

**Preliminary Proposal for**

**Federal Columbia River Power System  
Summer Juvenile Bypass Spill Operations**

**Bonneville Power Administration  
U.S. Army Corps of Engineers**



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# Preliminary Proposal for Federal Columbia River Power System Summer Juvenile Bypass Spill Operations

## I. Introduction

The goal of this proposal for summer spill operations is to achieve similar or better biological benefits for salmon at less cost than the current summer spill program. It is guided by the best available biological information we have about fall chinook. At the same time, regional decision-makers must consider the proposal in light of the need to balance the multiple objectives of the river system and the significant implications of alternatives to the region as a whole.

This is a joint proposal of the federal action agencies – Bonneville Power Administration (BPA) and the U.S. Army Corps of Engineers (Corps). It was developed in collaboration with NOAA Fisheries. BPA and the Corps propose to revise the 2004-2008 Implementation Plan to the NOAA Fisheries' 2000 Biological Opinion for FCRPS operations (2000 BiOp) to reflect this proposed summer spill operation and mitigation actions. The framework of the 2000 BiOp allows federal agencies to compare various alternatives to achieve the survival performance standards for listed species under the Endangered Species Act (ESA) – in this case, Snake River fall chinook. Through the implementation planning process, the actions described in the 2000 BiOp's Reasonable and Prudent Alternative (RPA) are further clarified and, in some cases, modified to meet the original intent of the agencies in adopting the RPA and its associated management framework.

The federal agencies' proposal has been guided by policy direction from several sources. First, The Northwest Power and Conservation Council (Council) adopted Mainstem Amendments in 2003 that included support for the 2000 BiOp's hydrosystem performance standards and its overall adaptive management framework. Recognizing the flexibility inherent in that framework to modify actions commensurate with their biological performance for adult and juvenile fish survival, the Mainstem Amendments asked the federal agencies "to examine the benefits of the current summer spill program... and to determine whether the biological benefits can be achieved in a more effective and less costly manner."<sup>1</sup> The Council has found that both ESA and Northwest Power Act responsibilities can "in many cases... be met in the same set of actions."<sup>2</sup> This is especially true with measures like summer spill where the action is needed for compliance with the 2000 BiOp yet it benefits primarily non-listed fish.

The four Northwest Governors sent their recommendations to the President dated June 5, 2003,<sup>3</sup> endorsing the Council's Mainstem Amendments, and urging the federal action agencies to fully implement them "as soon as is practicable." Then, in a joint executive statement on August 26, 2003, the regional executives of NOAA Fisheries, the Corps, and the BPA<sup>4</sup> said that "...under

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<sup>1</sup> Northwest Power and Conservation Council. "Mainstem Amendments to the Columbia Basin Fish and Wildlife Program," April 2003; p. 16.

<sup>2</sup> Northwest Power and Conservation Council. "Columbia River Basin Fish and Wildlife Program," 2000; p. 10.

<sup>3</sup> "Recommendations of the Governors of Idaho, Montana, Oregon and Washington for Protecting Columbia River Fish and Wildlife and Preserving the Benefits of the Columbia River Power System," signed by the four Northwest Governors June 5, 2003.

<sup>4</sup> See at <http://www.nwd-wc.usace.army.mil/tmt/agendas/2003/0827Exespil>

any survival estimates the costs [of the current summer spill program] appear exceedingly high relative to the biological benefit.” The agency heads said that they had “a responsibility to the region to devise an approach that is less costly while maintaining the ability to achieve the biological objectives for salmon and steelhead.” They committed to work with all interested parties in the region to achieve this objective. Subsequently, ten members of the Northwest delegation to the United States House of Representatives wrote BPA, NOAA Fisheries, and the Corps to encourage the agencies to test whether full mitigation of the biological impacts from reduced spill could be achieved at lower cost to ratepayers.<sup>5</sup>

In addition to this policy guidance, the federal agencies’ proposal has been informed by the best available scientific information, including analyses developed by the Spill Committee process, sponsored by the Council and the Columbia Basin Fish and Wildlife Authority (CBFWA). The federal agencies have analyzed the estimated effects of a range of summer spill operations on the FCRPS and programs to help mitigate for any effects of reduced summer spill on the fish that are migrating through the system during that time. In addition, the agencies have considered input from stakeholders throughout the region, including state and tribal fisheries managers and utility customers, who have submitted extensive comment on the technical and economic aspects of the alternatives.

