Summary of Hydrosystem Operations as specified in the FCRPS 2000 Biological Opinion
Prepared by the Council's Legal Division -- July 24, 2001

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FCRPS 2000 Biological Opinion -- Hydro Measures

Seven major strategies

There are seven major strategies for hydrosystem operation in the 2000 BiOp to achieve the objectives of listed fish recovery:

1. **Water management --** manage natural flows and system storage to meet established salmon flow and survival objectives:
   - in-season management for operational flexibility and best use of available water volumes
   - spring and summer flow objectives at Lower Granite, Priest Rapids, McNary and Bonneville dams
   - guidance on reservoir elevations in early spring, refill of FCRPS storage projects by June 30, and specified draft limits at the end of the summer augmentation season
   - shifts of flood control storage among projects.
   - implementation of VARQ flood control operations at Libby and Hungry Horse reservoirs
   - evaluate effectiveness of providing additional water from Dworshak reservoir in September for adult fish passage and water quality
   - additional drafts for summer flows from Grand Coulee and Banks Lake
   - additional water from other sources (e.g., non-Treaty storage) plus a review of system flood control objectives and possible changes
   - coordination with Canadian parties for additional water releases from Canadian projects
   - continued research on summer-migrating Snake River fall chinook salmon population losses

2. **Improve juvenile fish passage survival --** actions prescribed for further improving juvenile passage survival through the hydrosystem:
   - reduce reliance on transporting summer juveniles by truck and continued extension of the barging season
   - increase spillway passage by using gas abatement and longer spill hours to allow increased spill volumes, spill pattern refinements and evaluation of removable spillway weirs to improve spill efficiency and water quality
   - evaluate 24 hr. spill at Little Goose, Lower Granite and John Day, and evaluate higher daytime spill levels at Bonneville after deflector optimization
   - transmission system upgrades to increase spill capability
   - improvements in fish passage system operations and reliability
   - increase screen and bypass system effectiveness through implementation of extended screens, new and relocated bypass outfalls, and improved hydraulic conditions
   - evaluate extended-length screens at Lower Monumental and John Day
   - develop less intrusive PIT-tag detection methods in bypass systems to avoid dewatering and separation at McNary, Ice Harbor and John Day

2. **Improve juvenile fish passage survival (cont'd)**
   - evaluate McNary bypass system, including outfall relocation; also potential outfall relocation at Lower Monumental
   - upgrade Bonneville 1 bypass system and outfall relocation.
   - fast-track development and prototype testing of surface bypass technology, with implementation as appropriate
   - evaluate removable spillway weirs (RSW) at Lower Granite, John Day, McNary, Ice Harbor, Lower Monumental and Little Goose; Bonneville 2 surface bypass corner collector with high-flow outfall; and Bonneville 1 powerhouse surface collection.
   - improve turbine designs; evaluate effects of draft tubes and tailraces on survival; remove unnecessary obstructions; index testing and operating guidelines
   - spillway research to identify other potential survival and fish passage improvements

3. **Improve juvenile reservoir survival --** actions to identify and address mortality in reservoirs to increase inriver survival of downstream migrants, including:
   - increase flow augmentation for summer migrants, particularly in low water years
   - manage reservoir and run-of-river projects to reduce extreme water level fluctuations
   - improve management of predator populations, including fishes, birds and mammals
   - research on the effect of passage delay at dams and the relationship between dam passage and reservoir mortality

4. **Improve adult passage survival --** passage improvements are expected to reduce the direct and pre-spawning mortality of upstream migrating adult salmon:
   - develop actions to reduce fallback through turbines and over spillways
   - increase adult facility reliability and the ability to maintain operating criteria
   - investigate measures to protect steelhead kelts
   - investigate to identify/correct passage delays and evaluate pre-spawning mortality
   - develop means for timely adult egress from the McNary and Ice Harbor juvenile bypass systems

