

Technical Management Team
2001~~0~~ WATER MANAGEMENT PLAN
For The Federal Columbia River Power System

02 April 2001

I. Introduction

This Water Management Plan (Plan) describes the measures needed in 2001~~0~~ to provide the fish passage conditions called for in the National Marine Fisheries Service (NMFS) Biological Opinion (BiOp), *Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS) ~~and, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin~~*, dated 21 December 2000, and in the U.S. Fish and Wildlife Service (USFWS) BiOp, *Effects to Listed Species from Operations of the FCRPS*, dated 20 December 2000. ~~in 1995 and Future Years, the 1998 Supplemental BiOp, and the 2000 Supplemental BiOp.~~ It covers relevant factors affecting the operation of FCRPS, including federal reservoir and dam operations to augment flows for fish, power generation, turbine outage and spill scheduling; water temperature **management control**; total dissolved gas (TDG) management, and special operation for research and other purposes. The Plan is updated annually by April 15th of each year by the Technical Management Team (TMT). It is consistent with the TMT Guidelines and gives full consideration to the provisions of and effects on the Northwest Power Planning Council's Fish and Wildlife Program, other **BiOps biological opinions**, state and tribal plans and programs, the Endangered Species Act (ESA), the Clean Water Act (CWA), and other **relevant** operational requirements. **Appropriate measures resulting from ongoing NMFS consultation with the U.S. Bureau of Reclamation (BOR) on operation of upper Snake River projects will be consider for inclusion ~~included~~ upon completion of that consultation. It expected that a new BiOp will be issued later this year which may cause changes in the operations specified in the current water management plan.**

The BiOps call on the Action Agencies to develop 1- and 5-year implementation plans encompassing each major salmon recovery program area, including water management. This Plan serves as a transition 1-year water management plan to begin implementing the new BiOps. The time period of this Plan is 1 October 2000 through 30 September

2001. This time frame is also consistent with the hydrologic Water Year. The 2002 1-year Plan will be completed by 1 September 2001. Also, a 5-year Plan will be prepared by 31 March 2001 and included in the overall Action Agency Implementation Plan.

Six ~~even~~ appendices are attached to the Plan:

- Appendix 1. Dissolved Gas Management Plan
- Appendix 2: Emergency Protocols
- Appendix 3: Load Shaping Guidelines for Turbine Operation Outside 1% Peak Efficiency
- Appendix 4: TMT Guidelines
- Appendix 5: Maintenance Schedule Outages of Generating Units
- ~~• Appendix 6. TMT Goals, Objectives and Triggers~~
- Appendix ~~6:7~~. Operation-~~R~~related BiOp ~~Measures~~~~Provisions~~

II. Water Supply Forecasts

The (April Early Bird ~~Final~~) January - July forecast for the Columbia River at The Dalles is 55.7 million acre-feet (~~MAF~~~~maf~~), 53% of normal. Runoff forecasts for Reclamation reservoirs above Brownlee are in the 21 - 61 percent of normal range. Pertinent water supply forecasts issued by the River Forecast Center are summarized in Table 1 for key locations on the Columbia and Snake Rivers. The final observed water supply for ~~2000~~~~1999~~ is also given for comparison purposes.

Table 1. April Early Bird ~~Final~~ 2001~~0~~ (~~and May Final 2000~~~~1999~~) Runoff Volume Forecasts ~~That Are Referenced in the BiOps, and 2000 Actual Runoff Volumes.~~

Location	April Early '01 0	% of Normal April Early '01 0	May Final 2000 1999 (actual)	% of Normal 2000 1999 (actual)
	Maf	%	Maf	%
Libby (Apr-Aug) *	3.36	53%	5.50	86%
Hungry Horse (Apr-Aug) #		%	1.91	90%
Lower Granite (Apr-Jul)	10.7	49%	17.2	79%
The Dalles (Apr-Aug)	50.2	54%	84.3	90%

(*) Should use COE Forecast (March Final)

(#)~~BOR Forecast~~

III. Objectives, priorities, and decision criteria for various water conditions.

The NMFS BiOp states that the Plan will contain system operational objectives, priorities, and decision criteria that will apply to various water conditions (Section 9.4.2.2, page 9-28). This section defines goals and objectives developed by TMT over the past year, and which will be used by TMT in 2001 as overall guidance in making operational recommendations to the action agencies.

Below is the latest Criteria and Priorities from the federal family.

**Federal Agencies' Criteria and Priorities for 2001 FCRPS Operations
March 30, 2001**

BACKGROUND

Poor water conditions in the Columbia River basin coupled with an extraordinary power market on the West Coast have caused an unprecedented river management situation this year. In recognition of obligations to operate FCRPS projects to meet multiple purposes consistent with: (1) authorizing legislation, (2) additional laws including the Endangered Species Act (ESA), the Clean Water Act (CWA), Pacific Northwest Electric Power Planning and Conservation Act, Reclamation Laws, and cultural resource laws such as the National Historic Preservation Act and the Native American Grave Protection and Repatriation Act, (3) treaties and executive orders with Pacific Northwest Indian tribes and the Federal Government's trust responsibilities, and (4) existing Biological Opinions for the operation of hydroelectric reservoir projects in the FCRPS and the marketing and transmission of power from those projects, these principles are proposed by the regional offices of the following federal agencies: Bonneville Power Administration, U.S. Army Corps of Engineers, Bureau of Reclamation, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Environmental Protection Agency. These principles recognize that achieving the objectives of the system's multi-purpose operation this year is made more difficult by the continuing poor water conditions, and that the unprecedented power market conditions this year may result in emergency operations of the FCRPS. The six Federal agencies agree to seek consensus on emergency operations that minimize variations from the operations described in existing Biological Opinions, by considering priorities for fish operations to minimize effects on listed and unlisted fish populations, and to seek offsetting measures sufficient to achieve the objectives of the Opinions.

Existing Biological Opinions recognize that water management actions may change due to unforeseeable power system, flood control or other emergencies. Emergencies may include a power emergency; one based on insufficient power supply to meet demand in the Pacific Northwest. There may also be West Coast demand involving health and human safety that requires an emergency response. Emergency actions should be viewed as a last resort, and will not be used in place of long-term investments necessary

to allow full, uninterrupted implementation of the required reservoir operations while maintaining other project purposes, such as an adequate and reliable power system.

It is recognized that federal agencies may, through adaptive management, adjust FCRPS operations over time, as there are deteriorating or improving changes in circumstances, for example water supply, economic outlook, power market conditions, conditions affecting listed fish, fish and wildlife, water quality, cultural resources, or project uses. Continued coordination will ensure federal agencies have current information and appropriate input from all interested parties on which to base their decisions.

These principles are not intended to and do not alter or affect the statutory and other legal rights, authorities, responsibilities, and obligations of the federal agencies and the right and authority to interpret and implement other statutory authority. These principles are intended only to improve the coordination of the federal agencies in their management of the FCRPS, and are not intended to, nor do they create any right, benefit, or new trust responsibilities, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any person.

ACTIONS PRECEEDING AND DURING A POWER SYSTEM EMERGENCY DECLARATION

In order to meet Pacific Northwest load requirements, the following actions will be taken prior to declaring and throughout a power system emergency:

1. Provide for voluntary conservation;
2. Implement conservation measures, to the extent possible;
3. Exercise contract provisions that reduce firm load obligations;
4. Pursue purchase of load reductions consistent with criterion 3 below;
5. Pursue purchases consistent with criterion 3 below; and
6. Pursue acquisition of irrigation pumping load consistent with criterion 3 below;

POWER EMERGENCIES: CRITERIA AND PROCESS

Assuming an adjustment in FCRPS operations is required to maintain the reliability of the FCRPS, the following criteria will be used for determining a risk to reliability and a declaration of a power emergency. The criteria are:

1. Operational Power System Reliability due to near-term insufficiency. Defined as insufficiency of electrical generation to meet Pacific Northwest electrical near-term demand. An indicator of resource scarcity may be a quick rise in prices over a few hours or days.

2. Planning Power System Reliability due to a forecasted insufficiency.
The reliability criterion is exceeded when the probability of insufficient generation to meet load exceeds 5% for any of the next 12 months.
3. Power System Reliability due to inadequate reserves to acquire sufficient electrical generation and maintain other BPA funded activities, including programs to protect, mitigate and enhance fish and wildlife.
The financial criterion for a power system emergency is exceeded when the probability of FCRPS financial reserves being \$0 or less after meeting all expected financial obligations exceeds 20% for any of the next 12 months.

These planning criteria will be estimated using statistical distributions of estimated future values for streamflows, revenues, power prices and similar inputs to cashflows, and will also take into account expected benefits of tools which are reliably available to mitigate cashflow problems, such as monthly 4(h)(10)(c) credits.

All power emergencies will be declared consistent with TMT's Interim Protocols for Emergency Operations dated September 22, 2000, or as subsequently amended, including, as soon as practicable, notice to states and tribes. The Protocols may be found at:

<http://www.nwd-wc.usace.army.mil/TMT/2000/ManPlan/emmerprotocl0922.PDF>.

