Federal Agencies' 2001
FCRPS Operations Plan Proposal

April 13, 2001

Table of Contents

Executive Summary

This operations plan has two major elements. First is an evaluation of FCRPS conditions relative to the emergency criteria included in the "Federal Agencies' Criteria and Priorities for 2001 FCRPS Operations." Second is a summary of operations that will be implemented this year, including a decision process for determining spring and summer spill levels.

FCPRS Conditions Relative to the Criteria

CRITERION 1: Sufficient Resources to meet near-term power system demand

54 MAF is the threshold at which BPA cannot meet spring and summer power system demands without drafting reservoirs and impacting 2001-02 system reliability. A forecast buffer is added to address the risk associated with forecast error. The May forecast error buffer is 4.5 MAF.

SUMMARY RESULT: A 58.5 MAF May Final forecast is needed to have confidence near-term reliability can be maintained.

CRITERION 2: Sufficient Resources to maintain a 5% loss of load probability in future months

NWPPC analysis indicates the Pacific Northwest Region currently has a 26% chance of not meeting power system demand in the December through January period of 2001-02. Additional analysis indicates that storage of up to 1500 mw-mo could reduce this probability to 20% and also significantly reduce the amount of load curtailment.

SUMMARY RESULT: 1500 mw-mos (approximately 1.5 MAF) of additional storage is necessary to maximize the reduction of the loss of load probability

CRITERION 3: Sufficient Cash Reserves to maintain reliability

Current BPA analysis finds that there are no months in the coming 12 months that are at or above 20% probability of zero reserves. In fact, the greatest probability is 13.5%. A preliminary conclusion suggests the possibility that some reserves could be used this year to: a) fund implementation of offset actions or b) purchase power from extra-regional sources to reduce the amount of storage needed for next winter or to further reduce next year's loss of load probability.

SUMMARY RESULT: No additional revenues are necessary to achieve the insufficient reserve criterion.

Spring/Summer Operations

- Spill start date and spill levels will be determined based on volume forecasts. May final volume forecast would need to be equal to or greater than 60 MAF for spill to be considered in May. Project priority for any spill that may be available is included on page 16.
- Transport up to 50% of juvenile migrants at McNary Dam in the Spring.
- Surging operation at Lower Granite to move juveniles through the pool.
- Allow for consideration to reduce bull trout minimums at Libby to aid in refill.

I. Introduction

The year 2001 is shaping up to be one of the lowest water years on record with unprecedented increases in the cost of power. Under these conditions, BPA has been forced to periodically declare power system emergencies in order to maintain the reliability of the power system. The Federal Agencies have made and will continue to have to make deliberate and careful choices about how to use the system's limited flexibility to achieve multiple objectives.

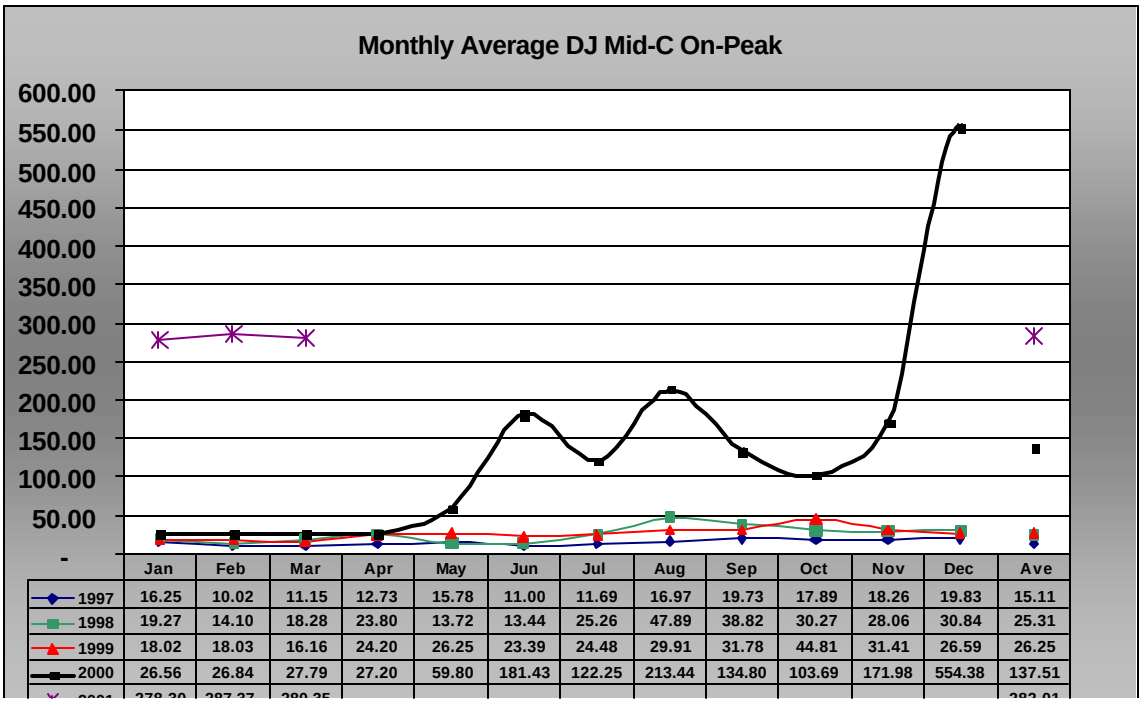
Purpose: The Action Agencies intend to implement the biological opinions issued by NMFS and FWS in December 2000. This 2001 Operations Plan provides a framework for development of a Water Management Plan for operation of the FCRPS in consideration of these biological opinions.

Objective: The plan is intended to outline an operation that will both meet the reliability criteria in the Federal Agencies Criteria and Priorities (Appendix A) while making best efforts to minimize adverse impacts to fish.

II. Background

A. West Coast Power Market

The West Coast power market does not currently have sufficient generation and transmission infrastructure to meet demand. This is evidenced by the blackouts experienced in California and the increase in West Coast wholesale prices. The above average water conditions in recent years have insulated Northwest utilities from these effects. However, beginning in November of 2000, below average streamflows in the Northwest contributed to a sharp escalation in prices. This poor precipitation and streamflow pattern has continued through March resulting in one of the lowest runoffs in the 70-year record. The poor water conditions in the Northwest have exacerbated the West Coast's generation and transmission inadequacies resulting in wholesale electricity prices 10 times historical average.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
1997	16.25	10.02	11.15	12.73	15.78	11.00	11.69	16.97	19.73	17.89	18.26	19.83	15.11
1998	19.27	14.10	18.28	23.80	13.72	13.44	25.26	47.89	38.82	30.27	28.06	30.84	25.31
1999	18.02	18.03	16.16	24.20	26.25	23.39	24.48	29.91	31.78	44.81	31.41	26.59	26.25
2000	26.56	26.84	27.79	27.20	59.80	181.43	122.25	213.44	134.80	103.69	171.98	554.38	137.51

B. Northwest Water Supply

The first volume forecast in early January projected 80.4 MAF runoff at The Dalles. The forecast has continued to deteriorate, with the current forecasted runoff at The Dalles down to 56.1 MAF, which would be the second lowest runoff on record.