5. **Improve water quality --** water quality is vital to overall health of the aquatic ecosystem and survival of listed anadromous fish, especially management of total dissolved gas and water temperature while working toward attainment of water quality standards:
   - structural and operational modifications at spillways, including spillway flow deflectors and improved spill patterns, to reduce TDG levels
   - spillway deflector optimization programs called for at John Day, McNary, Lower Monumental, Little Goose and Bonneville dams
   - develop alternative fish passage measures, such as surface bypass, to help reduce spill volumes and total dissolved gas
   - release cool water in the summer from storage projects, e.g., Dworshak Reservoir for water temperature control in the lower Snake River

- special powerhouse operations to reduce temperature in fish facilities, e.g., McNary Dam

6. **Resolve critical uncertainties --** critical uncertainties relate primarily to hypothesis of delayed mortality due to effects of hydrosystem passage:
   - investigate delayed mortality of transported juvenile migrants (the "D-value," when expressed relative to survival of non-transported migrants below Bonneville Dam)
   - investigate delayed mortality of inriver juvenile migrants (known as "extra mortality")
   - investigate delayed mortality and/or passage effects on adults, enhance effort to enumerate unaccountable losses, including actions to reduce unaccounted losses and unsuccessful spawning
   - investigate estuarine and near ocean survival, e.g., differential timing, distribution and use of ESUs in the estuary and ocean may help explain mortality otherwise attributed to hydrosystem.

7. **Enhance operation and maintenance of fish passage facilities --** properly operated and maintained juvenile and adult fish passage facilities are essential to improving passage survival; suggested improvements include:
   - develop adequate annual o&m budgets for fish facilities and an expanded fish barging program through flexible one- and five-year planning process
   - improve preventive maintenance planning and daily operation of fish passage facilities by measures to exclude debris and operating facilities within identified criteria
   - enhance reliability of fishways through redesign and replacement of aging facilities and backup auxiliary water capabilities
   - modify fishway hydraulics to reduce fallback at ladder junction pools
   - evaluate adult counting station facilities and improve as needed

Water management strategies

The federal operating agencies are to operate FCRPS dams and reservoirs with the intent of meeting the flow objectives (see next page for details) on both a seasonal and weekly average basis for the benefit of migrating juvenile salmon. This flow management program emphasizes four strategies or general priorities:

1. **Limit the winter/spring drawdown of storage reservoirs to increase spring flows and the probability of reservoir refill.** Operate storage reservoirs to ensure a high probability of water surface elevations within one-half foot of the upper flood control rule curve by April 10 and to refill by June 30, except as specifically provided by the Technical Management Team. Meeting the spring flow objectives occasionally requires reservoir drafting, but the spring flow objectives are primarily met by limiting winter storage drafts and improving reservoir refill probabilities. This operation allows for a more natural spring hydrograph by passing spring runoff through the storage reservoirs.

2. **Draft from storage reservoirs during the summer to increase summer flows.** Draft storage reservoirs as necessary within specified limits in an attempt to meet the summer flow objectives and to provide colder water for the benefit of migrating juvenile salmonids. These operations also benefit adults in passage by moderating temperatures.

3. **Provide minimum flows in the fall and winter months to support mainstem spawning and incubation below Bonneville Dam.** The purpose of this strategy is to provide habitat for mainstem spawning and emergence for chum and fall chinook. It includes flows to protect redds from dewatering through fry emergence in the spring, to the extent possible without significantly impacting refill probabilities of FCRPS storage projects and spring flow objectives.

4. **Acquire water from non-FCRPS sources.** Bonneville and the Corps are directed to negotiate agreements that will provide water during the migration season. These agencies are also directed to negotiate storage volumes and shaping of flows with Canada. Reclamation is directed to conserve and seek to reduce water usage in its irrigation projects.

Flow objectives

Flow objectives are guidelines for in-season management; they are not intended to be hard constraints. NMFS has determined that natural flow variation is too great within the Columbia River basin to require inflexible targets.