The federal agencies propose here to provide the same or greater biological benefits to affected salmon stocks while supporting the FCRPS’ ability to remain an economic, efficient, and reliable energy source. We note that the fall chinook salmon affected by the summer spill changes also have economic importance for international, national, and tribal commercial harvest and regional sport fisheries, where they are harvested at approximately a 50 percent rate. This proposal presents a combined policy and biological issue, which must be considered in light of all the multiple objectives of the river system.

## **II. Summary of Summer Spill Proposal**

The federal agencies propose a three-year program (2004-2006) of spill reductions and mitigation actions. During this period, we will continue our ongoing monitoring of fish migration and offsets using the tools described in Section IV and updating information in the models and tests as it becomes available. At the conclusion of the three-year period, it is our understanding that the Council will conduct a public review process with the goal of providing recommendations to the federal agencies for the most biologically effective spill actions at the lowest possible cost.

Spill reductions would be implemented in mid-July at Ice Harbor Dam on the Snake River and in August on both the Snake and lower Columbia rivers. Spill at the lower river projects (Bonneville, The Dalles, and John Day) would end on July 31. To mitigate the impacts of these spill reductions on summer migrants, the federal agencies propose to implement a package of offset actions aimed at providing direct and indirect benefits to affected species. The specifics of the federal agencies’ proposal are described in Section IV.

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<sup>5</sup> Letter from Representatives Peter DeFazio, Darlene Hooley, Brian Baird, Rick Larson, Mike Simpson, George Nethercutt, Doc Hastings, Greg Walden, C.L. “Butch” Otter, and Dennis Rehberg to Steven J. Wright, D. Robert Lohn, and Brigadier General William T. Grisoli (March 13, 2004).

Table 1 shows the estimated impacts of this reduced spill operation, taking into account the comments we received in February. The range reflects the uncertainty inherent in the range of potential smolt-to-adult return rates (SARs), from 0.5 percent to 4 percent. Recent SARs for listed Snake River fish have been 0.32 percent, while recent rates for Hanford Reach fish have been 0.2 to 1.0 percent.

**TABLE 1: Estimated Biological Impacts of Spill Proposal**

<b>Stock</b>	<b>Smolts</b>	<b>Adults</b>
ESA-listed Snake River Fall Chinook	-500	-2 to -20
Non-listed Hanford Reach Fall Chinook	-177,000	-885 to -7,080
Other Non-listed Fall Chinook	-138,000	-690 to -5,520

To address these estimated adverse impacts from the summer spill modifications, we propose to implement a program of offsetting actions with same or better biological benefits for both listed and non-listed fall Chinook. The federal agencies propose to implement the following offset actions aimed at providing direct benefits to affected species:

- Enhanced Northern Pikeminnow management
- Hanford Reach stranding protection flows

The estimated benefits of these offsets are described in Table 2, below:

**TABLE 2: Estimated Offset Benefits (Increased Adult Returns)**

<b>Stock</b>	<b>Pikeminnow</b>	<b>Hanford Reach Anti-stranding</b>	<b>Total Adults</b>
ESA-listed Snake River Fall Chinook	+1 to +11	Not applicable	+1 to +11
Non-listed Hanford Reach Fall Chinook	+250 to +8,000	+3,916 to +80,662*	+4,166 to +88,662
Other Non-listed Fall Chinook		Not applicable	

\*The offset benefit attributed to Hanford Reach anti-stranding represents half of the overall total estimated biological benefit of the anti-stranding operation. The other half of the benefit from this operation, when combined with Grant County PUD's hatchery program, spill program, and its juvenile bypass systems at Priest Rapids and Wanapum Dams, is intended to mitigate for the existence and operation of Grant's projects.