FISHERY OPERATIONS PRIORITIES FOR 2001

1. Recognizing conditions may change, the following are the priorities for fishery operations for January through August of 2001.
 - a) *Power/Chum Flows through a minimum of 65% emergence*
 - b) Full fish transportation in the Snake River
 - c) Transport evaluation from McNary Dam in the spring
 - d) Balance spring spill operations for ESA listed stocks (wild and hatchery) at mainstem FCRPS dams with uncertainty associated with volume forecast error
Allocate any spill available within the following project priority
 - i) The Dalles (with a consistent operation for study purposes)
 - ii) Bonneville
 - iii) John Day
 - iv) McNary
 - v) Ice Harbor
 - e) Lower Granite surging operation targeted to move fish through pool to Lower Granite
 - f) Balance summer flow augmentation (June 30 refill) and spring spill operations
 - i) Refill of Dworshak has highest priority for providing fish flow and water quality benefits
 - ii) Ensure sufficient water in Hungry Horse and Libby to provide bull trout minimum flows
 - g) Minimum Operating Pool on the Snake River and John Day within 1½foot of minimum level for irrigation pumping.
 - h) Balance Vernita Bar protection level and Grand Coulee Elevation
Consider reducing protection flows if the reduced protection flows, combined with forecasts of BPA loads or streamflows below Grand Coulee provide a high confidence of benefit in Grand Coulee elevation
 - i) Summer spill operations at mainstem FCRPS dams for ESA listed stocks (wild and hatchery)
 - j) Targeted spring spill for non-listed hatchery releases
 - k) Targeted summer spill for non-listed hatchery releases
 - l) Spring system flow augmentation, with emphasis on May
2. Monitor and evaluate (with EPA technical assistance) and consider effects on water quality and any applicable water quality standards, in determining priorities.
3. Convene TMT to seek input on the timing of implementation and provide greater definition to these priorities, with elevation to Implementation Team or Regional Federal Executives, as necessary.

(Italics indicate operations that have already been implemented and completed.)

IVH. Winter Operations (OctoberSeptember 20001999 - March 20010)

Reservoir Refill

During the winter season leading up to the 20010 fish passage season, the Federal projects were operated in order to provide protection for the chum salmon redds below Bonneville Dam and to provide necessary flows for power generation during power system emergencies. The chum flow operation ended this year on 0700 March 16th. Also keeping in mind the goal of with-best-efforts to-meeting the BiOp's recommendations on reservoir refill- This objective was to achieve the levels of confidence of refill summarized in Table 2 to April 10th flood control at Grand Coulee, and April 20th flood control at Libby, Hungry Horse and Albeni Falls. A 59-year modeling run is routinely used to predict the expected refill probability of each of the reservoirs involved. The results of the model runs are described in more detail in Section VII, Outlook for Meeting Flow Objectives.

Table 2. Required Confidence Levels for Reservoir Refill (Source: 19952000 BiOp)

Libby and Hungry Horse	Grand Coulee	Albeni Falls
75%	85%	90%

The maximum flood control draft varied at each project. The timing of the maximum draft also varied for each project. Table 3 provides the 20010 maximum flood control requirements at each project and the date of maximum draft at each project.

Table 3. Flood Control (FC) Requirements (based on March 2001 April final forecast)

Projects	Date of Max. FC Draft	Max. FC Draft Elev.	Min. Pool Elevation	Max. Pool Elevation
Mica	31 January	527*	2320.0	2475.0
Arrow	31 January	1431.1	1377.9	1444.0
Duncan	28 February	1833.7	1794.2	1892.0
Libby	15 March 31 Jan	2415.3	2287.0	2459.0
Hungry Horse	30 April	3551.8#	3336.0	3560.0
Albeni Falls	30 April		2051.0	2062.5
Grand Coulee	30 April 31 Mar	1283.3	1208.0	1290.0
Brownlee	31 January	2077	1976.0	2077.0
Dworshak	31 January	1537.1	1445.0	1600.0

(*) in kaf. Mica flood control evacuation requirements are defined in kaf space required rather than a corresponding elevation in feet.

~~(**) includes partial flood control shift from Dworshak to Grand Coulee to provide additional lower Snake flow augmentation in April.~~

(#) VARQ From BOR

Reservoir and Reservoir-Related Operations

Libby. Libby ended August with an elevation of ~~2434.89~~ ~~2455.7~~ feet. Libby was operated for power in the September through December period, and for flood control in the January-March period. ~~In early November outflow from Libby was increased to provide additional generation due to a cold snap power emergency. Outflows from Libby were also increased in early December because of a power system emergency. Libby has been on minimum flow of 4 Kcfs since then until March 27th when flow was increased to 4.5 Kcfs in order to return some water to Canada. The end of December flood control target was elevation 2411 feet. Because of the low inflows during the winter it was possible to provide low flows of 4 Kcfs for the burbot Study. Toward the end of December Libby was drafted below 2411 feet in an attempt to try to provide low flows for burbot study. Unfortunately due to high inflows it was not possible to provide the low flows requested.~~ Libby's end of December elevation was ~~2411.45~~ ~~2408.4~~ feet. The end of January, February, and March flood control elevation targets were ~~2415.3, 2435.3, and 2448~~ feet respectively based on each respective water supply forecast. Libby's end of January, February, and March elevations were ~~2405.79 (9.5 feet below flood control), 2391.17, 2387.59~~ feet respectively. ~~Outflows from Libby were again increased in the middle of January and the end of January through the beginning of march because of power emergencies. The end of February flood control elevation was not met because it was felt that the March final forecast would be lower than the February forecast and to help in making the April 15th 95% confidence of refill goal.~~

The BiOp's objective is to achieve the April 15th flood control evacuation point with 75% confidence. ~~The end of January, February, March, and April interim rule curves (IRC draft limits) were at elevations 2391, 2371, 2352, and 2367 (note all IRC elevations are based on information received from Brian Marotz in April) feet, respectively.~~

Hungry Horse. Hungry Horse ended August at elevation ~~3539.75~~ 3554.39 feet. It has continued to draft up to the current time ~~until the early part of November. It then filled to elevation 3544.63 feet near the end of November 29th.~~ The end of January, February, March and April flood control elevations were ~~3545.9, 3529.5, 3516.5, and 3503.2 feet respectively based on each respective water supply forecast.~~ End of January, February, and March elevations were 3509.94, 3498.64, 3491.34 feet respectively. ~~The end of January, February, March, and April interim rule curves (IRC draft limits) were at elevations 3525.7, 3513, 3512, and 3511.3 feet, respectively.~~ It has continued to draft up to the current time as a result of meeting minimum instream flow targets at Columbia Falls and occasional power releases. Hungry Horse will be operating according to VARQ flood control this year.

Albeni Falls. Albeni Falls ended August with an elevation of elevation of ~~2062.31~~ 2061.87 feet. ~~Going into September the Lake Pend Oreille elevation operation range was 2062 – 2062.5 feet.~~ The lake was drafted to elevation ~~2060.01~~ 2062 feet by September 30th. ~~It was intended to draft the lake elevation 2056 feet by October 31st. The elevation target was later changed to 2055 feet by October 20th – 25th and 2051 feet by mid-November. The planned 2051 feet elevation was the second part of a five year test where the first three years (completed last year) the lake was to be operated at elevation 2055 feet during the winter and then for the next two years the lake was to be operated at elevation 2051 feet.~~ In an agreement reached the end of October ~~on November 1st~~, the decision was made for the lake to be drafted no lower than to elevation 2053 – 2053.5 feet ~~during the winter by November 20th.~~ The operating range was changed to 2053 – 2054 feet at the end of December.

Grand Coulee. Grand Coulee started September at elevation ~~1280.1~~ 1286.56 feet. It ended September at elevation ~~1285.5~~ 1284.99 feet. ~~In October and November, Grand Coulee operated between elevations 1283 and 1288 feet.~~ Grand Coulee reached its highest winter elevation toward the end of October of 1287.3 feet. Since that time Grand Coulee has generally been drafting in order to ~~In December, the project drafted to elevation 1272.10 feet as needed to~~ produce power and to maintain the minimum discharge requirements for chum below Bonneville while inflows to Lake Roosevelt receded. The chum operation ended 0700 March 16th . In January the end of month elevation was 1241.3 (48.7 feet below flood control), ~~the project drafted to elevation 1263.3 feet,~~ the flood control elevation was 1290 feet, ~~and the draft limit to assure an 85% confidence of filling was 1225.0 feet.~~ ~~The January draft was, again, for the~~

~~purpose of producing power and maintaining the minimum discharge for Chum below Bonneville. The project ended February at an elevation of 1227.3 with a flood control elevation of 1290 feet. In March the project continued to draft until March 16th with a midnight elevation of 1221.1 feet. It ended March with an elevation of 1222.70 feet. In March, the project filled slightly to elevation 1264.40 in preparation for reaching the April 10 target elevation near 1258 feet while still maintaining the minimum discharge for chum below Bonneville. On March 17th the region agreed upon a partially shifted flood control operation, where Dworshak would shift about 65 kfs of April flood control to Grand Coulee. This lowered the March 31 flood control elevation about two feet. Grand Coulee ended March at an elevation of 1263.10 feet. Its end of April flood control elevation is 1239.6 feet.~~