Spring Flows at Lower Granite Dam. Based on the April final runoff volume forecast at Lower Granite Dam for April to July, spring flow objectives will be as follows:

- when the volume forecast is less than 16 maf (million acre feet), the flow objective will be 85 kcfs (thousand cubic feet per second)
- when the volume forecast is greater than 16 maf and less than or equal to 20 maf, the flow objective will be determined by a linear interpolation between 85 kcfs and 100 kcfs
- when the volume forecast is greater than 20 maf, the flow objective will be 100 kcfs

Summer Flows at Lower Granite Dam. Based on the June final runoff volume forecast at Lower Granite Dam for April to July, summer flow objectives will be as follows:

- when the volume forecast is less than 16 maf, the flow objective will be 50 kcfs
- when the volume forecast is greater than 16 maf and less than or equal to 28 maf, the flow objective will be determined by a linear interpolation between 50 kcfs and 55 kcfs
- when the volume forecast is greater than 28 maf, the flow objective will be 55 kcfs

Spring Flows at McNary Dam. Based on the April final runoff volume forecast at The Dalles Dam for April to August, spring flow objectives will be as follows:

- when the volume forecast is less than 80 maf, the flow objective will be 220 kcfs
- when the volume forecast is greater than 80 Maf and less than or equal to 92 Maf, the flow objective will be determined by a linear interpolation between 220 kcfs and 260 kcfs
- when the volume forecast is greater than 92 Maf, the flow objective will be 260 kcfs

Spring Flows at Priest Rapids Dam. The spring flow objective at Priest Rapids Dam is 135 kcfs.

Summer Flows at McNary Dam. The summer flow objective at McNary Dam will be 200 kcfs. If the numbers of juvenile fish migrating during late August decrease sharply, however, the Technical Management Team should consider preserving some of the flow augmentation water to support the fall spawning operation below Bonneville Dam.

Fall/winter flows below Bonneville Dam (from 11/1 to emergence). 125-160 kcfs, depending on forecasted and actual water conditions; maintain flows within 5 kcfs of established minimum during spawning.

Water management by project

Snake River Basin

Ice Harbor
Spill: 45 kcfs day (limited by needs of adult passage)
100 kcfs night (limited by TDG cap)
Reservoir levels: Apr-Aug: near minimum operating pool (MOP) for fish passage

Lower Monumental
Spring spill: 40 kcfs 24 hours/day (limited by TDG cap)
Reservoir levels: Apr-Aug: near MOP for fish passage

Little Goose
Spring spill: 45 kcfs 12 hours/day (limited by TDG cap)
Reservoir levels: Apr-Aug: near MOP for fish passage

Lower Granite
Spring spill: 60 kcfs 12 hours/day (limited by Total Dissolved Gas cap)
Reservoir levels: Apr-Aug: near MOP for fish passage
Flow targets: Apr3-Jun20: 85-100 kcfs
Jun21-Aug: 50-55 kcfs

Dworshak
Manage flows to maintain water temperatures at or below 68F at Lower Granite
Reservoir levels:
Aug: draft limit 1520'
evaluate draft to 1500' for impact of lowered temperatures on returning adults
Project flows:
Sep-Apr15: min outflow
Apr-Aug: max releases up to Total Dissolved Gas cap and state water quality standard/variance

Hells Canyon Complex (Brownlee)
under FERC re-licensing process

Upper Snake
under separate consultation with the Bureau of Reclamation; present operations call for 427 kaf contribution

Water management by project

Lower Columbia River

Bonneville

Flow targets, to enhance chum salmon spawning habitat downstream at Ives and Pierce Islands area:

Nov-Dec 31: 125 kcfs minimum or higher managed spawning flow

Jan-Apr: 125 kcfs or higher spawning flows minus 10 kcfs

Spill:

90-150 kcfs (night) (limited by TDG cap)

75 kcfs (day) (limited by adult fallback)

investigate higher daytime spill levels after deflector optimization work

The Dalles

Spill: 40% of instantaneous flow 24 hours/day (limited by tailrace flow patterns and survival concerns)

John Day

Reservoir levels:

Apr10-Sep: elevation 262.5' (MOP plus elevation needed to accommodate irrigation needs)

Oct-Apr15: elevation 265'

Spill: 12 hour spill at 60% of outflow up to TDG cap (85-160 kcfs)

investigate 24-hour spill

McNary

Spring spill: 120-150 kcfs 12 hours/day (limited by TDG cap)

Flow targets (for juvenile chinook)