JANUARY-JULY 2001 RUNOFF VOLUME FORECASTS

	GCL		LWG		TDA	
Date (Forecast)	MAF	%	MAF	%	MAF	%
01/09 (Jan FF)	48.8	77	23.6	79	80.4	76
02/07 (Feb FF)	41.2	65	18.8	63	66.4	63
03/07 (Mar FF)	37.6	59	16.3	55	58.6	55
04/06 (Apr FF)	37.5	59	14.1	47	56.1	53

Source: NWS-RFC & USDA-NRCS
% = Percent of 1961-90 Normals
EB= Early Bird
FF= Final
MM= Mid-month

C. Actions by BPA to avoid emergencies

In mid-December, the Federal Agencies recognized that below average conditions were likely to persist through January. Under such conditions, BPA would not have sufficient hydro resources to meet its load obligations. Historically in low water conditions, BPA has purchased upwards of 1200 MWs from California during the winter, in order to meet this shortfall. However, this winter California did not have sufficient resources to meet its own demand and market prices for power were 10 times the historical average limiting BPA's financial ability to secure sufficient resources.

Therefore, BPA pursued more creative ways of reducing load obligations and increasing supply. A summary of the measures undertaken by BPA to reduce potential power supply deficits and avoid or reduce declarations of emergencies follows:

- Energy Exchanges with California—2 for 1 exchanges provided BPA with additional 500 mw-mo of energy.
- Acquisition of Power from Industries—BPA secured over 2300 mw-mo of load reduction at a cost of more than $500 million.
- Acquisition of Market Energy—Secured several hundred mw-mos of market energy.
- Acquisition of irrigation load—Secured approximately 600 mw-mo of irrigation load.
- Conservation of Energy-Expedited the implementation of conservation credit.
- Oregon and Washington Calls for Conservation—Assisted governors in call for 10% reduction in consumption.
- Sold any surplus generation resulting from chum and Vernita Bar operations to reduce probability of future power emergencies.

D. Winter Operations

Throughout the fall, the system was operated to provide spawning habitat for chum salmon below Bonneville dam. In early January, spawning was complete and a minimum flow was provided during incubation of the redds. The Biological Opinion (BiOp) recognized that under poor water conditions there will always be a trade-off between the fall chum operation and meeting refill targets; however, the Opinion leans toward abandoning the chum operation in favor of meeting refill. Given the power situation, in early January the Federal Agencies decided to pursue an operation that combined chum and power needs for mutual benefit. It was acknowledged that in the absence of the chum operation, levels equal to or higher than the minimum flow required for chum would be needed to meet federal load obligations. Despite this combined power and chum operation, BPA declared two multi-day power emergencies in January and February due to insufficient power on the wholesale market to meet federal load obligations.

E. 2000 NMFS BO and Allowance for Variations in Water Conditions and for Emergencies

In its BO issued on December 21, 2000,NMFS recommended a reasonable and prudent alternative (RPA) for avoiding jeopardy to listed salmonid species and adverse destruction or modification of their critical habitat. The Corps, Bureau, and BPA are relying on this and prior biological opinions as they make operational decisions in 2001.

The 2000 NMFS BO presents a long-term RPA for avoiding jeopardy that, combined with other improvements by others, are likely to ensure a high likelihood of survival and a moderate-to-high likelihood of recovery. To avoid jeopardy, the RPA requires satisfaction of performance standards. To satisfy the performance standards, the RPA requires development of one- and five-year implementation plans to define and revise particular measures for implementation. The implementation plans include water management plans to define how to operate the FCRPS to achieve applicable performance standards. The RPA then presents an initial set of measures and actions designed to meet the performance standards, subject to revision through the one- and five-year planning process. To ensure progress toward the performance standards, the RPA provides for midpoint reviews in 2003, 2005, and 2008.

Applicable performance standards may not be met in all years. The fifty-year historical record of water years shows a wide range of water conditions. Consequently, the NMFS BO recognizes that meeting flow objectives and refilling reservoirs "may not be possible every year, especially in low water years."

The NMFS BO anticipated that there could be circumstances when the power grid would require extraordinary support, and it allows for variations in case of unforeseeable power system, flood control, or other emergencies. Given current forecasts of volume runoff and power market prices, this year may turn out to have an extended period of such extraordinary circumstances. As demonstrated by actions taken to date, the Federal Agencies view emergency actions as a last resort and do not intend to use emergency declarations in place of long-term investments that would allow fish operations while maintaining other purposes, such as an adequate and reliable power system.

III. Water Supply Forecast

- The April Final Jan – July runoff forecast at The Dalles is 56.1 million acre feet (MAF), 53% of normal. There is a 50% likelihood of being above 56.1 MAF.
- There is a 95% likelihood of being above 42.5 MAF, 70% likelihood of reaching at least 51.8 MAF and 60% likelihood of reaching 54 MAF or higher.

April 2001 Final Runoff Volume Forecasts

Location	April Final	% of Normal April Final
	MAF	%
Grand Coulee (Apr-Jul)	32.90	60%
Lower Granite (Apr-Jul)	10.0	46%
The Dalles (Jan - Jul)	56.1	53%

IV. Emergency Criteria

This section quantifies the status of the FCRPS and BPA reserves relative to the Federal Agencies' power emergency criteria. 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 BPA reserves. Reserves are needed 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.

CRITERION 1: Near-Term Insufficiency

Two analyses are used to measure achievement of this criterion:

1. NWPPC reliability study: The results of the NWPPC reliability study show that under a 53.8 MAF condition, the Northwest region may suffer load curtailments even without any fish spill this spring and summer season unless water was borrowed from some future period.
2. BPA inventory analysis: Inventory analysis results presented in the table below reach a very similar conclusion in that BPA cannot meet firm load in the 52.6 MAF year without borrowing approximately 1100 MW-mo of storage from next year (2002).

However, in the 54.2 MAF condition, BPA can meet firm load. The combination of these two BPA scenarios is consistent with the Council analysis indicating that approximately 54 MAF is required to meet firm load.

The RFC April Final Forecast indicates a 40% probability of having an actual runoff of 54 MAF or less. If the Federal Agencies commit to spill based on a volume forecast that does not materialize, reservoirs will have to be drafted deeper than traditional end of summer reservoir elevations to meet load. This will affect 2001-02 winter reliability and could affect cultural resources, resident fish, and anadromous fish protection in 2002. Given these consequences, the Federal Agencies find this 40% probability too high to take management actions such as spill without taking forecast error into account. Therefore, the Federal Agencies propose a forecast error buffer that would reduce the probability of a 54 MAF condition to less than 25%.