Brownlee. Brownlee ended August with an elevation of 2047.22 ~~2045.3~~ feet. It ended September at elevation ~~2039.65~~~~2038.5~~ feet and continued to draft until the ~~early part~~ ~~middle~~ of October at which point it began to fill ~~with a steady release of 9,500 cfs, which is a downstream spawning operation.~~ Brownlee reached a maximum elevation of ~~2073.73~~~~2075.20~~ feet January ~~3rd~~~~14th~~. Brownlee drafted until the middle of February when it began to fill. Brownlee's end of January, February, March and April flood control elevations were 2077.0, 2077, 2077, and 2077 ~~2056.7, 2053.1 and 2056.2~~ feet respectively based on each respective water supply forecast. Brownlee's end of January, February elevation was 2067.87 feet (9.1 feet below flood control), 2069.04, and 2073.66 respectively. ~~Brownlee's end of January, February, and March elevations were 2063.36, 2059.95, and 2050.51 feet. A variance was given to Brownlee for their end of February flood control elevations because of high inflows to the project.~~

Upper Snake River. Reclamation's reservoirs in the upper Snake River continued to draft for irrigation through the middle of October. Releases were then set to winter minimums. Irrigation demands and augmentation releases during the previous summer and fall caused some reservoirs to be well below their winter flood control space requirements for 2001. Maximum flood control space for the upper Snake River reservoirs is typically required by early May. With a below average snowpack this year, the upper Snake reservoirs will continue minimum releases through March before irrigation season begins. It is doubtful whether flood control requirements will impact reservoir releases in 2001. ~~Reclamation's reservoirs in the upper Snake River continued to draft for irrigation through the middle of October at which time they either went to winter stream maintenance flows or passing inflows. Irrigation demands and augmentation releases during the previous summer and fall drafted all of these reservoirs well below their winter flood control space requirements. Maximum flood control space for the upper Snake River reservoirs is typically required by early May at which point the reservoirs start refill, reaching full typically by late June or early July. With the near to below average snowpack this year the upper Snake reservoirs remained at their winter outflow levels through February before increasing releases to~~

~~pass inflow and/or draft slightly during March and April to reach May 1st flood control space requirements.~~

Dworshak. Dworshak ended August at an elevation of 1520.07 ~~1527.04~~ feet. At the beginning of September Dworshak went to minimum project release (around 1500+ cfs because of gas standards ~~was still releasing water for flow augmentation and temperature control.~~ It kept this level of outflow (except for some higher flows for unit testing until December 10th when it when to full load because of the power emergency . Dworshak went back to minimum flow on December 12th. Dworshak again kept releasing project minimum until January 22nd when it increased flow for the power emergency. Dworshak went back to minimum flow February 3rd. Dworshak again increased outflows from February 13th to the 19th for a power emergency. It has been on minimum flow since then. ~~It's end of September elevation was 1256.7 feet. Dworshak went to minimum project release September 14th when elevation reached 1520 feet and stayed there until around January 6th.~~ The end of January, February, March and April flood control elevations were 1537.1, 1566.3, 1581.8, and 15589.5 ~~1530.6, 1523.6, 1512.2, and 1510.4~~ feet respectively based on each respective water supply forecast. Dworshak's end of January, February, and March elevation was 1507.92 feet (29.2 feet below flood control), 1502, 1512.29 feet respectively. ~~Dworshak's end of January , February and March elevations were 1529.73 ,1524.27 and 1522.20 feet. On March 17, the region agreed to a shifted flood control operation from Dworshak to Grand Coulee. Approximately 65 ksf (out of a possible 95 ksf) was shifted at the end of March to enhance April flow in the lower Snake River.~~

Lower Snake River Projects. Due to seepage problems at the western Lewiston Levee Lower Granite forebay elevation was restricted to maximum elevation of 735 feet. ~~Lower Granite went off MOP November 15th.~~ Little Goose, Lower Monumental, and Ice Harbor projects operated within the normal operating range after August except for several forebay exceedances which where needed to assist with several power emergencies.

Bonneville. Bonneville's outflow was controlled to provide protection for spawning Chum and Fall Chinook.- The minimum flow level was set at 125 kcfs ~~3015~~ October. The protection level was set at 130 – 135 Kcfs ~~140 kefs (+10 kefs)~~ November 24 ~~10~~th. The protection level was set to 135 – 140 Kcfs December 5th ~~TMT set the protection level at 150 kefs at the December 15th meeting.~~ On January 5th the constraint was changed to a 12 foot minimum tailwater elevation. This was done in order to allow a lower flow to save water while still providing projection for most of the redds ~~This level was increased to 160 kefs in mid February.~~ The minimum tailwater elevation was reduced to 11.7 feet January 10th. The minimum tailwater elevation was further reduced to 11.5 feet March 3rd . On March 7th the nighttime minimum tailwater level was reduced to 11.3 feet and on March 12th the daytime minimum tailwater elevation

was also reduced to 11.3 feet. Protection was ~~will be~~ provided until 0700 March 16th when the operation was stopped. ~~emergence in completed in April.~~

~~John Day. A spill test was held at John Day dam in early February to test the effect of tailwater elevation on the flow deflectors.~~

Winter Flood Control Operational Strategy.

The Corps' flood control guidance technical document can be found on the web at <http://www.nwd-wc.usace.army.mil/report/colriverflood.htm>. The calculated flood evacuation at each reservoir is an upper limit reservoir elevation for the end of that month. During January and February variances to operate a project slightly above its end of month flood control elevation are examined on a case by case basis as requested by the project owner. Depending upon the hydrologic conditions at the time of the request, the request may be granted. The April 30th flood control upper limit has high system flood control value, since it is just prior to the start of the freshet and the spring refill period. Refill is initiated either by the system flood control operation necessary to meet the initial controlled flow at The Dalles, or to meet assured refill criteria.. ~~Since the end of January all flood control projects have been well below their flood control requirements. The system was operated since January to meet power needs and support chum flows below Bonneville Dam.~~

IV. Spring Operations (April-June)

Spring Flow Objectives at Lower Granite and McNary

The spring flow objectives at Lower Granite and McNary are to be calculated based on the ~~April May~~ final volume runoff forecast, using a sliding scale defined in the BiOp. Values shown in Table 4 resulted from an early determination based on the April early bird runoff forecasts (April-July runoff forecast of ~~19.2~~ 10.7 MAF ~~maf~~ at Lower Granite and ~~April – August January-July~~ runoff forecast of 50.2 ~~105-MAF maf~~ at The Dalles).

Table 4. BiOp Spring Flow Objectives (based on April early bird runoff forecast)

Lower Granite		McNary	
Period	Flows (kcfs)	Period	Flows (kcfs)
4/3-6/20	85	4/20-6/30	220

~~Because of the low water supply conditions this year the FCRPS will not be at their April 10th flood control elevations. There will be very little or no water released for spring flow~~

augmentation. There may be small releases to benefit certain hatchery releases. The federal actions agency's goal at this time to try and refill Dworshak, Libby and Hungry Horse to within 20 feet from full around June 30th.

~~As called for in the BiOp (Page 96), the FCRPS will be operated to meet the spring flow objectives, with reservoirs at flood control elevations on April 10th (or April 20th, as the case may be) and full on June 30th. Dworshak will operate to a partially shifted flood control elevation on April 3rd, and meet April 30th flood control level. During April 3rd to June 20th, Dworshak may be used to help meet the spring seasonal flow objective, subject to meeting applicable downstream TDG limits. If drafts from Dworshak are used for flow augmentation prior to April 10th the elevation that the Dworshak would have been at without the drafts will be used for April 10th flood control elevation mentioned above. Given the average runoff forecast at The Dalles, it is anticipated there will be no need to limit the spring flow augmentation in order to refill the reservoirs by June 30th.~~

Spring Flow Objective for the Mid-Columbia River

The recommended average flow objective at Priest Rapids is 135 kcfs during the April 10th - June 30th period. One of the objectives to be decided this year is should the Venita Bar flows of 65 Kcfs be kept until emergence.

~~The shaping of the flows will be guided by the desire to refill Grand Coulee by June 30th, timing and magnitude of the juvenile migration, water temperature, spill and total dissolved gas levels, adult fish and other requirements for improved survival of listed fish. Flows greater than the objective may be provided on a weekly basis during key points in the migration if this does not jeopardize reservoir refill and summer flow augmentation. Flows lower than the objective may occur some weeks during the migration due to hydrologic conditions.~~

Snake Reservoirs at MOP

The lower Snake River reservoirs will be operated within one foot of the minimum operating pool (MOP) from an ~~yet to be determined April 3rd planning~~ date until adult fall chinook salmon begin entering the lower Snake River (late August). ~~In 2001 it will not be possible to operate at MOP at Lower Granite and Ice Harbor due to navigation concerns. This is because maintenance dredging did not occur on the lower Snake River during the winter due to ESA concerns about impacts on listed fish species. Actual start dates for MOP operations were April 5th for Ice Harbor and Lower Monumental, April 7th for Lower Granite and April 10th for Little Goose.~~ The operating ranges are shown in Table 5.

MOP draft and refill operations will be determined by TMT and done in a manner that provides fish benefits, while avoiding exceedence of state TDG standards, if possible.