Apr10-Jun: 220-260 kcfs

Jul-Aug: 200 kcfs

Priest Rapids

Flow targets: Apr10-Jun: 135 kcfs

Water management by project

Upper Columbia River

Grand Coulee

manage storage primarily so that Action Agencies can draft as needed to meet summer flow objectives at McNary; implement VARQ flood control operation

Jan-Apr10: store to achieve refill to upper rule curve by April 10

Apr 10-Jun: action agencies draft as needed to meet spring flow objective at Priest Rapids and refill

Jul-Aug: draft to elevation limit of 1280' in average water years (>92 maf)
draft to elevation limit of 1278' in below average water years (< 92 maf)

Aug: 130 kaf from Banks Lake

Nov-Apr: chum flows (at Bonneville)

Nov-May: Vernita Bar spawning, incubation and emergence flows

Libby

manage for spring storage; implement VARQ flood control; evaluate and implement a revised flood control operation during the fall to reach a fixed end-of-December elevation

Jan-Apr10: minimum flow, to achieve refill to upper rule curve by April 10

May-Jul: sturgeon and bull trout flows per USFWS Biological Opinion

Jul-Aug: draft to elevation limit of 2439' by Aug. 31 for salmon flow augmentation; . if reservoir is below 2439', meet USFWS minimum flows for bull trout

Hungry Horse

manage for spring storage; implement VARQ flood control operation

Jan-Apr10: minimum flow, to achieve refill to upper rule curve by April 10

May-Jun: refill

Jul-Aug: draft to elevation limit of 3540' by Aug. 31

Mica

negotiate with BC Hydro to release non-Treaty water in July and August

Arrow

store up to 1 maf in Treaty space in low water years for release to enhance spring migration flows for juveniles

Albeni Falls

Oct-Apr: alternate draft between elevations 2051' and 2056' for 6 years to evaluate spawning conditions for kokanee.

May-Jun: refill

Juvenile fish transportation

Spring migration

Snake River:

- transport all juveniles collected at the three Snake River collector projects (Lower Granite, Little Goose, Lower Monumental)
- implement voluntary spill at all three Snake River collector projects when seasonal average flows are projected to meet or exceed 85 kcfs, which will decrease the number of fish collected and thus spread the risk between transportation and in-river passage
- estimates of the proportion of Snake River spring/summer chinook that are expected to be transported under this strategy range from 43% to 91% depending on flow/runoff conditions
- if results of Snake River studies indicate that survival of juvenile salmon and steelhead collected and transported during any segment of the spring migration (i.e., before May 1) is no better than the survival of juvenile salmon that migrate inriver, identify and implement through the annual planning process appropriate measures to optimize inriver passage at the collector dams during those periods

Columbia River:

- bypass juvenile spring migrants collected at McNary Dam and provide the spring spill levels described for that project
- develop a McNary Dam transportation evaluation study plan focused on the response of upper Columbia River spring chinook and steelhead to transportation; begin approved research by 2002; evaluate spring transport from McNary beginning in 2002

Summer migration

- operate the collector projects (Lower Granite, Little Goose and Lower Monumental in the Snake; McNary in the Columbia) to maximize collection and transportation of subyearling migrants during the summer migration; i.e., no voluntary spill except as necessary for approved research
- initiate collection of subyearling fall chinook for transportation at McNary until inriver migratory conditions are deteriorating (i.e., no longer spring-like); switch from spring to summer operation to occur on or about June 20

Other actions

- extend the period of barge transportation from the lower Snake River dams and McNary to further reduce reliance on trucking
- evaluate transport/inriver return ratios for wild Snake River yearling chinook and steelhead; evaluate effects of transportation on summer-migrating SR subyearlings
- evaluate delayed mortality of transported versus inriver migrants; effects of transport on homing of adults; and strategies to enhance post-release survival
- install adult PIT-tag detectors at appropriate projects to assist research

Structural passage improvements at specific projects

The following is a list of project-specific juvenile and adult passage improvements called for in the biological opinion. This list does not include general or systemwide studies and improvements called for, such as a general call to evaluate and improve auxiliary water system diffusers to reduce risks to adult passage, to investigate measures to protect steelhead kelts from problems related to operations of adult passage facilities, and to evaluate pre-spawning mortality of fish that have passed through adult passage facilities.

