir carryover and less than average runoff from 2000-2004, it is unlikely that the entire 487 kaf will be available in 2005.

## *5.7 Brownlee, Dworshak, and Grand Coulee Flood Control*

Opportunities to shift system flood control requirements from Brownlee and Dworshak to Grand Coulee shall be considered. These shifts may be implemented after coordination with TMT. The purpose of this action is to provide more water for flow augmentation in the lower Snake River. This will occur when the shifts will not compromise flood control and they have been coordinated.

## *5.8 Dworshak*

### 5.8.1 Flood Control

Dworshak will be operated during the winter season in order to achieve a high probability[1] of water surface elevations within 0.5 foot of the flood control rule curve by April 10 and to refill by June 30, except as specifically provided by the TMT.

### 5.8.2 Refill

During the spring, the Action Agencies shall operate Dworshak to meet the flow objectives and refill by approximately June 30.

After summer fish operations are completed, flows from Dworshak shall be limited to minimum one turbine operation (approximately 1,500 cfs) unless higher flows are required for flood control, emergencies, chum flows below Bonneville Dam, or other project uses. The purpose of

[1] No specific probability of refill is stated in the UPA and BiOp

these actions is to manage the filling of Dworshak reservoir while operating the project for multiple uses. Flows from Dworshak also may be maintained above minimum flow if Corps analysis determines there is flexibility to release a volume of water above minimum flow and still maintain a high reliability of meeting spring refill objectives.

### 5.8.3 Summer anadromous fish

During the summer (July and August) the Action Agencies shall operate Dworshak to help meet the flow objectives. The summer reservoir draft limit is 1,520 feet. This limit determines the maximum draft available for summer flow augmentation from Dworshak. The Action Agencies will draft Dworshak to 1520 feet in September. The extension of the draft limit into September reflects assumed requirements for about 200 kaf to be held for release by the Nez Perce Tribe as defined by the final outcome of the Snake River Basin Adjudication process. If this assumption proves to be false, the Action Agencies will revisit this aspect of the UPA, and revise as necessary through the implementation planning process. [2]

### 5.8.4 Water quality

During the summer, releases shall be made from Dworshak to attempt to maintain water temperatures at the Lower Granite tailrace fixed monitoring site at or below 68 F. Although a previous FCRPS BiOp stated the goal was to maintain the forebay at this temperature, modeling and experience have demonstrated that the tailrace temperature is more representative of river conditions and temperature exposure of migrating salmonids. The purpose of this action is to improve water quality (by lowering water temperature) in the Lower Snake River. This fishery action also assists in cooling the downstream lower Snake River closer to the state water temperature standards.

## *5.9 Grand Coulee*

### 5.9.1 Flood Control

Normally, Grand Coulee would be operated during the winter season in order to achieve an 85% probability of water surface elevations within 0.5 foot of the flood control rule curve by April 10, and the TMT may recommend other specific operations. However, Grand Coulee will be held below elevation 1255 feet for a minimum of 6 weeks during April and May 2005 to accomplish required maintenance on the spillway drum gates. This will result in the reservoir being below the April 10 flood control elevation in a year of less than average water supply.

### 5.9.2 Refill

During the spring, the Action Agencies shall operate Grand Coulee to refill by approximately July 4. The ability to meet flow objectives in May and June may be affected by drum gate maintenance.

### 5.9.3 Summer anadromous fish

During the summer (July and August) the Action Agencies shall operate Grand Coulee to help meet the flow objectives for juvenile salmon out migration. The July Final forecast produced by

[2] UPA pg. 46

RFC determines the summer reservoir draft limit. The draft limit is 1,280 feet in years when the April through August forecast for The Dalles is equal to or exceeds 92 maf. If the forecast is less than 92 maf the draft limit will be 1,278 feet. This limit determines the maximum draft available for summer flow augmentation from Grand Coulee.

## 5.10 Banks Lake Summer Draft

Banks Lake will be drafted to elevation 1,565 feet by the end of August. The purpose of this action is to provide more water for summer flow augmentation.

## 5.11 Bonneville Dam Chum Tailwater Elevations

The purpose of the following actions is to provide spawning areas and protect redds of chum salmon.

Tailwater elevations will be regulated below Bonneville Dam to support spawning of chum salmon if the best hydrologic data available by early October indicate that precipitation, runoff, and reservoir storage are likely to support the operation from the start of spawning (late October or early November) until the end of emergence (generally through the start of the spring flow management season in April). The SOI has been given consideration in previous years as a method to get a relative gage as to what the coming year's precipitation may be. The chum spawning operation cannot adversely affect implementation of NOAA's 2004 FCRPS higher priority actions or the parties' ability to comply with the Vernita Bar agreement. If these conditions cannot be met, the Action Agencies will work with NOAA Fisheries and the regional salmon managers to identify operations that would benefit salmon while maintaining these other fish protection measures. Such operations may include intentionally managing flows below what is necessary for mainstem spawning to discourage redds from being established in the area or shaping flows in a manner that would discourage redd development (reverse load factoring). In recent years, operating to the Bonneville tailwater gage during daylight hours was found to be an effective management tool. Operations with discharges more than 75 kcfs over the daytime discharge level have occurred without impacting where chum redds were placed. The tailwater gage better reflects the effects of tides, tributary inflow, and groundwater influence below Bonneville Dam. The Action Agencies intend to operate to a minimum Bonneville tailwater elevation to provide spawning flows as agreed to at TMT in operating year 2005. In recent years, the tailwater operation has started when chum are present in the area and this is the plan in 2005. .