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This will be accomplished through proper timing of the draft at each individual reservoir, proper sequencing of the operation, and controlling the draft rate. Detailed draft operation will be discussed in-season.

Table 5. Lower Snake River Reservoirs Operating Ranges

Reservoirs	MOP Range(ft)	Normal Operating Range (ft)
Lower Granite	7343 - 7354	733 - 738
Little Goose	633 - 634	633 - 638
Lower Monumental	537 - 538	537 - 540
Ice Harbor	4387 - 4398	437 - 440

~~MOP draft and refill operations will be determined by TMT and done in a manner that provides fish benefits, while avoiding exceedence of state TDG standards, if possible. This will be accomplished through proper timing of the draft at each individual reservoir, proper sequencing of the operation, and controlling the draft rate. Detailed draft operation will be discussed in season.~~

Other Reservoir Spring Operation

Sturgeon Flows from Libby.

~~The Sturgeon flows provided from Libby are set according to the 2000 USFWS BiOp, based on the April - August volume runoff forecast at Libby. This year's April - August forecast at Libby is 4.76 MAF based on the latest Corps of Engineer's forecast. At this forecast amount sturgeon flows are not requested. Also at this forecast level minimum bull trout flows between sturgeon and salmon flows are set at a level of 6 kcfs.~~

~~Libby will be operated for Kootenai River sturgeon, using operational guidelines for Kootenai River white sturgeon prepared by USFWS in coordination with NMFS. The Service will also make recommendations for operation of the Libby Project and Hungry Horse projects for bull trout, which has been listed under the Endangered Species Act. These recommendations may be in the form of operational guidelines. Specific requests for project and reservoir operations at the Libby Project will be made by System Operational Requests. The end of May and June IRC draft limits at Libby are at elevations 2396 and 2441 feet, respectively.~~

~~The end of May and June IRC draft limits at Hungry Horse are at elevations 3536.6 and 3560 feet, respectively.~~

Canadian Treaty projects will operate consistent with the ~~2000~~¹⁹⁹⁹-2001~~0~~ Detailed Operating Plan (DOP) and related operating agreements such as the Non-Power Uses Agreement and the Non Treaty Storage Agreement. The Operating Rule Curve for the whole of Canadian Storage shall be the sum of the Operating Rule Curves for each of Duncan, Arrow, and Mica. Mica will operate consistent with the Mica Project Operating Criteria table as shown in the DOP. More detailed information on the DOP will be available via the TMT homepage.

Spring Spill for –fish passage

Because of the low water supply there will be no spill for juvenile fish at the three Lower Snake collector projects (Lower Granite, Little Goose, and Lower Monumental). The full BiOp spill levels will not be provided at the other projects. The details for spill levels at the other projects have not been set yet. The Federal Agencies' Criteria and Priorities for 2001 FCRPS Operations have set the following priorities for spill first The Dalles (with a consistent operation for study purposes) then Bonneville, John Day, McNary, and Ice Harbor.

Planning dates for spring spill are April 3rd to June 20th in the Snake River and April 12~~0~~th to June 30 in the lower Columbia River. ~~Spill started April 4th at Lower Monumental and Ice Harbor. Spill started April 7th at Lower Granite and started April 10th at Little Goose. Spill at McNary started April 13th. Spill was scheduled to start April 16th at John Day, April 18th at The Dalles and April 20th at Bonneville.~~ A summary of the general guidance on spill requirements and other considerations provided in the ~~2000~~ ¹⁹⁹⁸ Supplemental NMFS BiOp is listed in Table 6. ~~In 2001 the Corps intends to implement the spill provisions of the NMFS BiOp and coordinate with states to accomplish this action. This includes~~ spill will be up to the level of ~~the~~ 120% TDG in tailraces and 115% at forebays of the next project downstream. ~~In-season adjustments of the spill caps will be made based on actual TDG levels measured below the projects. limit where waivers or exceptions to the 110% standard are in effect. Prior to initiating spill to the 115/120% total dissolved gas level (TDG) a "waiver" is sought from the State and/or tribal agency that has water quality regulatory authority for the affected reach. The waiver request for the 2000 season was made in February by NMFS to Idaho, Oregon, and the Nez Perce Tribe. The State of Washington has approved spill for the purpose of improving juvenile fish survival through 2003. Spill will also be implemented at all three Snake River collector projects "when seasonal average flows are projected to meet or exceed 85 kfs". Water supply forecasts and flow models indicate that the 85 kfs seasonal average is unlikely to be met in spring 2001. In-season adjustments of the spill caps will be made based on actual TDG levels measured below the projects.~~

~~NMFS has requested the necessary state waivers to allow spill for fish passage to occur up to the recommended 120% TDG level. The Washington Department of Ecology has granted a 3 year waiver dated April 1, 1999. The Oregon Department of Environmental Quality issued a waiver dated April 4, 2000. The Idaho and Nez Perce Tribe exemption, with conditions of short term activity, is dated March 31, 2000. On April 5, 2000, the NMFS requested further discussion on the conditions by the State of Idaho and the Nez Perce Tribe and has recommended that, in the meantime, the Corps continue to operate to the 110% spill limit.~~

If needed to provide the best condition for an evaluation of the effects and efficacy of spill to improve in-river survival, the TMT may recommend that a single spill regime prevail throughout the spring migration season. This action will depend on when the numbers of fish arriving at the projects are significant and when the flows are expected to reach trigger levels during the spring season.

~~Table 6. Summary of Spill Requirements and Other Considerations (20001998 Supplemental NMFS –BiOp and Memo issued by NMFS April 13, 2000 based on regional coordination) from **Table 9.6-3**. Estimated spill levels and gas caps for FCRPS projects during spring (all) and summer (nontransport projects). note Spill levels adjusted to current Gas Caps (set last summer)~~

Project ¹	Estimated Spill Level ²	Hours	Limiting Factor
Lower Granite	60 kcfs	6 p.m. - 6 a.m.	gas cap
Little Goose	42 kcfs	6 p.m. - 6 a.m.	gas cap
Lower Monumental	27 kcfs	24 hours	gas cap
Ice Harbor	105 kcfs (night) 45 kcfs (day)	24 hours	nighttime - gas cap daytime - adult passage
McNary	170 kcfs	6 p.m. - 6 a.m.	gas cap
John Day	140 kcfs/60% ³ (night)	6 p.m. - 6 a.m. ⁴	gas cap/percentage
The Dalles	40% of instant flow	24 hours	tailrace flow pattern and survival concerns (ongoing studies)
Bonneville	105 kcfs (night) 75 kcfs (day)	24 hours	

Notes

¹ Summer spill is curtailed beginning on or about June 20 at the four transport projects (Lower Granite, Little Goose, Lower Monumental, and McNary dams) due to concerns about low inriver survival rates.

² Estimated spill levels shown in the table will increase for some projects as spillway deflector optimization measures are implemented.

³The TDG cap at John Day Dam is estimated at 85 to 160 kcfs, and the spill cap for tailrace hydraulics is 60%. At project flows up to 300 kcfs, spill discharges will be 60% of instantaneous project flow. Above 300 kcfs project flow, spill discharges will be at the gas cap (up to the hydraulic limit of the powerhouse).

⁴Spill at John Day Dam will be 7:00 p.m. to 6:00 a.m. (night) and 6:00 a.m. to 7:00 p.m. (day) between May 15 and July 31.

Project	Flow trigger	Spill Duration	Recommended Min/Max Powerhouse Capacity⁽⁴⁾	Spill Cap for 120% TDG⁽²⁾ at the start of the spring season	Other Considerations (per 1998 Supplemental BiOp Appendix C) to prevent eddy formation, improve fish passage, etc.
	Kcfs	Hours	Kcfs	kcs	% of flow or kcfs
LWG	85	12 ⁽⁴⁾	11.5/123	45	
LGS	85	12 ⁽⁴⁾	11.5/123	60	35% max ⁽³⁾ , page C-11
LMN	85	24 ⁽⁷⁾	11.5/123	40	50% max ⁽³⁾ , page C-11
HHR		24	7.5/94	75	
MCN		12 ⁽⁴⁾	50/175	120-160	
JDA		12 ⁽⁵⁾	50/-	180	60% max (for flows up to 250-300) or TDG cap (whichever is less); 25% min (due to eddy) See page C-13
TDA ⁽⁶⁾		24	50/-	230 ⁽⁶⁾	⁽⁶⁾ 40% max 30% min (test). See page C-14
BON		24	30 min. (BPA); see page C-14. 60 min. (FPP)	120	50 kcfs min. spill (tailrace hydraulics); 75 kcfs max. daylight hours (adult fallback) See page C-14

1. Max. value is for powerhouse with units operating within 1% peak efficiency
2. Starting value subject to in-season adjustments based on real-time information
3. Levels provided in the 1998 BiOp to prevent eddy formation and maintain good adult passage conditions. May be adjusted in-season by TMT
4. Normally between 1800-0600 hours
5. From April 20th to May 14 1800—0600 from May 15 to July 31 1900 to 0600 and from August 1 to August 31 1800-0600 at John Day.
6. The spill percentage at The Dalles was changed to 40% in memo issued by NMFS April 13, 2000 based on regional coordination.
7. The spill time at Lower Monumental was changed from 12 hours to 24 hours in memo issued by NMFS April 13, 2000 based on regional coordination.