Lower Columbia

McNary

juvenile passage:

existing facilities:

- extended length screens on all 14 main units
- juvenile monitoring facility/collection and bypass, with capability for collection for transport or return to the river.
- 22 bay spillway with deflectors on 18 bays

specified improvements:

- conduct spillway efficiency and effectiveness evaluations, spillway deflector optimization investigations, and surface bypass removable spillway weir prototype studies as appropriate (based on results at other locations)
- determine optimum spring migration juvenile survival configuration and operations
- upgrade extended intake screens and implement gatewell screen cleaning and other juvenile bypass system improvements
- investigate a less intrusive PIT-tag interrogation method for juvenile sampling facilities
- evaluate the need for juvenile bypass outfall relocation

adult passage improvements:

- investigate and implement corrective action for fallback through turbines
- investigate and implement corrective action for adults trapped in juvenile collection facilities and primary dewatering facilities

John Day

juvenile passage:

existing facilities:

- standard length screens at all 16 main units
- juvenile fish monitoring and bypass facility
- 20 bay spillway , with new deflectors on 18 bays

specified improvements:

- continue 24-hour spill investigations to determine juvenile passage and survival benefits
- construct end deflectors by 2002 and assess water quality and fish survival benefits of
- deflector optimization
- conduct surface bypass removable spillway weir prototype evaluation in 2002 as a surrogate for skeleton bay surface collection
- continue to develop extended intake screen system, and conduct prototype tests in 2001/2002
- synthesize incremental juvenile survival benefits of all juvenile passage options in late 2002 and proceed with the most promising survival-improvement measures
- investigate less intrusive PIT-tag interrogation method for juvenile sampling facilities

adult passage improvements:

- investigate and implement corrective action for fallback through turbines
- investigate and implement corrective action for adult steelhead holding and jumping in the fish ladders

The Dalles

juvenile passage:

existing facilities:

- ice/trash sluiceway operated as surface bypass
- 23 bay spillway with shallow spilling basin and no deflectors

specified improvements (high priority, because one of lowest levels of survival in the FCRPS system):

- evaluate, identify, and implement the appropriate 24-hour spill levels (day and night considered separately) to optimize spring and summer juvenile survival
- investigate surface bypass collection efficiency improvements (blocked trash racks) and sluiceway passage survival in 2001 and fully implement measures across the powerhouse as warranted
- evaluate the juvenile survival benefit of sluiceway outfall relocation
- implement composite outfall relocation and auxiliary water emergency measures
- if spillway juvenile mortality rate is excessive at 40% spill in 2000, investigate mechanistic causes of physical injury, including potential construction of spillway deflectors
- defer an intake screen and bypass system implementation decision until other measures are fully evaluated
- consider the installation of fish friendly turbine designs (e.g., minimum-gap turbine runners) as part of the turbine rehabilitation program.

adult passage improvements:

- investigate and implement corrective action for fallback through turbines
- improve auxiliary water supply to north ladder
- implement powerhouse collection channel improvements

Bonneville:

juvenile passage:

existing facilities:

- standard length screens at all 18 main units (both powerhouses)
- fish bypass modifications to powerhouse facilities
- ice /trash sluiceway at the first powerhouse
- 18 bay spillway with deflectors on 13 bays

specified improvements (high priority, because one of lowest levels of survival in the FCRPS system):

Bonneville First Powerhouse:

- evaluate surface collector and extended submerged intake screen prototypes in 2000, followed by a decision to proceed with development of one alternative (or a hybrid of each)
- complete minimum gap turbine runner installation and evaluation
- continue to develop debris-control measures if extended-length screens are installed
- continue to develop improvements to the existing juvenile fish bypass system (including dewatering screens and outfall relocation)

Bonneville Spillway:

- finish spillway deflector optimization development and implement deflector additions and improvements
- develop optimum spill patterns and conduct juvenile survival studies
- synthesize results to determine how to optimize spillway adult and juvenile project/spillway survival and implement the most promising measures

Bonneville Second Powerhouse:

- develop and implement a surface bypass corner collector, pending high-flow outfall investigation results for increasing the high-flow impact velocity criterion, conduct outfall site selection evaluations, and design and construct a corner collector system by 2004
- continue intake screen guidance improvement investigations and implement as warranted
- investigate a less intrusive PIT-tag interrogation method for the new juvenile fish

bypass system

adult passage improvements:

- investigate and implement corrective action for fallback through turbines
- investigate and implement corrective action to reduce adult fallback and mortality through spillway
- implement auxiliary water improvement measures
- investigate and implement debris control measures

Structural passage improvements at specific projects (cont'd)

Lower Snake

Lower Granite

juvenile passage:

existing facilities:

- extended length screens on all 6 main units
- juvenile monitoring facility/collection and bypass, with capability for collection for transport or return to the river.
- prototype power house surface collector
- 8 bay spillway with deflectors on all bays

specified improvements:

- initiate surface bypass removable spillway weir (RSW) studies in 2001
- complete design of juvenile bypass system improvements to add open-channel flume, juvenile separation by size, and other system improvements
- upgrade extended intake screens
- investigate the effectiveness of 24-hour spill, either separately or in conjunction with a surface bypass RSW
- investigate spillway deflector optimization and implement it as warranted
- defer a decision on permanent powerhouse surface bypass collector until other measures are fully evaluated
- add additional transport barges as warranted

adult passage improvements:

- investigate and implement corrective action for fallback through turbines

Little Goose

juvenile passage:

existing facilities:

- extended length screens on all 6 main units
- juvenile monitoring facility/collection and bypass, with capability for collection for transport or return to the river.
- 8 bay spillway with deflectors on 6 middle bays

specified improvements:

- investigate surface bypass RSW
- investigate spillway deflector optimization (including
- addition of end bay deflectors)

- investigate replacing the juvenile bypass system separator, as well as
- making other system improvements
- upgrade extended intake screens
- investigate the effectiveness of 24-hour spill, either separately or in conjunction with a surface bypass RSW;
- determine the need and frequency of powerhouse debris containment boom use to reduce predation losses and implement debris removal criteria

adult passage improvements:

- investigate and implement corrective action for fallback through turbines

Lower Monumental

juvenile passage:

existing facilities:

- standard length screens on all 6 main units
- juvenile monitoring facility/collection and bypass, with capability for collection for transport or return to the river.
- 8 bay spillway with deflectors on 6 middle bays

specified improvements (high priority, because one of lowest levels of survival in the FCRPS system):

- investigate a surface bypass RSW
- investigate spillway deflector optimization (including the addition of-end bay deflectors)
- investigate juvenile bypass system separator replacement, as well as making other system improvements
- investigate a new juvenile bypass outfall location
- investigate an extended intake screen system
- repair erosion in the spillway stilling basin apron

adult passage improvements:

- investigate and implement corrective action for fallback through turbines

Ice Harbor

juvenile passage:

existing facilities:

- standard length screens at all 6 main units
- 10 bay spillway with deflectors on all bays

specified improvements:

- assess the possibility of a less intrusive PIT-tag interrogation method for the juvenile bypass system
- consider, based on other studies, a surface bypass removable spillway weir (RSW)
- consider the installation of fish-friendly turbines as part of the turbine rehabilitation program

adult passage improvements:

- investigate and implement corrective action for fallback through turbines
- investigate and implement corrective action for adults trapped in juvenile collection facilities and primary dewatering facilities

Implementation planning and institutional arrangements for in-season management

Operations and planning for the system are conducted by the operations agencies (Bonneville, Corps and Bureau) with advice from NMFS and USFWS.

Implementation planning/one- and five-year plans: The Biological Opinion calls for both one- and five-year plans for implementation. The plans are to cover all operations, configuration, research, monitoring and evaluation actions. The planning process is expected to provide the following benefits:

- identify progress made and actions required to achieve FRCPS hydro performance standards
- integrate all FCRPS operations, configuration, research,, monitoring, and evaluation actions
- describe priorities to guide regional planning and in-season actions
- constitute a comprehensive plan to support funding requests

The hydro five-year plan is to include specific measures from the Biological Opinion's reasonable and prudent alternatives (RPA) for hydro operations. The one-year plan will provide project-specific detail needed to implement the first year of the more general 5 year plan. NMFS will review the plan for consistency with the BiOp and issue a finding as to the adequacy of the plan. The plans are specifically required to address exceptions for emergencies declared to ensure the reliability of power supply and transmission service. The reasonable and prudent alternatives also require long-term planning for the possibility of dam breaching breach (including preconstruction engineering and design and the development of a socioeconomic mitigation plan).