If water supply conditions indicate that it is not possible to maintain this minimum tailwater elevation at Bonneville Dam, flow will be provided at times during the chum-spawning season to allow access to Hamilton and Hardy Creeks if the creeks are flowing. Details will be set through coordination in TMT.

From January 1 to the start of spring flows April 10, if the chum operation is possible, the minimum tailwater elevation at Bonneville Dam will be the daily minimum water surface elevation established by coordination in the TMT.

Chum salmon will be captured and used as broodstock to initiate/bolster a spawning population in the recently restored habitat of Duncan Creek. The Northwest Power and Conservation Council's Duncan Creek project outlines the logistics for a brood movement and fry-rearing

program. The salvage operation would expand the numbers of fish captured and reared in this newly established brood collection program to make up for the lack of tributary or mainstem spawning

The Implementation Team sought criteria that NOAA Fisheries uses to make decisions regarding the provision of water for chum spawning. A memo responding to this request is attached in Appendix 5.

# 6.0 Hydrosystem Substrategy 2.3: Spill operations for project passage

This substrategy addresses spill at certain FCRPS projects to provide improved survival and better project passage for juvenile fish while avoiding adult fallback problems and creating greater than 120% saturation levels of total dissolved gas in the tail race and 115 % at the designated downstream monitoring stations at the forebay of the next dam downstream.

The planning dates for spring spill for juvenile fish migration range from April 3 to June 20 in the Snake River (however this varies based on the seasonal average flow forecast at Lower Granite, the UPA states "In years when the seasonal average Snake River flow at Lower Granite is expected to be less than 70 kcfs, maximization of transportation will occur from the date the JBSs begin operation. Due to the mixed benefits of early season transport, however, collection for transport will not be initiated until April 20 in all years where average seasonal flows are expected to equal or exceed 70 kcfs. Prior to April 20, all collected fish will be bypassed back to the river. In those years where flows are anticipated to be between 70 and 85 kcfs, spill will be provided at the collector projects until April 20. Further investigations of spill patterns (e.g. large gate openings/bulk spill) that provide optimum spillway survival conditions in these lower flow conditions will be coordinated through the FFDRWG. "), and April 10 to June 30 in the lower Columbia River. Spill levels and times are indicated below. Planning dates for summer spill for juvenile fish migration are June 21 to August 31 in the Snake River, and July 1 to August 31 in the lower Columbia River. There will be no summer spill at the four collector projects (Lower Granite, Little Goose, Lower Monumental, and McNary).

Spill for the various projects are shown in the table below:

In regard to summer spill the Updated Proposed Action states "The Corps, BPA and NOAA Fisheries will be exploring further definition of and subsequent exercise of the annual hydrosystem performance measure approach outlined in Section II (Adaptive Management Framework) and/or a revision to the Updated Proposed Action to address summer spill issues in the context of achieving appropriate biological performance."[3]

[3] UPA pg. 2

**Table 4.** Spill at run-of-river projects to aid out migration of juvenile anadromous fish.

| Project | Planning Dates | Time | Spring Spill | Summer Spill | Amount | Minimum Generation Requirements kcfs |
|---|---|---|---|---|---|---|
| Lower Granite | April 3– June 20 | 24 hours a day | Yes | No | 19 kcfs (RSW with training) | 11.5[a] |
| Little Goose | April 3– June 20 | 1800-0600 | Yes | No | 120/115 gas cap | 11.5[a] |
| Lower Monumental | April 3– June 20 | 24 hours a day | Yes | No | 45% or 50% of outflow | 11.5[a] |
| Ice Harbor | April 3– August 31 | 24 hours a day [d] | Yes | Yes | 120/115 gas cap 1800-0500<br>45 Kcfs 0500-1800 | 7.5 – 9.5[a] |
| McNary | April 10– June 30[b] | 1800-0600 | Yes | No | 120/115 gas cap | 50 |
| John Day | April 10– August 31 | 1800-0600<br>1900-0600 May 15– July 20<br>June 21 24 hours a day | Yes | Yes | 60% of outflow until June 20<br>Min spill 30%<br>Starting June 21 30% of outflow | 50 |
| The Dalles | April 10– August 31 | 24 hours a day | Yes | Yes | 40% of outflow | 50 |
| Bonneville | April 10– August 31 | 24 hours a day | Yes | Yes | 120/115 gas cap nighttime<br>75 kcfs daytime [c]<br>50 min flow | 30 |

a – Minimum generation requirements at the Lower Snake River Projects may not be needed all the time.

b – Collection of subyearling fall chinook for transportation at McNary Dam shall not be initiated until in-river migratory conditions are deteriorating (i.e., no longer spring-like). In general, the switch from spring to summer operation will occur on or about June 20. Spring-like is defined as favorable flow and water temperature conditions; i.e., river flows are at or above the spring flow target (220 to 260 kcfs) at McNary Dam, and ambient water temperatures are below 62°F (17°C). Actual dates shall be set by TMT coordination.

c – Day and nighttime vary during the spill season and are set in the Fish Passage Plan.

d- An RSW is planned for installation this winter at Ice Harbor.