Recognizing the mitigation actions set forth above offset approximately half the impact of the proposed spill reduction and therefore do not meet the criteria for providing similar or better biological benefits, the following actions are also under consideration. We request comments on which of these might be feasible and beneficial as summer spill offsets to fill the remaining gap. Such comments will inform an amended proposal that the federal agencies plan to release in advance of the April 16 regional executives meeting.

- Council Fish and Wildlife Program enhancement
- Additional flow augmentation from Dworshak Reservoir

- Tribal harvest enforcement funding
- Additional or improved artificial production
- Avian predation research
- Additional water acquisitions
- Habitat protection/enhancement
- Commercial harvest reductions (non-tribal), as available
- Additional Removable Spillway Weirs

### **III. The Process for Developing the Summer Spill Proposal**

Guided by the policy statements described above, BPA, Corps, NOAA Fisheries, and Council staff engaged in discussions to advance this initiative. The Council subsequently supported the CBFWA-sponsored Spill Committee process for broader regional discussion and development of a comprehensive summer spill evaluation. Participants included state, tribal, and federal agency representatives, as well as Council staff. This Spill Committee identified four summer spill options, and appointed a Science Team to develop study proposals for each and to assess their feasibility. The Spill Committee also appointed an Offsets Team to develop potential alternatives and to assess their effectiveness to mitigate for adverse impacts of reduced spill.

#### **A. Spill evaluation approaches**

The CBFWA Spill Committee Science Team considered two general approaches for determining the effect of the four summer spill options on fish survival: systemwide survival studies (either based on juvenile survival or returning adults) and project-specific survival studies.

The ideal approach would be to measure the system survival impacts of the existing operation or of any modification. A systemwide study is attractive because of its potential to assess the full range of direct and indirect effects of changes to spill operations. The overall complexity of such large-scale studies, however, is huge. The high observed seasonal and annual variability in survival requires tagging one to two million fish and likely alternating test conditions across years (as opposed to within years) to ensure that test fish are exposed to the subject treatment conditions. This requires decades or even centuries, to achieve a reasonable confidence level in the results. (Refer to Skalski<sup>6</sup>; also see comments of NOAA Fisheries regional director Bob Lohn<sup>7</sup>.)

For these reasons, the federal agencies continue to focus on project-specific evaluations to assess alternative operations (or configurations). Section IV describes the methods for the project-specific analyses in more detail.

The federal agencies used the SIMPAS model developed by NOAA Fisheries for the 2000 BiOp to estimate the relative biological impacts of a series of spill reduction

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<sup>6</sup> Skalski, John R., *Overview of Design Options for a Summer Spill Study*. 2003, p. 4.

<sup>7</sup> Bob Lohn presentation to Northwest Power Planning and Conservation Council, at [http://www.nwcouncil.org/news/2003\\_12/lohn.htm](http://www.nwcouncil.org/news/2003_12/lohn.htm)

scenarios. SIMPAS is widely used within the Regional Forum for management decisions on the hydro system.

The SIMPAS model has been criticized for not being able to predict survival with great certainty. Unfortunately, uncertainties and uncontrolled variables are characteristic of field biology studies as well. Past experience has shown that uncertainties, and the way they are treated, are at issue regardless of the model used. We chose the SIMPAS model precisely because it minimizes the number of uncontrolled variables used in analysis, and allows the broadest use of available field data, and because it is the method that has the broadest acceptance.

The federal agencies evaluated several spill reduction scenarios ranging from elimination of summer spill only at Ice Harbor Dam to full elimination of summer spill. These survival results were then used to show the relative effect on survival of juvenile and adult fish. This made the impacts analysis comparable to the estimated benefits of offset actions, because not all of the offsets can be expressed in terms of percent survival. Fish numbers also provide a somewhat better sense of the relative magnitude of impact.

#### **B. Assessment of offsets**

The CBFWA Spill Committee Offsets Team identified a broad list of potential offset actions, and developed principles or criteria for evaluating the efficacy of those actions. The committee used these criteria to screen its broad list, ultimately identifying and further developing several actions that were considered viable for offsetting the impacts of spill reductions. These actions were primarily aimed at reducing avian and fish predation and improving rearing habitat conditions for Hanford Reach fall chinook.