The National Weather Service's River Forecast Center forecast procedure shows that in order to have no greater than a 25% chance of less than 54 MAF, the following final forecasts must be observed:

May:	58.5 MAF (54 MAF + 4.5 MAF Buffer)
June:	58 MAF (54 MAF + 4 MAF Buffer)
July:	57.5 MAF (54 MAF + 3.5 MAF Buffer)

SUMMARY RESULT: Actual volume of approximately 54 MAF is necessary to achieve the near-term sufficiency criterion. In addition, an allowance is needed in each of the final forecasts to ensure no greater than a 25% probability of being less than 54 MAF, which will be handled by using a forecast error buffer of 4.5 MAF in May, 4 MAF in June, 3.5 MAF in July.

CRITERION 2: Forecasted Insufficiency

Northwest Power Planning Council reliability analysis is used to measure achievement of this criterion. BPA's initial reliability analyses focused on near-term reliability through the current fiscal year (FY 2001). As the Northwest's volume runoff forecast deteriorated, regional attentions were drawn to the question of whether we could borrow water from next year to enhance conditions for this year. As part of that analysis, an understanding of FY 2002 reliability was needed. The results outlined below indicate that due to poor reliability conditions in the winter of 2001-02 there is no additional storage to borrow from next year. In fact, the analysis suggests that we should store water from this year in order to improve the reliability conditions for next winter.

The preliminary NWPPC reliability study concludes that there is a 20% probability of load loss this winter if the federal hydro projects start the next operating year at their traditional reservoir elevations. The NWPPC's revised studies better reflect the expected conditions of the Canadian reservoirs, which results in an increase in this probability to 26%. After running several sensitivities, the conclusion is that storing 1500 MW-mos into next year can reduce the loss of load probability to 20%. More importantly, the magnitude of the load misses is greatly diminished. Storing more than 1500 MW-mos has little impact on either the loss of load probability or the magnitude of load loss.

Additional Storage	Loss of Load Probability	Illustrative Feb Day-Avg Load Miss
0 MW-mos	26%	1825 aMW
750 MW-mos	22%	1250 aMW
1500 MW-mos	20%	350 aMW
2250 MW-mos	19%	300 aMW

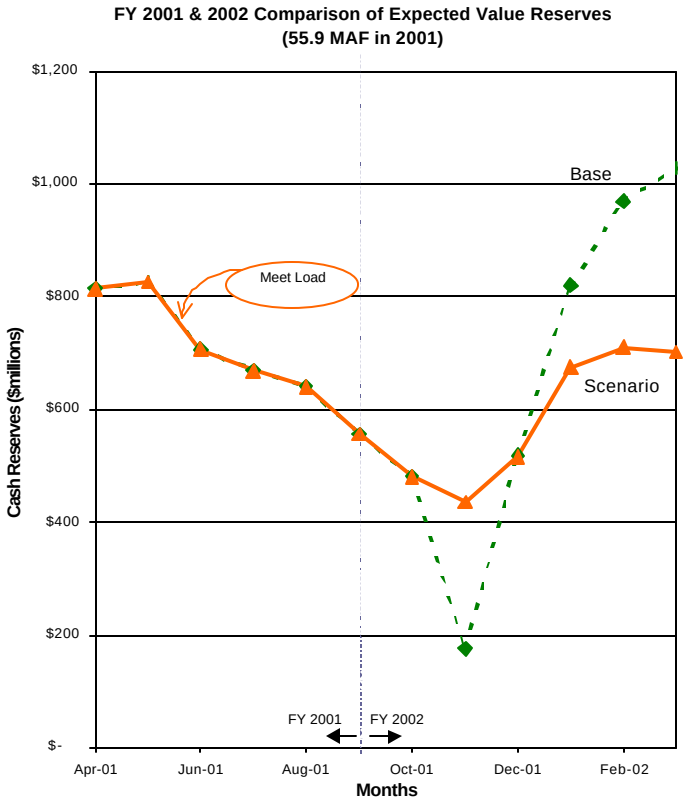
**more information on the NWPPC reliability study is included in Appendix B*

Consistent with the discussion in Criterion 3 below, there may be consideration given to purchase a portion of the 1500 mw-mo from extra-regional power sources rather than store the entire quantity. The amount purchased will depend on available cash reserves, extra-regional power availability, and wholesale power market prices, but is unlikely to be more than 400 MW-mo.

SUMMARY RESULT: 1500 mw-mos (approximately 1.5 MAF) of additional storage is necessary to maximize the reduction of the loss of load probability.

CRITERION 3: Insufficient Reserves

BPA cash flow analysis is used to measure achievement of this criterion. The latest cash flow analysis shows that with current runoff and market price projections, BPA achieves the goal of avoiding a greater than 20% chance of negative cash reserves in any of the next 12 months.



Cash Flow
(Probability of < $0 Reserves)

	Meet Load and Base Marketing	*Meet Load and Marketing Scenario*
Apr-01	0.0%	0.0%
May-01	0.0%	0.0%
Jun-01	0.0%	0.0%
Jul-01	3.9%	3.9%
Aug-01	5.5%	5.5%
Sep-01	6.6%	6.6%
Oct-01	7.4%	7.4%
Nov-01	13.7%	8.6%
Dec-01	7.6%	7.7%
Jan-02	4.0%	5.9%
Feb-02	7.2%	9.3%
Mar-02	11.0%	14.1%

FY2001 Ending Reserve Levels

(Probability of < $300M Reserves)

Sep-01	10.8%	10.8%

(Probability of < $650M Reserves)

Sep-01	52.0%	52.0%

Assumptions:
1. Cal ISO/PX don't pay anything due.
2. 4H10c credits applied monthly starting in Febru
3. Rate increase in Base is 248% for FY2002.
4. Rate increase in Scenario is 68% for FY2002.

If runoff and market prices projections remain in their current range some level of reserves might be available this year for expenditures such as:

- Implement offset actions.
- Secure extra-regional purchases to meet the 1500 MW-mo storage requirement and reduce the threshold for spill decisions.
- Secure extra-regional purchases for next winter in addition to the 1500 MW-mo of storage to further reduce next winter's loss of load probability.

SUMMARY RESULT: No additional reserves are necessary to achieve the insufficient reserve criterion.

ANALYSIS: Meeting All Three Criteria

The objective of the following analysis is to determine the conditions under which each of the three criteria are simultaneously met.

STEP 1:
The first step in this analysis is to determine what amount of water is needed to meet federal load obligations assuming minimal purchases. In this analysis, the system was operated to meet load and any water not needed to meet firm load obligations is stored in the system.