Note: Spill for juvenile fish passage may be reduced or turned off for short periods of time because of navigation problems at the projects or to allow for juvenile fish barges to dock and undock. Also research at projects that spill may change the details of spill at the project.

# 7.0 Other actions to enhance water management

This includes water management related actions that are being done to improve fish survival, such as studies, water quality actions, and water conservation improvements.

## *7.1 Libby*

### 7.1.1 TDG and Water temperature monitoring

Water temperature profiles in the south end (near-dam, or forebay area) of Lake Koocanusa during May and June will be monitored to provide information necessary for timing of sturgeon spawning/rearing flow augmentation.[4] Also, water temperature profiles in the forebay are used to determine whether warmer temperatures may be provided to assist sturgeon spawning

During the summer of 2003, the Seattle District installed a TDG monitoring sensor at a fixed monitoring station below Libby Dam on the spillway side of the river (left bank, looking downstream) directly across the river from the USGS stage gage.

### 7.1.2 Libby VARQ

The purpose of VARQ is to better ensure reservoir refill and to provide more (and more reliable) water for spring flows and summer flow augmentation without reducing flood control protection.

An Environmental Impact Statement (called the Upper Columbia Alternative Flood Control and Fish Operations EIS) is being prepared and additional public and Canadian (including Columbia River Treaty) coordination will be conducted before VARQ can be implemented at Libby, Hungry Horse, and Grand Coulee for the long term. VARQ will continue to be implemented on an interim basis until a final decision is made regarding long-term implementation. This decision will be made in 2005 upon completion of the EIS.[5]

### 7.1.3 Libby Storage Reservation Diagram and Runoff Volume Forecast Procedure

The purpose of the Libby storage reservation diagram study and investigation of a new forecast procedure and the investigation into a variable 31 December draft point is to see if more water can be made available for spring flows without reducing flood control protection.

[4] USFWS BiOp at Section 8.3.h Page 82 Note page numbers in USFWS BiOp may vary depending on how it is printed.

[5] USFWS BiOp Section 8.1.b page 73

The investigation of the forecast procedure has been completed and the December forecast will be used to determine an appropriate end of December flood control elevation. If the December water supply forecast is well below average, the Libby end of December flood control target may be higher than elevation 2411 feet. Forecasts will be done in water year 2005 using the new method. [6]

### 7.1.4 Coordination

An annual operational schedule to be supplemented on a monthly basis will be provided to the USFWS annually on or about May 1 but not later than May 10. The annual schedule shall include month-end estimates of water surface elevation at Koocanusa Reservoir and estimates of monthly discharge from Libby Dam. The monthly supplement shall include a report of actual operations over the previous month and shall include daily water surface elevation at Koocanusa Reservoir and hourly spill and releases at Libby Dam.[7] The purpose of this action is to provide for better coordination. The Action Agencies plan to do this required coordination at TMT meetings.

## *7.2 Hungry Horse Coordination*

Reclamation will fulfill the USFWS recommendation for annual and monthly reporting by contributing to the annual water management plan and presenting weekly and biweekly reports of Hungry Horse operations through the TMT process.[8]

Reclamation will also fulfill the USFWS recommendation for reporting actual operations by making available pertinent historic elevations and flows as related to Hungry Horse Dam through its current website at http://www.usbr.gov/pn/hydromet/esatea.html.

Reclamation began operating with VARQ flood control at Hungry Horse in 2001, pending completion of an Environmental Impact Statement. The VARQ EIS is scheduled to be completed in the spring of 2005. VARQ will continue to be implemented at Hungry Horse on an interim basis until a final decision is made regarding long-term implementation.

## *7.3 Water Quality Actions*

### 7.3.1 Water Quality Plans

As a condition of the TDG spill variances granted to the Corps by the states of Oregon and Washington, the Corps completed a comprehensive Water Quality Plan that would outline the physical and operational changes that could be used to improve the overall water quality in the mainstem waters of the Clearwater, Snake, and Columbia Rivers. The plan was first completed in April 2003 and updated in December 2003. The goals of the water quality plan are as follows

- To assist in our understanding of system wide loading capacity and loading allocation by assessing the existing effects at Federal and non-Federal dams and tributaries.

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[6] USFWS BiOp at Section 8.1.h Page 76; and USFWS BiOp at Section 8.1.i Page 76
[7] USFWS BiOp at Section 11.A.1.1.c Page 93
[8] USFWS BiOp at Section 11.A.1.2.A Page 93

- To provide an organized, coordinated approach to improving water quality, with the long-term goal of meeting water quality standards that the states and Tribes can integrate into their water quality management programs.

- To provide a framework for identifying, evaluating, and implementing reasonable actions for dam operators to use as they work toward reducing temperature and dissolved gas levels.

- To provide a record of the actions that are and are not feasible for structural and operational improvements aimed at improving water quality conditions and meeting water quality standards. This information may provide a basis for future beneficial use and water quality criteria revisions.

- To bring basin wide information into the decision processes regarding dissolved gas and temperature, and to provide technical assessment of a project's relative value in terms of water quality.

- To integrate dissolved gas and temperature work into one process for both Federal and non-Federal dams on the mainstem Columbia River and Snake River system.