#### **C. Public comment period**

In mid-January, federal agencies released the results of the spill evaluation and the offset approaches for public review and comment. The analyses of biological impacts and offsets were presented at meetings of the Technical Management Team (TMT) and the Implementation Team (IT) in early February, with oral comments from meeting participants reflected in meeting notes.

By February 20, the comment closure date, the agencies received a total of 95 comments plus about 65 identical form letters. Of the 95 individual comments, 74 supported a reduction in summer spill. Most of these were from utilities and ratepayers wanting cost-effective salmon recovery efforts. The remaining letters expressed support for continuing the current summer spill program, cited policy issues or challenged technical aspects of the federal analysis. These included a detailed set of comments submitted jointly by state, tribal, and federal fisheries managers. Critics of the analyses primarily claimed that the agencies underestimated impacts of reducing summer spill and overestimated or miscalculated mitigation benefits.

The federal agencies considered these comments in developing many aspects of this proposal, particularly the offset package. A number of the offset actions were dropped from consideration as a result of the comments while other actions are receiving renewed consideration.

The federal agencies are seeking written comments on this proposal through April 7, 2004. We particularly seek comments on a reasonable package of mitigation actions that could achieve our objective of providing similar or better biological results for salmon. We will continue to consult with tribal and state executives and key staff during this time. The federal executives plan to consult with the 13 Columbia Basin Tribes on this proposal April 16. Later that same day the Regional Executive Committee, consisting of federal, state, and tribal executives, will meet to review the input received. The federal agencies will release an amended proposal ahead of these April 16 meetings, and will announce a final decision shortly after the meetings.

**IV. Details of the Proposal**

**A. Specific spill operations**

The following table compares the federal agencies’ proposed spill operation to the BiOp spill operation. Operations and evaluations would continue through the three-year period proposed.

**TABLE 3: Specific Spill Proposal**

	Ice Harbor		John Day		The Dalles		Bonneville	
	BiOp	Proposal	BiOp	Proposal	BiOp	Proposal	BiOp	Proposal
July	120% TDG, 24-hrs	planned test thru 7/15; no spill 7/16-31	60% of river flow, 12 hrs	30% of river flow, 24 hrs	40% of river flow, 24 hrs	BiOp	75 kcfs day, 120% TDG night	test BiOp vs 50 kcfs/ 24 hrs
August	120% TDG, 24 hrs	no spill	60% of river flow, 12 hrs	No spill	40% of river flow, 24 hrs	No spill	75 kcfs day, 120% TDG night	No spill

The federal agencies propose to end spill operations effective August 1 because they believe the majority of the summer migration generally occurs before then. Many fish have been collected and transported at the four collector projects, leaving fewer fish migrating in the lower river. Finally, the federal agencies have made significant investments in lower river projects to improve passage.

Following is a further description of the July operations and why we are proposing them. All study designs are being coordinated through the Regional Forum and the Corps' Anadromous Fish Evaluation Program (AFEP) process.

- At Bonneville Dam, we are proposing the reduced-spill evaluation in order to assess means to optimize potential benefits of the new corner collector.
- At The Dalles Dam, we are proposing BiOp levels due to relatively low turbine survival estimates and the need to maintain planned research on the new spillway training wall.
- At John Day Dam, we are proposing 30 percent spill for 24 hours/day based on research results indicating higher survival with those spill levels compared to BiOp spill, and preliminary research findings of relatively low turbine survival.
- At Ice Harbor Dam, we are proposing no spill after July 16. This is based on completion of planned research and past studies finding very little project survival improvement for Snake River fall chinook with spill. In addition, at this time of year, most fish have been collected and transported at the three upstream collector projects, leaving few fish migrating at this point in the lower Snake River to benefit from spill.

## **B. Proposed offsets**

The following actions are intended to provide offsetting benefits for ESA listed fall chinook, so that overall survival is the same or better. For non-listed fall chinook, these actions will also achieve similar survival levels as under the 2000 BiOp summer spill regime.