If available storage is 0 it means there is no water in excess of that required to meet load. If available storage is negative, the system would need to be drafted below target levels or purchases would be needed to meet load. As this table indicates, 54 MAF is the volume threshold upon which federal load obligations are met. The amount of available storage has an implied band of uncertainty due to load overrun/underrun, shape of the runoff or unplanned outages of large generators.

Summary of Meet Load Studies	
Jan-Jul Vol.	**Available Storage After Meeting Load (MW-mos)**
52.6 MAF	-1100
54.2 MAF	550
55.7 MAF	1200
57.5 MAF	3900
59.2 MAF	3350

**For detailed information about these studies, please see Appendix A*

In those conditions where volume exceeds what is needed to meet load, storage available can be used as follows:

- Store excess water to improve ability to meet Criterion 2
- Generate energy and revenue to build reserves and improve ability to meet Criterion 3
- Spill to improve fish passage and survival

STEP 2:
As stated in the threshold for Criterion 1, a forecast error buffer is added to the volume forecasts to minimize risk associated with the volume forecast error. The following table shows the result of adding the 4.5 MAF forecast error buffer for the May Final Forecast:

Available Storage Conclusions for May Final Forecast	
Adj. Jan-Jul Vol.	**Available Storage After Meeting Load (MW-mos)**
57.1 MAF	-1100
58.7 MAF	550
60.2 MAF	1200
62.0 MAF	3900
63.7 MAF	3350

The table confirms the earlier information that a May Final Volume Forecast of approximately 58.5 MAF is required to meet load and provide a less than 25% chance of having an actual volume of at least 54 MAF.

STEP 3:
As stated in the threshold for Criterion 2, 1500 MW-mos of the storage available after meeting load will be retained in the system to maintain reliability for Winter 2001-02. The following table shows the Resulting Fish Storage that may be used for spill after reducing the initial storage quantities by 1500 MW-mos:

Available Storage Conclusions	
Jan-Jul Vol.	**Available Storage After Load and Reliability (MW-mos)**
57.1 MAF	-2600
58.7 MAF	-950
60.2 MAF	-300
62.0 MAF	2400
63.7 MAF	1850

As the table indicates, a May final volume forecast of approximately 60 MAF is required to meet load and store sufficient volume to maintain reliability for next winter.

CONCLUSION

CRITERIA	FORECAST REQUIRED	ASSUMPTIONS
Criterion 1: Near-Term Insufficiency (< 25% Probability of < 54 MAF)	May-----58. 5 MAF June-----58 MAF July------57.5 MAF Actual---54 MAF	May----4.5 MAF Buffer June----4 MAF Buffer Jul------3.5 MAF Buffer Actual--54 MAF
Criterion 2: Long-Term Insufficiency (< 5% Loss of Load Probability)	1.5 MAF*	1.5 MAF is used as a proxy for the 1500 MW-mo of storage needed.
Criterion 3: Insufficiency Due to Inadequate Reserves (< 20% Probability of $0 Reserves)	0 MAF	
TO MEET ALL CRITERIA	**MAY—------60 MAF** **JUNE—-----59.5 MAF** **JULY—-----59 MAF** **ACTUAL--55.5 MAF**	

*1.5 MAF is used as a proxy for the 1500 MW-mo of storage needed for reliability purposes. Depending on the location and shape of the volume, the MAF requirement to provide the MW-mo could change.

As stated previously, the amount of storage available for each volume has an implied band of uncertainty due to load overrun/underrun, shape of the runoff or unplanned outages of large generators. For that reason, the analysis included in the previous sections will be updated with new data upon receipt of new Final Volume Forecasts.

V. Spring Operations (April-June)

A. Spring Spill for Fish Passage

The NMFS 2000 BiOp calls for spill to be implemented at all three Snake River collector projects *"when seasonal average flows are projected to meet or exceed 85 kcfs."* Since current water supply forecasts and flow models indicate that the 85 kcfs seasonal average is unlikely to be met in Spring 2001, no spill is planned at the three Snake River collector dams.

Depending upon volume forecasts, the Federal Agencies will evaluate available storage in the hydropower system this year that may be available for spring spill at the Lower Columbia dams. The decision process for spring spill is illustrated in Figure 1. For each decision point, three illustrative levels of spring spill are allocated among lower Columbia River hydropower projects as outlined in Table 1 below, based on: a) the

project spill priority list below; b) the passage timing data displayed in Figures X and Y; and c) three illustrative levels of available storage 450 MW-months, 800 MW-months, and 1200 MW-months.

Available spill will be allocated to the following dams in order of priority:

1. The Dalles - This project has the lowest calculated survival rate of the lower Columbia River projects. Turbine intakes for this project are not screened. and turbine survival rates are quite low at this project.

2. Bonneville - This project has the second lowest calculated survival rate of the lower Columbia River projects. Juvenile guidance at this project is poor, which results in a high rate of turbine passage at this project.

3. John Day - This project has the second highest survival rate of the lower Columbia River projects. Standard length screens at this project are moderately effective at providing yearling migrants a route of non-turbine passage route.

4. McNary - This project has the highest calculated survival rate of the lower Columbia River projects. Extended length screens at this project are very effective in providing yearling migrants a route of non-turbine passage. Transportation is also an option from this project.

5. Ice Harbor - Few fish remain in the lower Snake River due to the collection and transportation of fish from the upper three projects.