Over the long term, with a focus on water quality, Plan implementation anticipates that EPA, NOAA, and the Federal Action Agencies will properly integrate implementation of the Plan to ongoing TMDL development activities on the mainstem and in the sub-basins.

### 7.3.2 Total Dissolved Gas Monitoring

Exposure to high levels of TDG over long periods of time can be harmful or lethal to fish. Environmental monitoring at the dams is necessary where voluntary spill is employed for juvenile fish passage to ensure that gas levels do not exceed TDG thresholds established in the NOAA BiOp, and variance levels established by the state water quality agencies.

There are two purposes for the Corps to monitor total dissolved gas (TDG) and water temperature at 10 Columbia River Basin dams: 1) to monitor project performance in relation to water quality standards, and 2) to provide water quality data for anadromous fish passage at Columbia/Snake mainstem dams. The monitoring program is considered an integral part of the Corps' Reservoir Control Center water management activities.

The physical TDG the monitoring program is to include the QA/QC provisions stipulated in the "Data Quality Criteria for Fixed Monitoring Stations" completed in 2002 and approved by the Water Quality Team. This report describes the accuracy, precision, and completeness of data required at each fixed monitoring station. To achieve these goals, procedural methodologies are specified. These methodologies are characterized in three parts: calibration protocols (data quality control), data review and corrections (data quality assurance), and completeness of data (a substitute quality assurance program for station redundancy). Each fixed monitoring station will be assessed at the end of the monitoring season against these criteria and a performance report will be included in the Annual Dissolved Gas and Water Temperature Monitoring Report provided to the states of Oregon and Washington.

TDG is the primary water quality parameter monitored. High saturation level TDG can cause physiological damage to fish. Water temperature is also measured because it affects TDG saturation levels, and because it influences the health of fish and other aquatic organisms. Both TDG and water temperature are closely linked to project water management operations (e.g., water released over the spillways, releases through the powerhouses and other facilities, and forebay and tailwater water surface elevations).

One component of the water quality strategy was for the Corps to take the actions necessary to implement the spill program at the dams indicated in the UPA, including obtaining variances from appropriate State water quality agencies. The Corps took the necessary actions to prepare for the 2002 through 2004 spill seasons. The Corps will follow a similar process prior to the 2005 season. The variance provides for a revision of the total dissolved gas standard from 110% to a revised standard of 115% in the forebays and 120% in the tailwaters of McNary, John Day, The Dalles, and Bonneville dams, and the Camas location, from April 1, 2003, to August 31, 2003. The 115% and 120% caps are based on the 12 highest hourly measurements per calendar day. Also, a cap of total dissolved gas of 125%, based on the two highest hours, is in effect.

The Reservoir Control Center is responsible for monitoring the TDG and water temperature conditions in the forebays and the tailwaters of the lower Columbia River/lower Snake River dams, and selected river sites. The operational water management guidelines in Oregon are to change spill levels and, subsequently, spill patterns at the dams (daily if necessary) so that the forebays are as close to, but do not exceed, daily (12 highest hours) average of 115% TDG, and the tailwater levels are close to, but do not exceed, daily (12 highest hours) average of 120% TDG. Also, a cap of total dissolved gas of 125%, based on the two highest hours, is in effect.

The Corps prepares a Total Dissolved Gas Management Plan each year (see Appendix 4). It is a supporting document for the Water Management Plan. The Plan summarizes the roles and responsibilities of the Corps as they relate to dissolved gas monitoring. The Plan stipulates what to measure, how, where, and when to take the measurements, and how to analyze and interpret the resulting data. The Plan also provides for periodic review and alteration or redirection of efforts when monitoring results and/or new information from other sources justifies a change. The Plan identifies channels of communication with other cooperating agencies and interested parties.

The Corps will be monitoring similarly to what occurred since 2000.

See: http://www.nwd-wc.usace.army.mil/TMT/

The 2004 Plan of Action can be found listed under the TDG category of the Reservoir Control Center Water Quality Team page on the following web site:

http://www.nwd-wc.usace.army.mil/TMT/wqwebpage/mainpage.htm

### 7.3.3 Other Water Quality Actions

The following water quality topics are covered in Appendix 4: Total Dissolved Gas Model, Temperature Model and Temperature Monitoring Needs, Water Quality Database.

## 7.4 Canadian Storage for Flow Augmentation

The purpose of the actions below is to see if more water from Canadian storage projects can be obtained for flow augmentation.

One (1) maf of Treaty storage shall be requested and negotiated when available with BC Hydro to be provided and released during the migration season.

BPA shall continue to work with BC Hydro to negotiate a non-Treaty storage agreement to provide for storage during the spring with subsequent release in July and August, for flow enhancement as long as operations forecasts indicate that water stored in the spring can be released in July and August.

A study regarding the shaping and release of water behind Canadian Treaty storage projects in July and August was completed in 2001.

## 7.5 Albeni Falls Coordination

The Action Agencies, the USFWS, and Idaho Department of Fish & Game shall meet annually to evaluate Lake Pend Oreille kokanee monitoring results and make necessary adjustments through subsequent in-season management.[9] The purpose of this action is to review IDFG monitoring results and to ensure winter lake operation protocol is addressing the needs of kokanee spawning and hence, threatened bull trout, which feed on kokanee.

## 7.6 Public Coordination

The purpose of the following actions is to provide for better regional coordination.