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Notes

~~Bonneville—Will test the fish passage effect of spilling to the gas cap 24 hours a day. There will a randomized block test consisting of a block of 3 days of spilling during the daylight hours to the gas cap followed by a block of limiting daytime spill to the 75 kefs adult fallback cap, April 20th to August 30th. See spill schedule below. (Table 7)~~

~~John Day—Will test spilling two levels during the daytime period. A randomized block design consisting of periods of 0% spill and 30% spill during daytime has been suggested. The daytime spill amount will be linked to the spill at Bonneville. John Day would spill during the day when Bonneville was spilling to the daytime 75 kefs cap and not spill when Bonneville was spilling to the gas cap during the day. (See Table 7 below)~~

~~Lower Granite—In support of the Surface Bypass Collector testing Lower Granite will be spilling 20% of flow + 4 kefs 24 hours a day.~~

VI. Summer Operations (July-August)

Summer Flow Objective at Lower Granite and McNary

The seasonal average flow objective for Lower Granite is to be based on the May final water supply forecasts, but the seasonal average flow objective for McNary is a fixed 200 kcfs regardless of the runoff forecasts. Summer flow objectives based on the April ~~early bird final~~ April-July runoff forecast are shown in Table 78.

Table 78. Biological Opinion's Summer Flow Objectives

Lower Granite	Lower Granite	McNary	McNary
Period	Flows (kcfs)	Period	Flows (kcfs)
6/21-8/31	50	7/1-8/31	200

At this time the amount of water available for summer flow augmentation has not been determined.

~~At Libby, draft to provide flows for white sturgeon spawning (RPA 1(a)) does not, in itself, preclude drafting below the interim draft limit to meet flow objectives for salmon in accordance with the conditions and process described in RPA 1(f) of the BiOp. The USFWS and NMFS, in coordination with the states and tribes, will make the best efforts to balance the flow requirements of both species and make recommendations to the TMT. The Corps will evaluate those recommendations consistent with its 1995 and~~

~~1997 Records of Decisions, and its 1998 Record of Consultation and Summary of Decision, which state that "the Corps will operate Libby Dam in an attempt to meet the sturgeon flow requirements consistent with existing treaties and laws, and will reduce releases if monitoring identifies potential adverse effects of flooding and/or bank erosion, or if requested to reduce releases by USFWS. If, at the conclusion of the operation for sturgeon, Lake Koocanusa is above elevation 2439 on or before August 31, the Corps may, if necessary lower Libby Reservoir to elevation 2439 by August 31 to meet salmon flow objectives without spilling at Libby." Montana is expected to compute IRCs for Libby so that they can be considered in the TMT summer decision making.~~

In 1995, 1996, 1997 and 1998, the Libby-Arrow swap ~~was~~ ~~has been~~ executed, which made it possible for Libby to stay full ~~many~~ more weeks into the summer. It was not executed in 1999 and 2000. The potential for repeating this beneficial, volume neutral operation will be reexamined in 2001~~0~~, since it is now part of the Libby Coordination Agreement with Canada. The exchange, if it occurs, will be fully documented. Provisions are in place in the DOP to provide for the optimal balancing of the storage of water in Libby and Arrow reservoirs, considering mutually beneficial power and non-power objectives. Storage and/or release rates may be modified at the appropriate reservoir should such modifications be necessary to protect fish or accommodate other operating constraints. Water stored in the Libby Account will be released later, according to a schedule agreed to by the U.S. and Canadian parties, and taking into account the project considerations on Canadian Treaty and Libby reservoirs as well as operation of Kootenay Lake under the International Joint Commission order. BPA and the Corps will coordinate Treaty operations with TMT.

Summer Reservoir Interim Draft Limits

The interim draft limits specified in the ~~2000~~1995 BiOp on reservoir elevations through August 31st are shown in Table ~~89~~ and are independent of the June 30th reservoir elevations. ~~Low water supply this year may change the numbers shown in Table 8. Detail have not been determined yet. Reservoirs are not always required to be drafted to those draft limits because of potential adverse impacts on other portions of the Columbia Basin ecosystem and the resident fish and wildlife that rely on the reservoirs (1995 BiOp, page 96). On the other hand, the 1995 BiOp (Page 102) also stated that, under certain circumstances, lower summer reservoir elevations may be recommended to meet flow objectives. Examples of special circumstances include:~~

- ~~—a low water year that is one in a series of low water years and an out migrating population of fish that represents a strong year class~~
- ~~—upper rule curve goals were not met on April 20 (later changed to April 10) at Grand Coulee and Albeni Falls, or~~
- ~~The Dalles April-August unregulated runoff is expected to be less than 65 maf, determined as of June 30."~~

Table 89. BiOp Interim Summer Reservoir Draft Limits (in feet) Through August 31

Grand Coulee	Banks Lake	Libby	Hungry Horse	Dworshak
1280/ 1278 1	1565	2439	3540	1520

Notes 1 Grand Coulee Draft limit depends on the July final April-to-August runoff volume forecast at The Dalles Dam. If the forecast is less than 92 MAF GCL can be drafted to 1278 feet. The current April – August forecast is 70.8 MAF.

Upper Snake River Reservoir Operation

Reclamation will provide water from the Boise, Payette, and Upper Snake River Basins for flow augmentation. The amount and sources of the water has not yet been determined. Releases will be from a combination of rentals and Reclamation space. Power head will be used, if necessary. Delivery of water through Brownlee Reservoir will be worked out between Reclamation, Idaho Power Company, and the TMT. There is currently no legislation pending in the Idaho legislature to address the issue of flow augmentation.

~~As recommended in the 1995 BiOp (page 101), the TMT will coordinate with IPC the release of a total of 237 kaf during the summer from Brownlee Reservoir in addition to water that might be drafted from Brownlee to deliver 427 kaf from USBR projects in the Snake River. TMT will also coordinate with IPC alternative operations during the summer, fall, and winter to optimize migration and spawning conditions in the lower Snake River and below Hells Canyon Dam. Delivery details of the 427 kaf of Upper Snake River water will be worked out between the state of Idaho, USBR, IPC, BPA, and the Salmon Managers. The TMT will provide recommendations on the actual delivery of the Reclamation 427 kaf water to optimize downstream migration conditions for migrating listed salmon while minimizing fishery and recreational impacts in Brownlee Reservoir, which is an ODFW recommendation. Reclamation's estimated sources of the 427 KAF for this year are shown in Table 10.~~

Table 910. Potential Sources for 20010 Water for Snake River Flow ~~Augmentation as of April, 12, 2000 (To be updated).~~

Source	Acre-Feet	Notes
Oregon	17,847	OWRD transfer order has been granted.
Boise	40,932	USBR storage.
Payette	150,000	95,000 af of USBR storage plus rental pool rentals.
Upper Snake	180,221	23,000 af of USBR storage plus rental pool rentals.
Shoshone-Bannock	38,000	Shoshone-Bannock tribes rental pool.

~~Reclamation plans to make 2000 releases in patterns similar to those of 1997 through 1999. Implementing this strategy would result in flows in the range of 1,500 cfs at Milner, 400 cfs above irrigation flow from Lucky Peak, and about 1,000 cfs above irrigation flow from Cascade and Deadwood. The Payette water releases will likely be split with a summer and winter release, assuming that Idaho Power shapes flows. Previous Payette seasonal splits have been 60/40 and 50/50 for summer/winter, with the 60/40 ratio being preferred in 1998 and 1999. The 1,500 cfs release past Milner also assumes Idaho Power Company will provide shaping for that amount of water that cannot be delivered past Milner during the augmentation season. Releases would generally start when storage releases for irrigation commence. In each case, Reclamation will work closely with the appropriate watermaster and other parties on the specific timing and volume of releases. Augmentation releases are driven by stream flow conditions and fish movement. Reclamation will also work with the Idaho Power Company to manage flow augmentation flows through Brownlee. Reclamation, BPA, and Idaho Power Company will coordinate with TMT to manage delivery of flow augmentation from Brownlee.~~

Summer Reservoir

Operations

Details have not been set yet for summer operations.

During the July - August period Dworshak will draft to as low as elevation 1520 feet. Note that this depends on the maximum allowable outflow. The maximum outflow without exceeding 110% and 120% TDG is about 14 and 22 kcfs respectively.

Albeni Falls will be full by the end of June and will pass inflow through July and August.