Figure 1

PROPOSED DECISION PROCESS FOR 2001 SPILL OPERATIONS

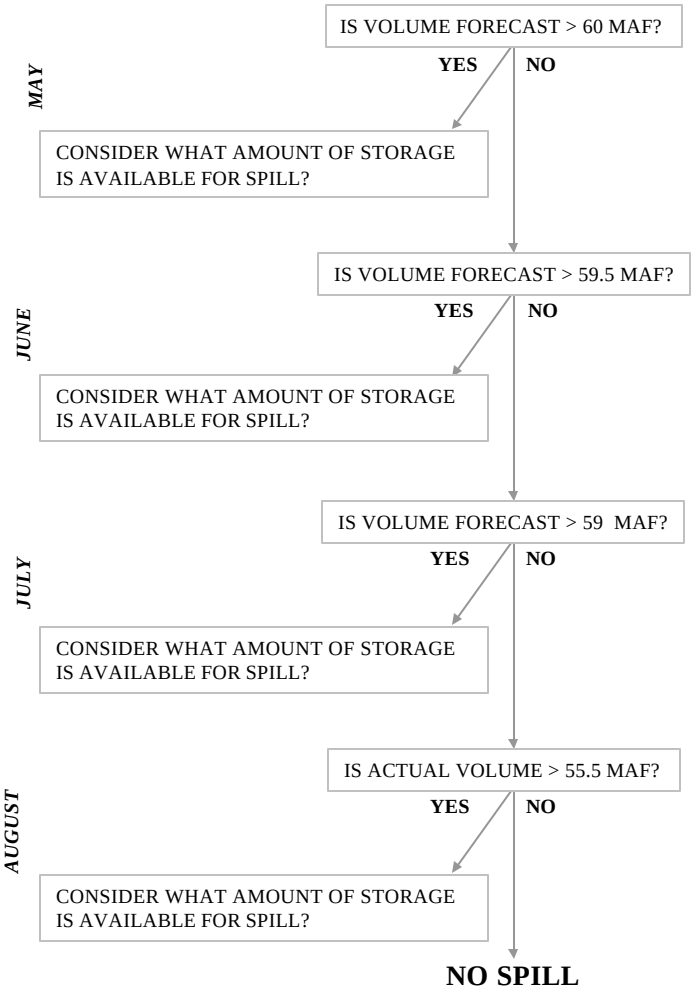


Table 1. Spill Levels Provided Under 3 Levels of Flexible Fish Storage

NOTE: This table represents where spill would be allocated and rough estimations of the levels of targeted spill given the MW-Months provided. Projects and dates of spill are flexible.

Decision Date*	**Spill Level Provided**		
May Decision	**450 mw-mos (May 1-31)**	**800 mw-mos (May 1-June 7)**	**1200 mw-mos (Apr 24-June 7)**
1. The Dalles	30% for 24 hours	40% for 24 hours	40% for 24 hours
2. Bonneville	50 Kcfs for 24 hours	75 Kcfs (day)/ 90 Kcfs (nite)	75 Kcfs (day)/ 90 Kcfs (nite)
3. John Day	0	0	30% for 12 hours at night
4. McNary	0	0	0
5. Ice Harbor	0	0	0
June Decision	**400 mw-mos (June 1-30)**	**800 mw-mos (June 1-30)**	**1200 mw-mos (June 1-30)**
1. The Dalles	30% for 24 hours	40%, 24 h/d	40%, 24 h/d
2. Bonneville	50 Kcfs for 24 hours	50/50k	75/120k
3. John Day	--	--	40%, 12 h/d
4. McNary	--	--	--
5. Ice Harbor	--	--	35k, 24 h/d
July Decision	**400 mw-mos (July 7-Aug 7)**	**800 mw-mos (July 7-Aug 7)**	**1200 mw-mos (July 7-Aug 7)**
1. The Dalles	40%, 24 h/d	40%, 24 h/d	40%, 24 h/d
2. John Day	30%, 12 h/d	30%, 12 h/d	40%, 12 h/d
3. Bonneville	--	50/50k	75/120k
4. McNary	--	--	--
5. Ice Harbor	--	--	35k, 24 h/d
6. Dworshak Spill for Flow Aug	Remaining mw-mos	Remaining mw-mos	Remaining mw-mos
August Decision	**400 mw-mos (Aug 1-31)**	**800 mw-mos (Aug 1-15)**	**1200 mw-mos (Aug 1-31)**
1. The Dalles	40%, 24 h/d	40%, 24 h/d	40%, 24 h/d
2. John Day	30%, 12 h/d	30%, 12 h/d	40%, 12 h/d
3. Bonneville	--	75k, 24 h/d	75/120, 24 h/d
4. McNary	--	--	--
5. Ice Harbor	--	--	35k, 24 h/d
6. Dworshak Spill for Flow Aug	Remaining mw-mos	Remaining mw-mos	Remaining mw-mos

**Table assumes No Spill occurs in months prior to the Decision Date.*
Spill, at those projects where it occurs, will be managed to the level of 120% TDG in tailraces and 115% in the forebays of the next project downstream, where variances to the 110% standard are in effect.

B. Spring Transport Operations

1. McNary Transport

Based on the anticipated reductions in spill and expected low river flows at lower Columbia River dams creating adverse inriver passage conditions in that reach, the Federal Agencies will implement a program of collection and transportation of spring migrants at McNary Dam.

In addition, the biological benefits of transporting Upper Columbia spring migrants from McNary Dam will be evaluated in 2001. Under these special circumstances in 2001, up to 50% of spring migrants arriving at McNary Dam would be collected and transported to release sites below Bonneville Dam.

The proportion of the bypass-routed fish to be transported from McNary will be determined by the need to keep a certain proportion of the mid-Columbia PIT-tagged fish in-river to ensure adequate downstream detections for the PUDs' comparative survival studies and the availability of space in the barges coming from the Snake River.

2. Snake River Transport

Spring transport from Snake River projects commenced on March 27, 2001. The benefit of transporting spring migrants from the Snake River has been well demonstrated (NMFS 2000 Transport White Paper). All Snake River juvenile fish collected will be transported to below Bonneville Dam in 2001 due to the expected low flows and adverse inriver passage conditions (NMFS 2000 BiOp Action 40, page 9-76).

C. Spring Flow Objectives at Lower Granite and McNary

Flows lower than the objectives will occur most weeks during the migration due to the extremely low hydrologic conditions and the need to refill headwater storage projects to their minimum elevation targets. Average spring flows at Lower Granite Dam on the Snake River are estimated to be 50-55 Kcfs this year, and average flows at McNary Dam on the Columbia River are expected to be 140-145 Kcfs.

D. Lower Granite Surging Operation

During late April and May, the Federal Agencies are proposing to conduct a Lower Granite pool surging operation which, when combined with a limited spring flow augmentation using Brownlee and/or Dworshak storage, is anticipated to help move juveniles through the Lower Granite pool, as well as the other Lower Snake pools, to the collection facilities for transportation. The pool surging and refill operation using Brownlee or Dworshak would occur for up to 4 weeks during the spring migration and would be monitored and evaluated for biological effects. The Federal Agencies have approached IPC and they have indicated they will operate for power purposes unless otherwise compensated. The use of Brownlee to support this operation is still an issue under discussion and has yet to be resolved.

E. Spring Flow Objective for the Mid-Columbia River

The recommended average flow objective in the NMFS 2000 BiOp at Priest Rapids is 135 kcfs during the April 10 through June 30 period. Any flexibility to shape spring flows that is available after meeting load will be guided by the following considerations: a) the desire to refill Grand Coulee reservoir to a minimum elevation of 1285 feet by June 30th; b) the timing and magnitude of the juvenile migration; c) water temperature, spill and total dissolved gas levels; d) adult fish; e) other requirements for improved survival of listed fish; and f) power system reliability requirements. Flows lower than the objective will occur most weeks during the migration due to the extremely low hydrologic conditions and the need to refill headwater storage projects to their minimum elevation targets. Average spring flows at Priest Rapids Dam are estimated to be __ Kcfs this year.