Actions in the Water Management Plan will be coordinated with NOAA Fisheries, USFWS, and the states and tribes in preseason planning and in-season management of flow and spill operations. This coordination shall occur in the Technical Management Team process.

At all appropriate decision points, the Action Agencies shall routinely seek timely input and concurrence from the USFWS on all matters affecting USFWS listed fish through the Columbia River Treaty, International Joint Commission Orders, and all other decision making processes involving transboundary waters in the Columbia River basin. This shall include notification of all meetings and decision points and provision of opportunities to advise the Action Agencies during meetings and in writing, as appropriate.[10]

## 7.7 Dworshak Draft to 1,500 Feet Adult Evaluation

The NOAA BiOp calls for drafting Dworshak to 1,500 feet in order to evaluate whether releasing approximately 200 kaf of water during September provides a benefit to adult migrants. The 2004 UPA does not call for this evaluation.

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[9] USFWS BiOp at Section 11.A.1.4.d Page 94
[10] USFWS BiOp at Section 8.1.g Page 76

Water conditions at the end of 2002 and a TMT recommendation in 2003 allowed approximately 200 KAF of storage from Dworshak to be released in September for the purpose of this study. The preliminary data from the 2002 test was presented to TMT in the fall of 2002.

# 8.0 Hydrosystem Substrategy 3.3: Juvenile fish transport actions to improve fish survival

This substrategy addresses actions to collect juvenile fish at some FCRPS projects while providing a balance between transported and in-river juvenile fish migration.

The Updated Proposed Action states "In years when the seasonal average Snake River flow at Lower Granite is expected to be less than 70 kcfs, maximization of transportation will occur from the date the JBSs begin operation. Due to the mixed benefits of early season transport, however, collection for transport will not be initiated until April 20 in all years where average seasonal flows are expected to equal or exceed 70 kcfs. Prior to April 20, all collected fish will be bypassed back to the river. In those years where flows are anticipated to be between 70 and 85 kcfs, spill will be provided at the collector projects until April 20. Further investigations of spill patterns (e.g. large gate openings/bulk spill) that provide optimum spillway survival conditions in these lower flow conditions will be coordinated through the FFDRWG. "

Results of McNary transportation studies with upper Columbia Chinook and steelhead may result in proposed modifications to spring transport at that facility.

## *8.1 McNary*

Juvenile spring migrants collected at McNary Dam shall be bypassed.

Collection of subyearling fall chinook for transportation at McNary Dam shall not be initiated until in-river migratory conditions are deteriorating (i.e., no longer spring-like). In general, the switch from spring to summer operation will occur on or about June 20. Spring-like is defined as favorable flow and water temperature conditions; i.e., river flows are at or above the spring flow target (220 to 260 kcfs) at McNary Dam, and ambient water temperatures are below 62°F (17°C). Actual dates shall be set through coordination with TMT.

# 9.0 Resident Fish Substrategy 1.1: Create conditions below Libby Dam that facilitate Kootenai River white sturgeon (KRWS) natural reproduction and juvenile survival

## *9.1 Libby*

### 9.1.1 Sturgeon

The purpose of the actions below is to provide water for sturgeon spawning.

Water shall be stored in Libby reservoir and supply, at a minimum, water volume during May and June, based upon water availability or the "tiered" approach as defined through coordinated reevaluation that took place in March 2002 among USACE, USFWS, and MDFWP, and

summarized in the table below. This water shall be in addition to storage needs for listed bull trout, salmon, and the 4,000 cfs minimum releases from Libby Dam. Accounting on these total tiered volumes shall begin when the USFWS determines benefits to conservation of sturgeon are most likely to occur. This may include releases timed to enhance survival of eggs, yolk sac larvae, or larvae reared under the preservation stocking program and released into the Kootenai River. Releases may be timed to serve both wild fish and hatchery eggs/fish. Sturgeon flows will generally be initiated between mid-May and the end of June to augment lower basin runoff entering the Kootenai River below Libby Dam.[11]

[11] USFWS BiOp at Section 8.1.c Page 73,

**Table 5.** "Tiered" volumes of water for sturgeon flow enhancement to be released from Libby Dam according to the April - August volume runoff forecast at Libby. Actual flow releases would be shaped according to seasonal requests from the USFWS and in-season management of water actually available.[12]

| **Forecast runoff Volume (maf*) at Libby** | **Sturgeon flow volume (maf) from Libby Dam** |
|---|---|
| 0.00 < forecast < 4.80 | Sturgeon flows not requested |
| 4.8 | 0.8 |
| 5.4 | 0.8 |
| 6.35 | 1.12 |
| 7.4 | 1.2 |
| 8.5 | 1.2 |
| 8.9 | 1.6 |
| Forecast > 8.9 | 1.6 |

Note: For forecasts between 4.8 and 8.9 maf, interpolate from the values shown in the table above.

The purpose of the actions below is to provide for the annual sturgeon pulse.