~~The end of July, mid August, and end of August IRC draft limits at Libby are 2459, 2456, and 2452 feet, respectively.~~

Reclamation will operate Grand Coulee and Hungry Horse consistent with the Biological Opinion and its stated limits of 1280 feet and 3540 feet, respectively, at these reservoirs. ~~The 2000 USFWS BiOp sets the minimum flow requirements at Columbia Falls based on the March final runoff forecast for Hungry Horse Reservoir for the period of April 1 to August 31. The April – August forecast is 1.51 MAF, based on the January final forecast. The minimum flow level at Columbia Falls will be ?.~~

~~Outflows from Hungry Horse will include meeting the 3,500 cfs minimum flow requirement at Columbia Falls without drafting below the 3540 foot limit anytime in July-August.~~ Reclamation will also attempt to reach IRC elevations at Hungry Horse depending on circumstances of runoff, with a higher priority for meeting the Biological Opinion flow objectives. ~~The end of July, mid August, and end of August IRC draft limits are 3560, 3557.8, and 3554.1 feet, respectively.~~

Summer Spill for ~~F~~fish ~~P~~assage

Planning dates for summer spill, where applicable, are ~~21 June to 31 August for the Snake River, and 1 July to 31 August for the lower Columbia River, the same as in the 1995 BiOp.~~ Summer spill requirements/limitations will be as shown previously for spring spill. Summer spill is only required at Ice Harbor, John Day, The Dalles and Bonneville. Daily spill periods are 24 hours at Ice Harbor, The Dalles and Bonneville. ~~At John Day spill hours are and 1800 – 0600 hours during (20 April 20 – 14 May 14) ,and -1900-0600 hours during (15 May 15-31 July 31) and 1800-0600 hours during (1 August 1 – 31 August 31)-at John Day. Spill for fish passage will be subjected to the state standards for TDG as determined by the spill caps, which will be adjusted in-season based on actual TDG readings.~~

VII. Fall Operations (September – ~~start~~March)

Operation for Chum Salmon Spawning in the Ives Island Area Below Bonneville Dam

This operation will be implemented as described below if the best hydrologic data available by mid-September 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 augmentation season in April) without adverse effect on implementation of the ~~2000 1995~~ BiOp, ~~the 1998 supplemental biological opinion,~~ or the ability of parties to comply with the Vernita Bar agreement. The goal is to make sure that providing the flows for Chum salmon spawning will not jeopardize refilling the storage projects to April flood control elevations or meeting the seasonal flow objectives. If these

conditions cannot be met, the TMT will recommend operations that will provide benefits to chum salmon while maintaining existing fish protection measures (i.e., 1995 BiOp, 1998 supplemental biological opinion, and Vernita Bar agreement).

If the operation is feasible (as described above), it will begin when chum salmon appear in the area around Ives and Pierce islands, but no later than November 1st. Based on recommendations developed by NMFS from information provided by the regional fish and wildlife managers, TMT proposes to manage FCRPS storage with natural flow to achieve a 125 kcfs average daily discharge (± 5 kcfs range) from Bonneville Dam from 1 November ~~1st~~ through 31 December ~~31st~~.

When reservoir storage, baseflows, and predicted hydrologic conditions permit, a higher managed daily average discharge may be adopted. The TMT will recommend the actual managed daily average discharge with a ± 5 kcfs range.

Control of water level in spawning areas through regulation of tailwater elevation at Bonneville Dam will be considered if needed to protect spawning chum salmon.

At managed daily average flows of 160 kcfs or higher, the FCRPS will be managed to provide an instantaneous minimum discharge of 155 kcfs (i.e., 160 kcfs minus 5 kcfs) at Bonneville Dam, with a day average of at least 160 kcfs. In this case, the maximum instantaneous discharge would not be limited. **Nighttime flows may be higher if needed to pass river flows while keeping daytime water levels lower, to limit access to high elevation habitat while chum are spawning.**

During incubation and emergence (January 1st through the start of the spring flow augmentation program for the lower Columbia River on 10 April ~~20th~~), TMT proposes to manage storage with natural flows to maintain the daily average discharge from Bonneville Dam needed to protect the highest redd established by the operation and to maintain connectivity between spawning habitat and the mainstem for outmigrants. If the daily average Bonneville outflow is between 125 kcfs and 134 kcfs during spawning, a discharge of at least 125 kcfs will be maintained through incubation and emergence. For all managed spawning flows of 135 kcfs and above, the highest spawning flow minus 10 kcfs will be the managed daily average discharge during incubation and emergence. The highest managed daily average discharge that will be provided during the incubation and emergence period is 150 kcfs.

VIII. Outlook for Meeting Flow Objectives in 2001

This section will be prepared for a later draft. It includes:

Table 10. 2001 Average Summary Hydrographs for Lower Granite and McNary.

Figure 1. 2001 Average Flow Hydrograph for McNary.

Figure 2. 2001 Average Flow Hydrograph for Lower Granite.

Table 11. 2001 Monthly Flow Objectives for Lower Granite, McNary, Vernita Bar, and Priest Rapids.

Table 12. March and April 2001 Flood Control Levels for Brownlee, Dworshak, Hungry Horse, Grand Coulee, and Libby.

Table 13. Expectations for Meeting 2001 Seasonal Flow Objectives.

VII. Outlook for Meeting Flow Objectives in 2000

Unregulated and Regulated Summary Hydrographs at Lower Granite and McNary

The monthly flow values of the average summary unregulated and regulated hydrographs for Lower Granite and McNary are provided in Table 11, and the hydrographs themselves are shown in Figures 1 and 2. This material was based on 1929-1987 runoff shapes that were normalized to match the March-final-January-July-2000 runoff volume forecasts. Note some of the values changed slightly in the April final forecast.

Table 11. 2000 Average Summary Hydrographs at Lower Granite and McNary

	LWG Unregulat ed Flow (kefs)	MCN Unregulat ed Flow (kefs)	LWG Regulated Flow (kefs)	MCN Regulated Flow (kefs)	LWG Flow Objective (kefs)	MCN Flow Objective (kefs)
Apr 1-15	67	185	68	220	— (Apr 1-2) —100 (Apr 3-15)	-
Apr 16-30	83	263	84	281	100	— (Apr 16-19) 260 (Apr 20-30)
May	110	438	97	287	100	260
Jun	98	483	87	316	—100 (Jun 1-20) —51.8 (Jun 21-30)	260
Jul	36	264	48	196	51.8	200
Aug 1-15	21	160	31	160	51.8	200
Aug 16-31	19	125	24	138	51.8	200

(*) average flows during the month indicated

The COE Power Branch made a 59-year (1929-1987) monthly flow computer simulation based on the March final runoff forecasts at Lower Granite and The Dalles. The model simulation provides an estimate of the expected flows at Lower Granite and McNary for any of the 59 years having the same January-July runoff volume as the water supply volume forecasted for 2000. When more reliable information becomes available, the results of the 59-year monthly study will be superceded by weekly flow projections made more specifically for 2000 (see below).

Study assumptions for the computer simulation run were as follows:

- Streamflows were adjusted based on the March final water supply forecast using The Dalles January-July volume.
- Starting elevation: Treaty projects use 23 Feb 00 TSR (Mica, Arrow, and Duncan). Other projects use actual 29 Feb 00 elevation at 2400 hours from CROHMS.
- Flow Objectives (kefs):

Projects	Apr1	Apr2	May	Jun	July	Aug1	Aug2
Lower Granite	100	100	100	83.9	51.8	51.8	51.8
McNary		260	260	260	200	200	200
Vernita Bar	60	60	60				

Priest Rapids		135	135	135			
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~~Flood Control levels based on the March final water supply forecast:~~ |

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	MAR	APR1	APR2
BRN	2053.1	2054.0	2053.9
DWR	1512.2	1498.3*	1516.6
HGH	3516.5	3509.2	3501.6
GCL	1272.0	1254.6*	1238.6
LIB	2331.3	2340.4	2349.6

~~(**) includes partial flood control shift from Dworshak to Grand Coulee to provide additional lower Snake flow augmentation in April.~~

~~Dworshak: will operate on Qmin or flood control in MAR—APR1 except as required to partially shift flood control to Grand Coulee. In APR—JUL (except June) operate to support the Lower Granite flow objectives. Operate to a target elevation of 1600' in June. Qmax is 14,000 cfs for augmenting LWG flow objectives, but can release to 25,000 cfs for flood control. Qmin is 1,300 cfs all periods.~~

~~Canadian operation using 23 Feb 00 TSR values.~~

~~Hungry Horse will operate on flood control in April only. Run on Columbia Falls requirement MAR—AUG. Target elevation of 3560.0' in JUN. Help meet McNary flows in AG1—AUG.~~

~~Grand Coulee will augment for Vernita Bar requirements (65 kefs) in MAR. Target elevation 1263.0' in MAR and 1290' in JUN. Meet flood control in APR1—APR.. In MAY help support Priest Rapids flow objective. In MAY—JUL help support McNary flow objectives.~~

~~Brownlee operates on flood control MAR—APR2. In MAY—AUG2 operate on target elevations:~~

~~May—June—July—Aug1—Aug2
2069—2077—2059—2059—2059~~

~~Libby will operate on flood control MAR—APR1. In MAY, JUN and JUL operate to support the Bonners Ferry flow objectives of 9,800 cfs in MAY, 16,000 cfs in JUN, and 10,100 cfs in JUL. Help meet McNary flows in AG1 and AUG. At Libby discharge is limited by the maximum allowable lake level at Kootenay Lake (Corra Linn) of 1739.32' MAR—MAY and 1743.32' JUN—AUG2 when releasing more than inflow. Maximum release of 25,000 in JUN.~~

~~Albeni Falls May elevation = 2062.5.~~

The analysis produced a wide range of flow conditions as a result of meeting the necessary system requirements for flood control, power, Libby sturgeon operation, and the BiOp seasonal flow objectives summarized above (see Table 12).