F. Spring Bull Trout Minimum Flow Requirements

The Federal Agencies will endeavor to maintain minimum discharges at Hungry Horse and Libby as called for in the USFWS 2000 Biological Opinion for bull trout protection and habitat productivity.

G. Vernita Bar Flows

Given current conditions, BPA and NMFS propose to maintain Vernita Bar protection level flows of at least 65 Kcfs through April 30. However, the Federal Agencies want to preserve the option of having the flexibility to reduce the Vernita Bar minimum protection flow level if a) runoff or meteorological conditions warrant such a reduction; and b) a significant volume of water could be stored in Grand Coulee as a result. Increased refill of Grand Coulee could provide additional water for subsequent flow augmentation or spill operations for listed salmon and steelhead.

G. MOP

Beginning April 12, as coordinated through TMT on April 11, Little Goose and Lower Monumental reservoirs in the lower Snake River will be operated within one foot of the minimum operating pool (MOP) until small numbers of juvenile fish are present and adult fall chinook salmon begin entering the lower Snake River (in late August). Lower Granite and Ice Harbor pools will be operated one foot above MOP this year to maintain navigation through both reservoirs.

In the lower Columbia River, John Day reservoir will be operated within a 1.5 foot range of the minimum level that provides irrigation pumping from an April 10 planning date through September. Projects may operate outside of pool restrictions if there are capacity constraints on the power system.

H. Spring Reservoir Operations

The proposed minimum elevation refill targets by June 30th in order of project priority are:

Headwater Storage Project Priority	Targeted Elevation	Probability of Achieving (4/10 Estimate)	Reason for Priority
1. Dworshak	1580*	69%	• Temperature Control in Snake River • Snake River Summer Flow Augmentation
2. Libby	2439	40%	• Columbia River Summer Flow Augmentation • Minimum Flow Requirements for Bull Trout
3. Hungry Horse	3540	22%	• Columbia River Summer Flow Augmentation • Minimum Flow Requirements for Bull Trout
Run of River Storage Project Priority	**Targeted Elevation**	**Probability of Achieving (4/10 Estimate)**	**Reason for Priority**
Grand Coulee	1280	N/A	• Columbia River Summer Flow Augmentation • Tribal Trust Responsibilities

Due to the low level of storage in headwater storage projects this spring, the FCRPS will be operated to fill storage reservoirs to less than full pool reservoir elevations by June 30th. The probabilities of reaching minimum elevation targets will be reviewed and updated with each new runoff forecast and expected operations.

1. Dworshak Operations

Refill of Dworshak to 1580 has been a top priority. However, given low flows in the Snake River this spring, the Federal Agencies are considering a surging operation to help move juveniles through Lower Granite Pool. Although Federal Agencies would prefer to use Brownlee to assist in this operation, IPC has indicated they are not willing to operate consistent with the needs of the surging operation. Therefore, the Federal Agencies are considering use of Dworshak for this operation. The Federal Agencies are seeking input on this through the Regional Forum Process.

2. Grand Coulee Operations

Grand Coulee will be operated to achieve elevations in May that allow sufficient irrigation deliveries to the Columbia Basin Project without drawing Banks Lake below elevation 1565 feet.

VI. Summer Operations (July-August)

A. Summer Spill for Fish Passage

As stated above, spill at non-collector dams is a high priority, with spill provided at the following dams in order of priority:

1. The Dalles - This project has the poorest subyearling passage survival rate of the lower Columbia River projects. Turbine intakes for this project are not screened. and turbine survival rates are quite low at this project.

2. John Day - This project has the second poorest subyearling passage survival rate of the lower Columbia River projects. Standard length screens at this project are not very effective at guiding subyearling migrants. Spill at this project is effective at moving a good percentage of juveniles.

3. Bonneville - This project has the second highest subyearling passage survival rate of the lower Columbia River projects. Standard length screens at this project are not very effective at guiding subyearling migrants. However, minimum spill requirement at this project is slightly higher than John Day's requirement, given this year's flow forecast.

4. McNary - This project has the highest subyearling passage survival rate of the lower Columbia River projects. Extended length screens at this project are moderately effective in providing subyearling migrants a route of non-turbine passage. Transportation is also an option from this project.

5. Ice Harbor - Few fish remain in the lower Snake River due to the collection and transportation of fish from the upper three projects.

Depending upon volume forecasts, the Federal Agencies will evaluate available storage in the hydropower system that may be available for summer spill. The decision process for summer spill is illustrated in Figure 1. For each decision point, three illustrative levels of summer spill are allocated among lower Columbia River hydropower projects as outlined in Table 1 above, based on: a) the project spill priority list above; b) the passage timing data; and c) three illustrative levels of available storage -- 450 MW-months, 800 MW-months and 1200 MW-months.

B. Summer Transport Operations

To improve overall juvenile fish survival through the FCRPS, all juvenile fish collected will be transported from the three Snake River and McNary collector dams. This transport operation is consistent with actions 42-44 in the NMFS 2000 BiOp. The summer transport strategy is to maximize collection and transportation due to low inriver survival rates.

C. Summer Flow Objective at Lower Granite and McNary

Flows lower than the objectives will occur most weeks during the summer migration due to the extremely low hydrologic conditions and the fact that some storage projects will not refill. Average summer flows at Lower Granite Dam on the Snake River are projected to be about 30 Kcfs this year, and average flows at McNary Dam on the Columbia River are expected to be 105 Kcfs.

Storage in Dworshak Reservoir and the use of its selective withdrawal facilities provides both flow and temperature control for Snake River subyearling chinook. Dworshak will begin drafting in late June or early July when water temperatures at Lower Granite forebay approach the state water quality standard of 68 degrees F.

D. Summer Bull Trout Minimum Flow Requirements

The Federal Agencies will endeavor to maintain minimum discharges at Hungry Horse and Libby as called for in the USFWS 2000 Biological Opinion for bull trout protection and productivity. However, as the season progresses, consideration may be given to reducing the bull trout minimums at Libby Dam to 4,000 cfs in favor of meeting refill objectives.

E. Summer Reservoir Operations

1. Storage Reservoir Operations

Generally, federal storage projects will be drafted to the following 2000 BiOp elevations by August 31 for summer flow augmentation: Dworshak to 1520 feet; Libby to 2439 feet or as needed for minimum flows for bull trout; Hungry Horse to 3540 feet or as needed for minimum flows for bull trout; and Grand Coulee to 1278 feet and Banks Lake to elevation 1565 feet. These levels may be modified as necessary to store additional water that is needed to achieve the forecasted insufficiency criterion.