Libby outflow will fulfill the operational guidelines provided by the USFWS annually prior to and during the sturgeon spawning/incubation period. During 2004, operational guidelines will include a request to deliver a high flow of water for 4 or 5 days at a time when both Kootenay Lake-Kootenai River stages are low and local runoff is high, to evaluate the potential of increased stream energy to scour sand from buried gravel within designated critical habitat. However, this would be done within established flood control criteria. Specific release recommendations will be developed in consultation with Action Agencies and submitted annually through the TMT or similar regional process.[13]

Efforts will be coordinated to attempt to limit sturgeon-spawning flows so they do not exceed a river stage elevation of 1,764 feet at Bonners Ferry. (Note: This may not always be possible during periods of unusual local runoff that may be beyond the control of Libby Dam.)[14]

[12] Letter from Michael White (USACE) to Anne Badgley (USFWS) dated August 23, 2002
[13] USFWS BiOp at Section 8.2.c Page 80
[14] USFWS BiOp at Section 8.3.b Page 80

During sturgeon recruitment flow periods, local inflow will be allowed to supplement Libby Dam releases to the maximum extent feasible, while assuring public safety by monitoring water levels throughout relevant areas of the Kootenai River basin.

TMT will coordinate with USFWS to implement 2005 BiOp sturgeon operations.

### 9.1.2 Coordination

Libby Dam flows shall be regulated consistent with existing treaties, Libby Project authorization for public safety, other laws, and the 1938 International Joint Commission order to achieve water volumes, water velocities, water depths, and water temperature at a time to maximize the probability of allowing significant sturgeon recruitment.[15]

# 10.0 Resident Fish Substrategy 2.2: Operate and modify FCRPS dams to protect, provide, and reconnect bull trout habitats

## *10.1 Libby*

The following minimum flows to protect bull trout between the sturgeon and salmon flows will be provided based on the April to August volume runoff forecast at Libby.

If Koocanusa Reservoir elevations are below salmon guidelines (2439 ft) on July 1, and salmon augmentation will not occur for that year, the Action Agencies shall provide 6,000 cfs for the bull trout minimum flow during July and August (lowest water years). If additional water is available, increases in minimum flows may be determined through the TMT process.[16]

[15] USFWS BiOp at Section 8.1.a Page 73
[16] USFWS BiOp at Section 11.A.1.1.b Page 93

**Table 6.** Minimum bull trout releases in July from Libby Dam.

| Forecast runoff Volume (maf*) at Libby | Min bull trout flows between sturgeon and salmon flows |
|---|---|
| 0.00 < forecast < 4.80 | 6 kcfs |
| 4.80 < forecast < 6.00 | 7 kcfs |
| 6.00 < forecast < 6.70 | 8 kcfs |
| 6.70 < forecast < 8.10 | 9 kcfs |
| 8.10 < forecast < 8.90 | 9 kcfs |
| 8.90 < forecast | 9 kcfs |

(USFWS BiOp at Section 3.A.2 Page 13)

**maf = million acre-feet*[17]

### 10.1.1 Ramp Rates

The purpose of the following actions is to provide better conditions for resident fish by limiting the flow fluctuations and setting minimum flow levels.

Operational constraints will be implemented at Libby Dam intended to minimize adverse effects of rapid and severe river flow fluctuations on bull trout, including year-round minimum flows and ramping rates, seasonal water management, conducting studies to monitor the adequacy of the constraints, and providing for modification of the operational constraints depending on study results.[18] Exact operational constraints are shown in paragraphs below.

The following ramp rates will guide project operations to meet various purposes, including power production.

[17] USFWS BiOp at Section 8.3.g Page 81
[18] USFWS BiOp at Section 10.A.1 Page 87

**Table 7.** Prescribed ramp rates to protect resident fish and their food organisms, and to minimize levee erosion, in the Kootenai River.

| **Daily and Hourly Maximum Ramp Up Rates for Libby Dam (as measured by daily flows, not daily averages, restricted by hourly rates)** | | | |
|---|---|---|---|
| **Flow Range** | **Ramp Up Unit (Daily max)** | **Ramp Up (Hourly max) 1 Oct – 30 Apr** | **Ramp Up (Hourly max) 1 May – 30 Sep** |
| 4,000 - 6,000 cfs | Limit ramp up to one unit per day (approx. 5,000 cfs per day) | 2,000 cfs/hr | 1,000 cfs/hr |
| 6,000 - 9,000 cfs | Limit ramp up to one unit per day (approx. 5,000 cfs per day) | 2,000 cfs/hr | 1,000 cfs/hr |
| > 9,000 - 17,000 cfs | Limit ramp up to two units per day (approx. 10,000 cfs per day) | 3,500 cfs/hr | 2,000 cfs/hr |
| > 17,000 cfs | No limit | 7,000 cfs/hr | 3,500 cfs/hr |

(USFWS BiOp at Section 3.A.2 Page 13)

| **Daily and Hourly Maximum Ramp Down Rates for Libby Dam (as measured by daily flows, not daily averages, restricted by hourly rates)** | | | |
|---|---|---|---|
| **Flow Range** | **Ramp Down Unit (Daily Max)** | **Ramp Down(Hourly max) 1 Oct – 30 Apr** | **Ramp Down (Hourly max) 1 May – 30 Sep** |
| 4,000 - 6,000 cfs | Limit ramp down to 500 cfs per day | 500 cfs/hr | 500 cfs/hr |
| > 6,000 - 9,000 cfs | Limit ramp down to 1,000 cfs per day | 500 cfs/hr | 500 cfs/hr |
| > 9,000 - 17,000 cfs | Limit ramp down to 2,000 cfs per day | 1,000 cfs/hr | 1,000 cfs/hr |
| > 17,000 cfs | Limit ramp down to one unit per day (approx. 5,000 cfs per day) | 5,000 cfs/hr | 3,500 cfs/hr |