Table 12. Expectations for Meeting 2000 Seasonal Flow Objectives
(based on 1929-1987 monthly simulation—59 years, and March final water supply forecast)

Lower Granite		
Periods:	Apr 3—Jun 20	Jun 21—31 Aug
Seasonal Flow Objective, kfs	100	51.8
Projected Seasonal Average, kfs	89.7	44.6
No. Years Seasonal Objective is Met	*1 (2%)	*6 (10%)
No. Years Ave. Flows → Seas. Objective:		
Apr1/Apr2/May/June	3/13/27/14	
June/July/Aug1/Aug2		19/19/0/0
McNary		
Periods:	Apr 20—Jun 30	Jul 1—31 Aug
Seasonal Flow Objective, kfs	260	200
Projected Seasonal Average, kfs	298	172
No. Years Seasonal Objective is Met	*57 (97%)	*8 (14%)
No. Years Ave. Flows → Seas. Objective:		
Apr2/May/June	35/54/51	
July/Aug1/Aug2		31/8/0
Priest Rapids		
Periods:	Apr 10—Jun 30	
Seasonal Flow Objective, kfs	135	
Projected Seasonal Average, kfs	158.0	
No. Years Seasonal Objective is Met	*56 (95%)	
No. Years Ave. Flows → Seas. Objective:		
Apr1/Apr2/May/June	15/48/58/53	

More reliable flow projections will be made starting in late March, using the results of the SSARR run adjusted as needed to meet the seasonal flow objectives at Lower

~~Granite, Priest Rapids and McNary. The projected seasonal average flows derived from the weekly flow projection spreadsheet will be shown in the following format:~~

~~Lower Granite: 4/3 - 6/20: X1 kefs; 6/21 - 7/31: X2 kefs~~

~~Priest Rapids: 4/10 - 6/30: Y1 kefs~~

~~McNary: 4/20 - 6/30: Z1 kefs 7/01 - 7/31: Z2 kefs~~

IX VIII. Water temperature

Water quality standards have been developed by the states and tribes under the authority of the federal Clean Water Act to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. High water temperature is a basin-wide issue involving tributaries and mainstem watercourses and impoundments. The TMT recognizes that water temperature is important to the survival of fish and other aquatic life forms, and will recommend that every effort be made to meet the state and tribal water quality standards in the mainstem.

20010 Actions

Timely summer drafts of cold water from Dworshak, as done in the previous years, will be considered in 20010 to lower water temperatures in the lower Snake River. This will be accomplished in close coordination with the NMFS, USFWS, Idaho Department of Fish and Game, and the Nez Perce Tribe to ensure that the water temperature requirements of the Clearwater River fish hatcheries and rearing conditions in the Clearwater River are taken into account. This operation will need to be closely coordinated with flow augmentation from Brownlee Reservoir, in consultation with the USFWS and other salmon management agencies, to ensure that optimum use is made of both of these reservoirs. In the past, a release temperature of 50 degrees F. range (+or - 5 degrees F.) has been found acceptable by all parties. Unless otherwise agreed to by ~~USFWS U.S. Fish and Wildlife~~, Idaho Department Of Fish and Game, and the Nez Perce Tribe, use of a similar water temperature level is anticipated for 20010.

The need for decreasing water temperature in fishways will be considered based on the results on-going mainstem adult passage studies. Real-time temperature monitoring in the lower Columbia and lower Snake Rivers will be continued as a part of the on-going, system-wide TDG monitoring program. Temperature monitoring in adult fishways will also continue. The emergency plan to address high water temperature incidences at McNary will be reviewed in the light of past experience in consultation with the salmon managers and other interested parties.

Additional activities for 2000 may also emerge as a result of on-going consultations and discussions between EPA, the states of Oregon, Idaho and Washington, and the Corps

in an effort to develop a long-term strategy regarding water quality standards for TDG and water temperature.

IX. Total Dissolved Gas Management

The Corps intends to provide voluntary spill for fish passage as called for in the NMFS BiOp, subject to further coordination through TMT given the below average runoff volume forecast and power system needs. ~~Given the average runoff forecast, normal amounts of spill is expected to prevail during a the 2000 fish passage season. Assuming that the necessary State waivers for TDG will have been obtained before the start dates, voluntary spill for fish passage will occur as called for in the 1998 Supplemental NMFS BiOp, subject to the 115%/120% TDG limits if they are in effect. In 2000 (note the following spill levels at Bonneville, The Dalles, and John Day are based of our current best estimate of what will happen. Final spill amounts have not be finalized yet . At Bonneville an in season test will be made comparing spilling during daytime hours to the gas cap as opposed to spilling at the 75 kcfs adult fallback cap. The Dalles will spill at a 40% level between 30 and 50% based on research that showed better juvenile survival at 30% than at the BiOp specified level. A study at John Day will evaluate daytime spill at a 320% (?) level or 0% level. on the days when the Bonneville is spilling during the daytime at the gas cap (?). At Bonneville, a test will be made to determine the effects of spilling during the daytime at the gas cap as opposed to spilling during the day to the 75 kcfs adult fallback cap. At Ice Harbor a similar test to the one at Bonneville is proposed alternating daytime spill between the gas cap and the 45 kcfs adult fallback cap. Because of the continuing testing of the surface bypass collector at Lower Granite spill will be set at a level of 20% for 24 hours a day.~~

Bonneville will spill to the 75 kcfs daytime cap to reduce adult fallback and spill at night to the 120%/115% TDG cap.

The spill limitation to ~~not exceed the~~ 115/120% TDG will be met by specifying an appropriate spill cap depending on the project's propensity to create TDG. This spill cap will be adjusted in-season ~~upon TMT recommendation~~ based on actual TDG readings and coordinated through TMT. A spill priority list will be developed and implemented, based on relevant information, including real-time and predicted TDG, flow, biological monitoring, and fish movement. The concept of the spill priority is illustrated in Figures 3 and 4.

TDG management options are limited. More water can be stored in the reservoirs behind the dams; the quantity of spill can be shifted to various periods within the day; more water can be put through the turbines; spill can be shifted within the system to avoid excessive local concentrations; spill can be transferred outside the system; and spill bays can be used more effectively. The TMT will work with the Water Quality

Team (WQT) to explore other tools available to the TMT for TDG reduction across the season.

Beside the spill priority list, changing the spill from a crown to an uniform pattern, avoiding the use of spillway bays without deflectors, and allowing turbine units to operate outside their 1% peak efficiency flow range are additional management options. Proper scheduling of service and maintenance time tables, identifying additional energy loads to serve, and displacing available thermal projects that are serving the same loads also help relieve the need for spill.

Normal operations and others that are required by research, construction, unit maintenance and services, etc. at COE and Reclamation projects will be managed to avoid causing TDG saturation levels above state standards to the extent feasible.

The COE and Reclamation will continue to monitor dissolved gas in the forebay and tailwater areas of all their mainstem Columbia and Snake Rivers projects and make them available to all interested parties through the TMT homepage. Other dams where spill is frequently scheduled will also be monitored. Winter monitoring may also be implemented below selected projects to establish baseline data. The COE will continue to develop and test regional dissolved gas abatement strategies and monitor their effects on the ecosystem in the framework of overall water resources management.

Appendix 1 provides more detailed information and discussions on total dissolved gas management in 20010 |