2. Upper Snake Reservoir Operation

Less than 60 kaf is currently available for flow augmentation from firm BOR sources above Lower Granite Dam. There is a possibility that an additional 50 kaf will become available for flow augmentation from BOR projects in Idaho during 2001. In addition, Idaho Power Company (IPC) has acquired energy associated with an estimated 109 kaf of diversion that is considered a cumulative effect of irrigation/power actions. Delivery of water from BOR sources will be managed through the TMT process. With respect to the

delivery of augmentation water below IPC's Hells Canyon Complex, this is still an issue under discussion and has yet to be resolved.

3. Brownlee Operation

The Federal Agencies have approached IPC on potential shaping operations. They have indicated they will operate for power purposes unless otherwise compensated. This is still an issue under discussion and has yet to be resolved.

VII. Other Operations

A. Fish Facility Operations

Operate all juvenile and adult fish passage facilities to criteria agreed to in the 2001 Fish Passage Plan. Operating fish facilities within their criteria will ensure adequate juvenile and adult fish passage conditions at all mainstem dams on the Snake and Columbia rivers.

B. Water Quality – Temperature and Total Dissolved Gas

Continually monitor water temperature and total dissolved gas levels in the Snake and Columbia rivers. Consider operational effects on water quality fish passage.

C. Treaty Fishery Operations

Regarding stable pool elevations during Zone 6 fishing, the US COE has agreed to operate the Bonneville project forebay near the top one and one half feet of the operating range, while maintaining some operational flexibility in the other Zone 6 pools to meet other project needs.

D. Research, Monitoring, and Evaluation

2001 presents an important opportunity to learn as much as possible about juvenile and adult fish passage behavior and survival in a low water year. Various research and monitoring evaluations have been designed to evaluate the biological effects of 2001 migration conditions.

VIII. Updates/Process

A. Connection to Water Management Plan, TMT Guidelines

The "Federal Agencies Criteria and Priorities for 2001 FCRPS Operations" serves as the overarching framework to this more detailed 2001 Operational Plan. Through defining the parameters within which operations must fall this year, the 2001 Operational Plan will then provide guidance to the Technical Management Team (TMT) for its development of the 2001 Water Management Plan. The Water Management Plan will be more detailed

and will be adapted in season to meet the needs of fish migration, power, and changing water conditions within the parameters set by the 2001 Operations Plan.

B. Coordination on Updates

The financial and reliability analyses that drive the operational parameters will be updated on a regular basis throughout the migration season. If results of revised analyses warrant a change to the operational parameters, the 2001 Operations Plan will be updated to reflect such changes.

The Federal Agencies may update the 2001 Operations Plan throughout the season if the Federal Executives recommend changes in the operating priorities. The Federal Agencies may update the Emergency Criteria of the Operations Plan when changes in priorities or conditions warrant update of the technical input. Meetings will be convened on an as needed basis.

C. In-Season Decision Making

In-season decision making on real-time implementation of the Water Management Plan will remain the responsibility of the TMT. As the Federal Executives are more active in the decision making process in 2001, the TMT in-season schedule should adapt to the Executives' schedule. Using the Columbia River Regional Forum decision making construct, the Federal Executives are the final dispute resolution body during 2001. To meet this schedule, the TMT should meet on Wednesday morning during the same week as scheduled Federal Executive meetings. Therefore if dispute resolution from TMT is needed, the IT may convene on Thursday, and the Executives will be available Friday.

Appendix A

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:

4. 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.
5. 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.
6. 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/emerprotocl0922.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 1½ foot 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.)

Appendix B--Study Assumptions for BPA Analysis

To do these studies, BPA's 90-Day model was used with five different streamflow traces ranging from a January-July volume at The Dalles of 52.6 MAF to 59.2 MAF, with a mean of 55.9 MAF. Note that these studies run through September, so the fact that the 57.5 MAF case has more Flexible Storage than the 59.2 MAF case is due to differences in August-September streamflows. All federal hydro projects were initialized to their April 1 elevations and were operated according to the assumptions discussed in the Appendix. Furthermore, no fish spill was assumed in these studies and the federal hydro projects achieved their BiOp elevations by the end of the Summer.

- Study assumptions
  - Projects initialized to their April 1 elevations
  - Maintain Vernita Bar through May 7 (forced surplus for 1 week in the 57.5 MAF year)
  - No fish spill (but includes sluiceway spill)
  - No additional water or load loss due to irrigation buyouts.
  - LIB: 4 kcfs through June
    6 kcfs min in July-Aug or higher to achieve 2439' by end of August
    4 kcfs min in Sep or higher to achieve 2432' by end of September
  - HGH: min (.4 kcfs) or C Falls min (3.2 kcfs)
    Run harder in July-Aug if we can reach 3540' by end of August
  - DWR: min until July 1 or until 1580' is reached (keep filling if GCL gets full)
    July: run 10 kcfs until 1520' is reached, then run at min
  - Arrow: maintain trout spawning flow of 30 kcfs through June. Pick up flows mid-May if GCL needs the water, but stay above TSR elevation
    Operate to TSR or higher elevation July-Sep (this is where water is stored for Flexible Storage)
  - BRN: Pass-inflow through June (2075')
    July: draft to 2064'; Aug: draft to 2045'; Sep: draft to 2040'
  - Mica: TSR for each ESP flow
  - Dun: TSR for each ESP flow
  - Koot: Fill to 1745.3' by June (try to maintain 20 kcfs May-Aug)
    Evenly draft to 1743.3 by end of August
    Pass-inflow in Sep
  - Kerr: Min until full (2893'), then pass-inflow
  - GCL: Operate as necessary to meet load and Vernita Bar while trying to achieve at least 1280' sometime in July
    End September at 1283'

Appendix C—Additional Information from the NWPPC Reliability Study

Study Assumptions

- Loads and purchase quantities/prices consistent with previous NWPPC analysis
- Previous studies indicated risk of September problems, which required further drafts from storage. This study was initialized on October 1 and assumed no additional drafts were required in September. This will be looked into further
- DSI load assumption generally consistent with the BPA's rate mitigation proposal
- 0% load growth assumed for Oct-Dec 2001
- 2% load growth assumed for Jan-Mar 2002 (relative to 2000)
- run for 500 simulations, with Dec through March run daily with 4 demand sub-periods each day
- Temperature years were sampled randomly from the 1929-2000 historical record.
- Water years were sampled randomly from your specified water year set.
- Stochastic treatment of thermal forced outage was used in these studies.