The specifics of the reasonable and prudent alternatives in the Biological Opinion may be revised through the implementation planning process so long as Action Agencies are making progress toward meeting performance standards and remain on track for full attainment of hydro standards by 2010 (see next page for standards).

In-season implementation process: The FCRPS hydro portion of the plan will be implemented through the existing NMFS Regional Implementation Forum process and, where appropriate, the Bonneville funding process. The Regional Forum will be the principal decision-making forum for issues related to the BiOp. The Forum will oversee activities and resolve disputes arising through the Technical Management Team (TMT), the System Configuration Team and the Water Quality Team. Refinements of the in-season management process should be done through the Regional Forum rather than specified as part of the BiOp

The Technical Management Team will meet regularly to advise the Action Agencies on the status of salmonid migrations and spawning activity, and to review dam and reservoir operations for compliance with optimal salmonid survival practices The TMT is also directed to prepare more detailed spring/summer water management plans after runoff forecasts are available, since the one- and five-year plans will be completed prior to availability of seasonal runoff forecasts.

Emergencies: In the event of an emergency during the winter, water held in reservoirs for spring and summer flow augmentation may be drafted, and should be replaced as soon as possible after the emergency is resolved. During summers with lower than usual water, storage reservoirs may be drafted below the BiOp draft limits or fish spill may be reduced only if a power system emergency is declared.

Performance Standards

Hydrosystem Biological Performance Standards

Specific adult and juvenile survival levels required to avoid jeopardy -- the table from the Biological Opinion specifying these survival levels is attached. The standards are defined as the estimated juvenile and adult survival levels throughout the FCRPS that are expected to directly or indirectly result from the best or most extensive agency actions that are biologically feasible and within the authority of the agency actions. The Action Agencies must be committed to attaining these standards by 2010.

Physical Performance Standards

Physical targets or goals directed at measures such as mainstem flow objectives and water quality that are intended to guide water management decisions. Physical performance standards supplement and sometimes serve as surrogates for biological performance standards.

[copied from NMFS' 2000 FCRPS Biological Opinion:
Table 9.2-3. FCRPS hydrosystem survival performance rates (%) for affected life stages.]

ESU	Adult survival rate		Juvenile survival rate		
			FCRPS inriver only		FCRPS combined[2] (transport + inriver + differential mortality of transported fish)
	FCRPS system	Per FCRPS project[1]	System	Per project	
Chinook salmon					
SR spring/summer	85.5	98.1	49.6	91.6	57.6
SR fall	74.0	96.3	14.3	78.4	12.7
UCR spring	92.2	98.1	66.4	90.3	66.4
UWR	n/a	n/a	n/a	n/a	n/a
LCR	98.1	98.1	90.7	90.7	90.7
Steelhead					
SR	80.3	97.3	51.6	92.1	50.8
UCR	89.3	97.3	67.7	90.7	67.7
MCR	89.3	97.3	67.7	90.7	67.7
UWR	n/a	n/a	n/a	n/a	n/a
LCR	97.3	97.3	90.8	90.8	90.8
CR chum salmon	n/a	n/a	n/a	n/a	n/a
SR sockeye salmon	88.7	98.5	n/a	n/a	n/a

Source: Adult standards taken from Table 9.7-2. Juvenile standards taken from Table 9.7-1.

[1] Per-project inriver survival rate calculated as the xth root of the system inriver survival rate (where x=number of FCRPS projects encountered). They are provided for illustrative purposes only. They are NOT intended to be interpreted as project-specific standards, or to be used in any way to support curtailment of survival improvement measures at an individual project.

[2] Values represent averages over the water years and D values in Table 9.7-1.