(USFWS BiOp at Section 3.A.2 Page 14)

Daily and hourly ramping rates may be exceeded during flood emergencies to protect health and public safety and in association with power or transmission emergencies.[19]

Variances to ramping rates during years where runoff forecasting or shortage shortfalls occur, or variances are necessary to provide augmentation water for other listed species, will be negotiated through the TMT process. This is expected in only the lowest 20th percentile water years.[20]

[19] USFWS BiOp at Section 3.A.2 Page 14
[20] USFWS BiOp at Section 3.A.2 Page 14

Note: The ramp rates will be followed except when they would cause a unit(s) to operate in the rough zone, a zone of chaotic flow in which all parts of a unit are subject to increased vibration and cavitation that could result in premature wear or failure of the units. In this case the project will utilize a ramp rate, which allows all units to operate outside the rough zone. The Action Agencies will provide additional information to the USFWS describing operations outside the "rough zone."[21]

## *10.2 Hungry Horse*

### 10.2.1 Ramp Rates

The following ramp rates will guide project operations to meet various purposes, including power production.

[21] USFWS BiOp at Section 3.A.2 Page 13

**Table 8.** Ramp rates prescribed for Hungry Horse Dam releases to protect resident fish and their food organisms in the Flathead River.

| **Daily and Hourly Maximum Ramp Up Rates for Hungry Horse Dam (as measured by daily flows, not daily averages, restricted by hourly rates).** | | |
|---|---|---|
| **Flow Range (measured at Columbia Falls)** | **Ramp Up Unit (Daily Max)** | **Ramp Up Unit (Hourly max)** |
| 3,200 - 6,000 cfs | Limit ramp up 1,800 cfs per day | 1,000 cfs/hour |
| > 6,000 - 8,000 cfs | Limit ramp up 1,800 cfs per day | 1,000 cfs/hour |
| > 8,000 - 10,000 cfs | Limit ramp up 3,600 cfs per day | 1,800 cfs/hour |
| > 10,000 cfs | No limit | 1,800 cfs/hour |

(USFWS BiOp at Section 3.A.1 Page 8)

| **Daily and Hourly Maximum Ramp Down Rates for Hungry Horse Dam (as measured by daily flows, not daily averages, restricted by hourly rates)** | | |
|---|---|---|
| **Flow Range (measured at Columbia Falls)** | **Ramp Down Unit (Daily max)** | **Ramp Down Unit (Hourly max)** |
| 3,200 - 6,000 cfs | Limit ramp down to 600 cfs per day | 600 cfs/hour |
| > 6,000 - 8,000 cfs | Limit ramp down to 1,000 cfs per day | 600 cfs/hour |
| > 8,000 - 12,000 cfs | Limit ramp down to 2,000 cfs per day | 1,000 cfs/hour |
| > 12,000 cfs | Limit ramp down to 5,000 cfs per day | 1,800 cfs/hour |

(USFWS BiOp at Section 3.A.1 Page 8)

Daily and hourly ramping rates may be exceeded during flood emergencies to protect health and public safety and in association with power or transmission emergencies.[22]

Variances to ramping rates during years where runoff forecasting or storage shortfalls occur, or variances are necessary to provide augmentation water for other listed species, will be coordinated through the TMT process. This is expected in only the lowest 20$^{th}$ percentile water years.[23]

Note: The ramp rates will be followed except when they would cause a unit(s) to operate in a zone that could result in premature wear or failure of the units. In this case the project will utilize a ramp rate, which allows all units to operate outside the rough zone. The Action Agencies will provide additional information to the USFWS describing operations outside the "rough zone."[24]

[22] USFWS BiOp at Section 3.A.1 Page 8
[23] USFWS BiOp at Section 3.A.1 Page 8
[24] USFWS BiOp at Section 3.A.1 Page 7

The minimum outflow for Hungry Horse Dam will be determined monthly starting with the January forecast, with final flows based on the March final runoff forecast for Hungry Horse Reservoir for the period April 1 to August 31. These forecasts will be provided by Reclamation to the TMT. If the April to August forecast is greater than 1,790 kaf, the minimum flow shall be 900 cfs. If the forecast is less than 1,190 kaf, the minimum flow shall be 400 cfs. If the forecast is between 1,190 and 1,790 kaf, the minimum flow will be linearly interpolated between 400 and 900 cfs.[25] The minimum flow from Hungry Horse can be lowered to 145 cfs when the river at Columbia Falls reaches flood level (13 feet).

The minimum flow at Columbia Falls will be determined monthly starting with the January forecast, with the final flows based on the March final runoff forecast for Hungry Horse Reservoir for the period of April 1 to August 31. If the April to August forecast is greater than 1,790 kaf, the minimum flow shall be 3,500 cfs. If the forecast is less than 1,190 kaf, the minimum flow shall be 3,200 cfs. If the forecast is between 1,190 and 1,790 kaf, the minimum flow will be linearly interpolated between 3,200 and 3,500 cfs.[26]

## *10.3 Albeni Falls*

### 10.3.1 Lake winter elevation

A proposal has been made to operate Lake Pend Oreille in the fall/winter to an elevation of 2,055 feet during the 2004/2005 season. Albeni Falls Dam will operate to hold this elevation as proposed.