Appendix D

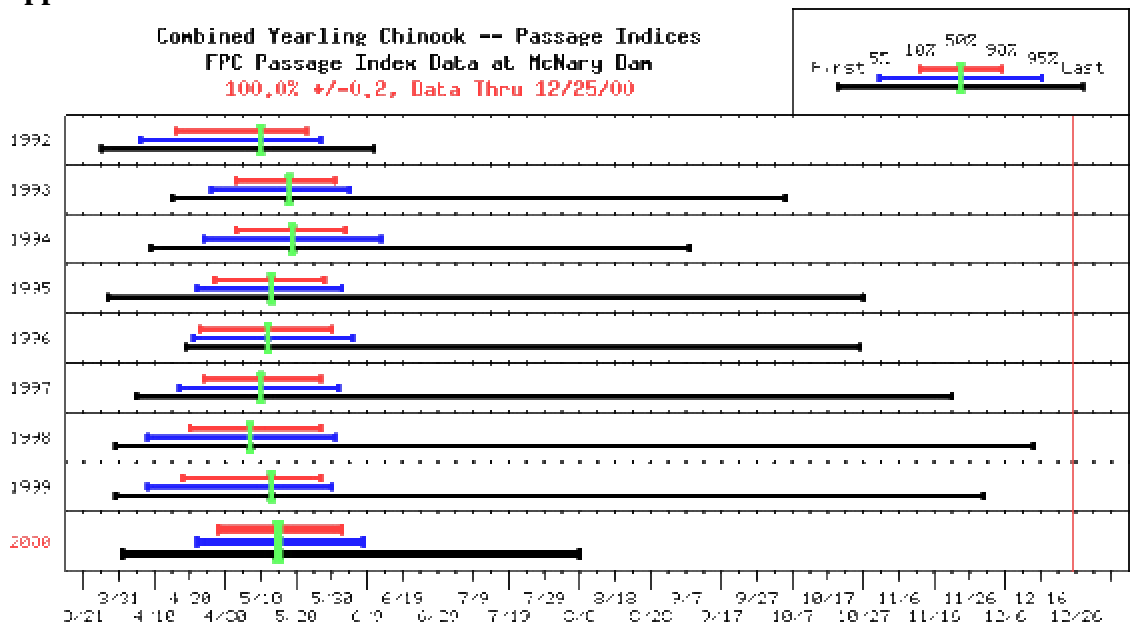


Figure 1. Combined Yearling Chinook -- Passage Indices Outmigration Timing Characteristics

FPC Passage Index Data at McNary Dam

	---------- Passage Dates ----------							
Year	First	1%	5%	10%	50%	90%	95%	Last
1992	03/26	04/04	04/06	04/16	05/10	05/23	05/27	06/11
1993	04/15	04/18	04/26	05/03	05/18	05/31	06/04	10/05
1994	04/09	04/13	04/24	05/03	05/19	06/03	06/13	09/08
1995	03/28	04/08	04/22	04/27	05/13	05/28	06/02	10/27
1996	04/19	04/19	04/21	04/23	05/12	05/30	06/05	10/26
1997	04/05	04/06	04/17	04/24	05/10	05/27	06/01	11/21
1998	03/30	04/05	04/08	04/20	05/07	05/27	05/31	12/14
1999	03/30	04/05	04/08	04/18	05/13	05/27	05/30	11/30
2000(1)	04/01	04/10	04/22	04/28	05/15	06/02	06/08	08/08
Mean(2)	04/04	04/10	04/16	04/24	05/13	05/28	06/03	10/15

Year	Middle 80% Duration (3)	Total MCN Passage
1992	38	2514319
1993	29	1729010
1994	32	2572338
1995	32	2879069
1996	38	1240878
1997	34	1184530
1998	38	1727071
1999	40	3692944
2000(1)	36	1986380

(1) Current year 2000 passage dates and durations are predicted by the Realtime Forecaster; yearly totals are to date.

(2) Mean of historical years.

(3) Duration of middle 80% of run in days.

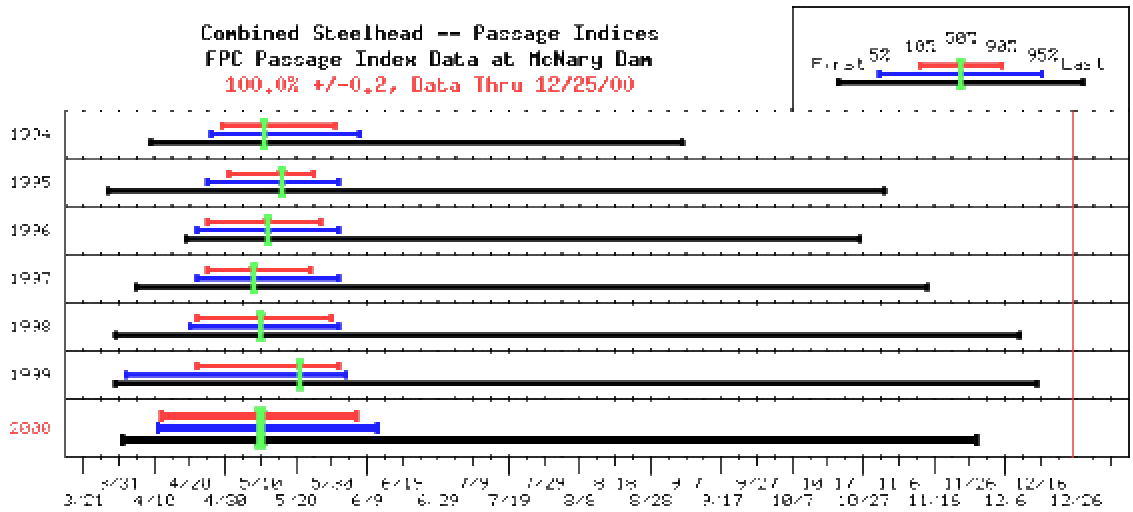


Figure 2. Combined Steelhead -- Passage Indices Outmigration Timing Characteristics FPC Passage Index Data at McNary Dam

	---------- Passage Dates ----------							
Year	First	1%	5%	10%	50%	90%	95%	Last
1994	04/09	04/19	04/26	04/29	05/11	05/31	06/07	09/06
1995	03/28	04/05	04/25	05/01	05/16	05/25	06/01	11/02
1996	04/19	04/20	04/22	04/25	05/12	05/27	06/01	10/26
1997	04/05	04/19	04/22	04/25	05/08	05/24	06/01	11/14
1998	03/30	04/16	04/20	04/22	05/10	05/30	06/01	12/10
1999	03/30	03/30	04/02	04/22	05/21	06/01	06/03	12/15
2000(1)	04/01	04/09	04/11	04/12	05/10	06/06	06/12	11/28
Mean(2)	04/04	04/13	04/19	04/26	05/13	05/28	06/02	11/07

	Middle 80% Duration	Total MCN
Year	(3)	Passage
1994	33	106520
1995	25	734878
1996	33	792462
1997	30	1234024
1998	39	571119
1999	41	1004348
2000(1)	56	617482

(1) Current year 2000 passage dates and durations are predicted by the Realtime Forecaster; yearly totals are to date.
(2) Mean of historical years.
(3) Duration of middle 80% of run in days.