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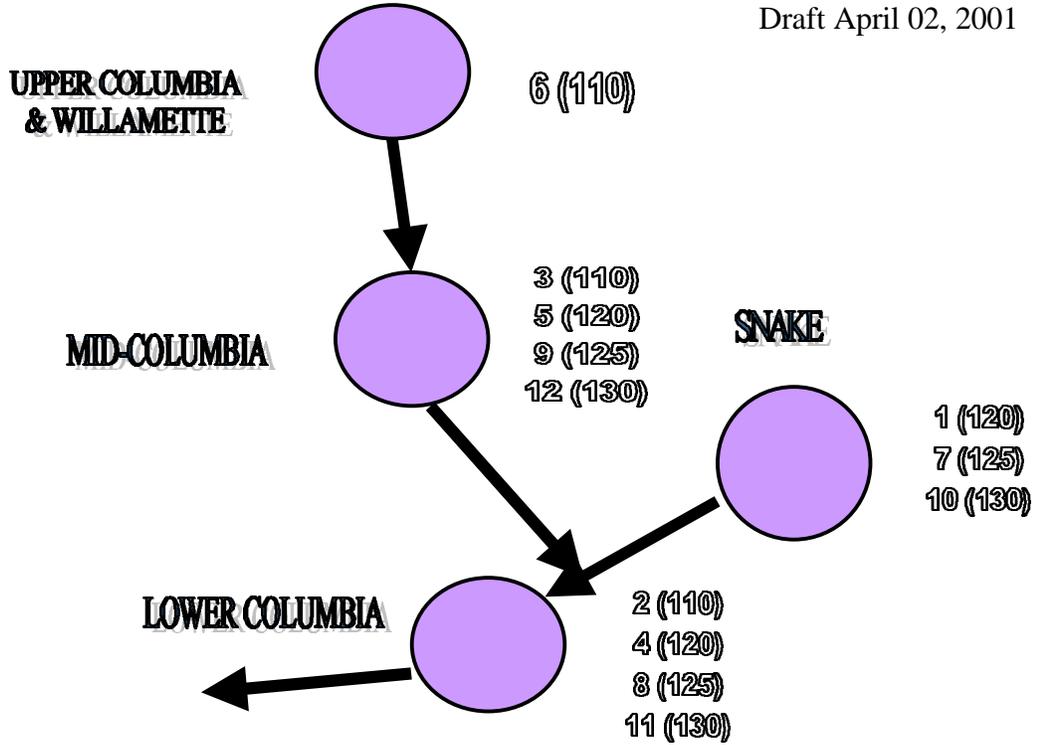
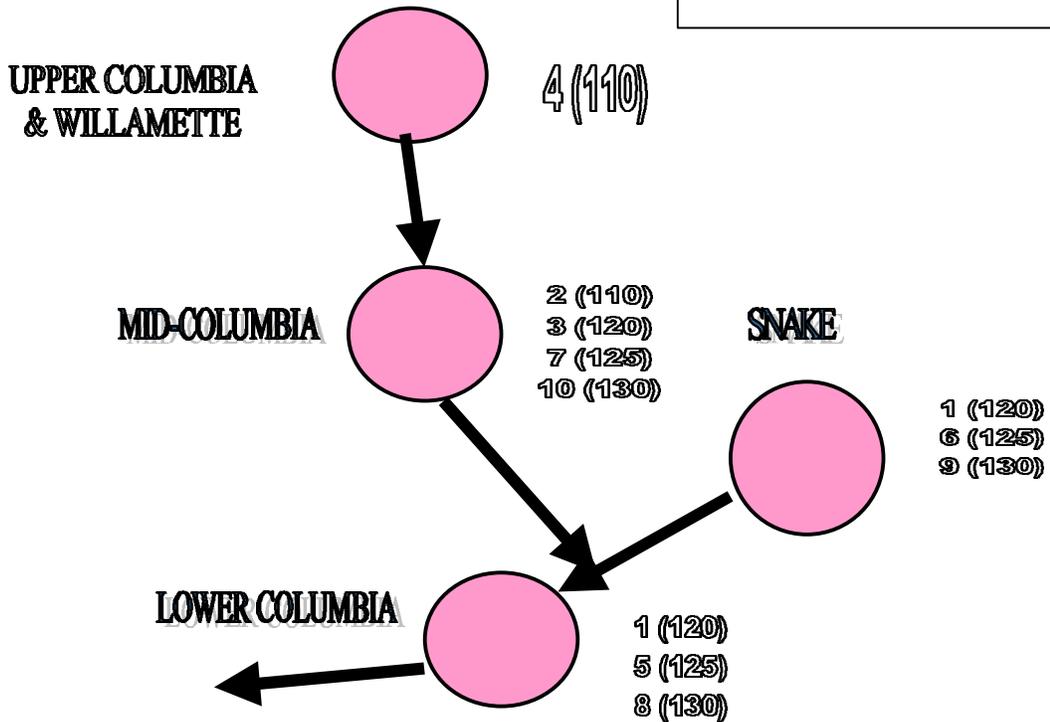


FIGURE 3
SPILL PRIORITY FOR APRIL 3 -
JUNE 20
Priority (% TDG)



36

FIGURE 4. SPILL PRIORITY FOR
JUNE 21-AUGUST 31
Priority (% TDG)

.XI. Transportation

Juvenile fish transportation will occur as outlined in the ~~2000~~1995 NMFS ~~BiOp and 1998 Supplemental BiOp~~, according to procedures described in the Corps of Engineers Fish Passage Plan, Appendix B, ~~dated February 2001~~. This will include fish collection and transportation in the spring and summer at Lower Granite, Little Goose, and Lower Granite Dams, and in the summer at McNary. TMT will evaluate biological, hydrologic, and water quality information to determine a date to initiate summer transportation at McNary.

Comments ~~have been~~ offered by the Independent Scientific Advisory Board (ISAB) and IDFG ~~are noted below~~. the ISAB stated that spill is provided in the spring at Snake River collector projects to "spread the risk" between transportation and in-river migration. The objective of transport is "not recommending any specific proposition to limit transported fish. Rather, we [ISAB] were recommending that transportation not be maximized..."

IDFG recommends that the TMT should retain the flexibility to manage smolt transportation operations based on the real-time needs and performance of the fish, and the real-time conditions of the river. Spill is not used just to "spread-the-risk", it is primarily used to help optimize dam passage conditions for in-river migrants. Oregon recommends a spread-the-risk transport policy for Snake River fall chinook with transport of no more than 50% of fish. As before, the transportation collector projects will operate to maximize collection and transportation (i.e., no voluntary spill except as needed for approved research) during the summer migration.

In general, the switch from spring to summer spill operation will occur on or about June 20. In practice, the TMT has the discretion to make the switch earlier or later based on monitoring of in-river conditions. When more favorable spring-like flows (~~220 kcfs or greater at McNary~~) and temperatures (~~less than 62 deg. F. McNary~~) either end before or extend after June 20, the actual date to end spill at collector projects should be modified, continuing to spread the risk of transport versus in-river passage for spring migrants so long as favorable flow and temperature conditions persist.

XII. Operations for Research & Other Activities

Project operations planned in conjunction with the activities listed below will be discussed and coordinated at the weekly TMT meetings as needed. In general, conduct of research at mainstem projects will be subordinate to the higher priority of ensuring the best possible downstream passage conditions for listed species. Details of project operations for fishery purposes at Corps projects are provided in the COE Fish Passage Plan. Special operations with potential impact to project performance are listed in Table

13. Implementation details may need to be worked on a case-by-case basis, based on specific river operation requirements for the specific activity, real-time river conditions and applicable test requirements, if any.

Table 14. Operational Requirements and Dates for Research and Other Activities at Projects in 2001. (To be prepared; updated from 2000 Water Management Plan, Table 13).

Table 13

Project	Activity	Operational Requirements	Start/End Date
Bonneville	Spring-Creek NFH Release	24 hour spill	3/9—3/16
	ESBS Testing PH1	1 Unit shut down for removal and placement of Fyke nets, Outages for equipment Installation, removal, inspection and repair.	4/15—7/15
	Unit Rehab Biological Testing	Unit shutdown for equipment Installation Removal and Repair. Unit becomes priority unit.	9/1—12/1 ?
	Fallback Spill testing	Change in daytime spill level.	4/15—6/15 ?
	Lamprey passage study	Change in operation of fish ladders	4/4—9/30
	FPE studies	Outages for equipment installation and removal	3/1—8/14
	PH2 Vertical Distribution	Change in unit operating priority	4/1—8/31

Project	Activity	Operational Requirements	Start/End Date
Bonneville	PH1 Prototype Surface Collector	Forebay limitations, Unit outages for equipment installation and removal, Change in unit operating priority and flow range	3/1—7/31
The Dalles	Spillway and Sluiceway Survival Studies	Possible flow restrictions because of boating in tailrace	4/20—7/31
	FPE Evaluation	Unit and spillway outages for equipment installation, repair and removal	4/20—7/31
	Behavioral studies	Possible outages for equipment installation, repair and removal	4/20—7/31
	Adult Salmon and Steelhead Passage Evaluations	Possible outages for equipment installation, repair and removal	4/1—10/31
John Day	FPE Studies	Alternating spill levels during daytime, Outages for equipment installation, repair and removal	5/1—8/31
	Adult Salmon and Steelhead Passage Evaluations	Alternating spill levels during daytime, Outages for equipment installation, repair and removal	4/1—10/31

Project	Activity	Operational Requirements	Start/End Date
McNary	Turbine Passage/Survival Studies	Unit outage for equipment installation and removal. Possible Unit outage while equipment in place but no testing going on.	5/1—10/22
	Effects of ESBS on Lamprey	Unit outage to install video camera	4/1—10/31
	Biological Performance of Plates of ESBS	Unit outages for equipment installation, repair and removal and while screens are switched	6/1—8/31
Ice Harbor	Spillway Survival Study	Alternating Spill levels, stable flow conditions during fish release	4/1—7/31
	Evaluation of Adult salmon and Steelhead Migration	Alternating Spill levels	3/1—11/30
Little-Goose	FGE Testing	Unit outages for screen-swaps along with outages for equipment installation, repair and removal	4/1—12/15
Lower Granite Dam	Surface Bypass Collector Testing	20% spill during test	4/10—5/27

APPENDICES

- **APPENDIX 1: ~~2001~~1999 Total Dissolved Gas Management Plan**
- **APPENDIX 2: Emergency Protocols**
- **APPENDIX 3: BPA's System Load Shaping Guidelines for Operating Turbines Outside 1% Peak Efficiency**
- **APPENDIX 4: TMT Guidelines**
- **APPENDIX 5: Northwest Power Pool 1999 Maintenance Schedule Outages of Generating Units (G:\rcc\tmt99\documents\wmp99_app5.doc)**

USFW recommends that the scheduled outages of the Hells Canyon Complex projects be included because of their effect on delivery of Snake River flows in the summer. While IDPC is unable to share its maintenance schedule with the TMT, it will share information relevant to TMT on an as needed basis.

~~**Appendix 6. TMT Goals, Objectives and Triggers**~~

- **APPENDIX ~~ppendix~~ 67. Operation-~~R~~related BiOp Provisions**