[25] USFWS BiOp at Section 3.A.1 Page 6
[26] USFWS BiOp at Section 3.A.1 Page 7

# 11.0 FCRPS Hydrosystem Performance Standards

The Action Agencies will operate the FCRPS hydrosystem as described in this Water Management Plan, in an adaptive management framework, to make progress towards meeting biological performance goals. Those goals are contained in the 2004 UPA and addressed in the 2004 NOAA Fisheries Biological Opinion. Adult and juvenile fish survival estimates from research, monitoring, and evaluation studies will be considered in annual planning as future plans are developed.

# 12.0 Fish and Wildlife Related Non-BiOp Actions

The following non-BiOp actions are typically options available to be addressed by TMT during the water management year.

## *12.1 Keenlyside Dam (Arrow)*

### 12.1.1 Mountain Whitefish

Spawning flow levels are set the third week in December between 45 and 55 kcfs. Spawning continues through mid-January. Egg protection flows are set 5 to 15 kcfs lower than the spawning flow through the end of March.

### 12.1.2 Rainbow Trout

Rainbow trout spawning begins in April. Protection levels begin somewhere between 15 and 25 kcfs. The goal is to have stable flows or ever-increasing flows through June.

## *12.2 Libby*

### 12.2.1 Burbot

Providing low flows from Libby Dam to aid upstream migration of burbot to spawning areas above Kootenay Lake on the Kootenai River in Idaho is considered each winter. These low flows may occur over several periods of time or may last for an extended period from December through February. The details of this operation for 2005 are being developed and may be included in the fall/winter update. Negotiations on a Memorandum of Agreement are underway for this species. Use of VARQ and implementation of the variable end of December flood control target elevation may aid this operation in years with medium runoff forecasts, and a variable December draft may help as well if and when it is implemented.

## 12.3 Dworshak

### 12.3.1 Flow increase for Dworshak National Fish Hatchery release.

Release 4 – 6 kcfs from Dworshak in order to move juvenile fish into the mainstem Clearwater River during the spring hatchery release.

## 12.4 Grand Coulee

### 12.4.1 Kokanee

Fill Grand Coulee to 1,283 feet by October 1. Maintain elevation 1,283 to 1,285 feet or greater through October for brood stock collection and access to tributaries.

## 12.5 Hanford Reach Protection Flows

Grant County PUD limits outflow from Priest Rapids Dam to minimize juvenile fish stranding.

## 12.6 Vernita Bar Protection Flows

Flow management occurs from Priest Rapids Dam in the fall to ensure that fall chinook salmon establish redds (spawn) at an elevation that enables the redds to have a high likelihood of not being dewatered prior to emergence of fry. Daytime flows are regulated to a range between 50 and 70 kcfs during October and November when redds are being established. Flow fluctuations are limited from the time of fish emergence in early April through early June. (Note: This is included pursuant to the Vernita Bar Settlement Agreement and the annual Hanford reach stranding agreement.)

## 12.7 McNary

### 12.7.1 Waterfowl nesting

To improve waterfowl nesting conditions in the McNary pool between March and May each year, we operate the pool in the top 1 foot of the pool range for several hours every 4 days.

### 12.7.2 Waterfowl hunting enhancement

In order to enhance Waterfowl hunting, we hold the McNary pool constant several times a week from October to January.

## 12.8 John Day

### 12.8.1 Goose nesting

To encourage geese to nest in areas that are not typically inundated by frequent fluctuations in the John Day pool between March and May each year, we operate the pool in the top 1 foot of the pool range for several hours every 4 days.

### 12.8.2 Waterfowl hunting enhancement

In order to enhance Waterfowl hunting, we hold the John Day pool constant several times a week from October to January.

## *12.9 Bonneville*

### 12.9.1 Tribal Fishing

To accommodate tribal fishing, the Bonneville pool is normally held between elevation 75 and 76.5 feet during tribal fishing seasons.

### 12.9.2 Spring Creek Hatchery Release

The U.S. Fish and Wildlife Service typically releases between 7 and 8 million tule fall chinook fry from the Spring Creek National Fish Hatchery upstream of Bonneville Dam in March. In 2005 the Action Agencies plan to operate Bonneville Dam with a powerhouse 2 priority, to operate all units with fish screens, and to operate the bypass facility in order to provide project passage for this hatchery release. The B2 Corner Collector will be operated for a period of days (to be determined) during the March 2005 release. The Fish and Wildlife Service, Corps of Engineers and Bonneville Power Administration reached mutual agreement on an operation at Bonneville Dam for the March 2004 release of sub-yearling chinook from Spring Creek Hatchery in support of a two-treatment evaluation in which the effectiveness of spill as compared to operation of the new B2 corner collector was evaluated. The agreement was reached in exchange for a commitment to no spill for March Spring Creek releases in 2005 and 2006 (unless we see significant problems with the new B2 corner collector, in which case we will revisit 2005 and 2006 operations for the March hatchery release).

# 13.0 Conclusion

This final 2005 Water Management Plan has been coordinated with the Technical Management Team. Seasonal action plans will be developed as described in the introduction to this plan. Additionally, operations may be adjusted in-season based on recommendations from the TMT.