### **1. Northern Pikeminnow Management Program augmentation**

Juvenile salmonids are the major dietary component of the northern pikeminnow, with approximately 80 percent of that predation occurring in July and August. This coincides with the peak migration of subyearling fall chinook.

One of the primary actions available to improve in-river survival of fall chinook is the management of predatory fishes. The Northern Pikeminnow Management Program (NPMP) is a multi-year effort to reduce fish predation on juvenile salmon, primarily through public angler-driven systemwide removals of predator-sized (nine inches or greater) northern pikeminnow. Since program inception in 1990, over 2 million northern pikeminnow have been harvested through the sport reward program, with an estimated benefit of reducing predation mortality by 25 percent.<sup>8</sup>

The NPMP is a well-established operation with demonstrated success in adapting to changing conditions and responding to special circumstances. More aggressive

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<sup>8</sup> Friesen T. and David Ward. 1999. Management of Northern Pikeminnow and Implications for Juvenile Salmonid Survival in the Lower Columbia and Snake Rivers. North American Journal of Fisheries Management 19:406-420.

and focused removals could provide substantial survival benefit to reduce the impact of the conditions that in-river out-migrants face in 2004 and beyond.

Comments from the state, federal and tribal fishery agencies joint technical staff suggest that while there may be benefit from increased removal of northern pikeminnow, those effects would not be discernable. In response, we are proposing to more aggressively implement the NPMP to achieve exploitation rates that are in the higher end of the target range (the target range is 10 to 20 percent annual average exploitation), and which in the long-term may be more significant relative to measurements. We are also proposing that the mark-recapture effort, which is the basis for the NPMP evaluation, receive additional statistical review, as recommended by Hankin and Richards<sup>9</sup> (2000). We believe increased removal of northern pikeminnow has the effect of reduced consumption on smolts, a positive trend that has biological value and that can be estimated. Additionally, in response to comments concerning potential increases in predation resulting from spill operation modifications, we are proposing the addition of focused removals from Bonneville, The Dalles, and John Day forebays and tailrace boat restricted zones.

The scope of the 2004 augmentation would include these focused removals as well as a general increase in the reward structure in the Sport-Reward Fishery to provide systemwide enhancement and benefit to all affected stocks. Using the 2001 Power Emergency NPMP as a model for 2004 and beyond and the implementation of focused removal fisheries in the tailraces of select dams, we conservatively estimate an increase in systemwide catch of 15,000 northern pikeminnow. We believe it is reasonable to anticipate the potential for increased catch as high as 40,000 additional northern pikeminnow.

## **2. Hanford Reach anti-stranding operation**

Hanford Reach fall chinook, while not listed under ESA, are an important fish for tribal and commercial harvest. They are recognized throughout the region as a strong and healthy population.<sup>10</sup> The adults spawn in the Hanford Reach of the Columbia River and the juveniles enter the system above McNary Dam. Juvenile fish migrate through the mainstem Columbia River from June through September.

The Hanford Reach anti-stranding operation is intended to protect Hanford Reach fall chinook juveniles as they rear and pass out of the area in the spring by limiting flow fluctuations from Priest Rapids Dam. As flows fluctuate along the riparian zones downstream from Priest Rapids Dam, they sometimes strand the young fry in dewatered gravel or isolated pools. Since 1999, on a year-to-year

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<sup>9</sup> Hanken, D. and J. Richards. 2000. The Northern Pikeminnow Management Program: An Independent Review of Program Justification, Performance, and Cost-Effectiveness, 38pp.

<sup>10</sup> Evenson, Hatch, and Talbot. CRITFC: Hatchery Contribution to a Natural Population of Chinook in the Hanford Reach of the Columbia River, Washington. August 2002. Mentions quotes from three sources to that effect, including the Washington Department of Fish and Wildlife.

basis, BPA has voluntarily participated to varying degrees in operations to reduce such stranding.

Though Priest Rapids is owned and operated by Grant County Public Utility District (PUD), operations at federal projects upstream of Priest Rapids can affect Grant PUD's ability to maintain operations within the desired flow fluctuation limits. To assist Grant in providing more stable flows, we are proposing that BPA obligate itself through a long-term agreement to maintain certain outflows from the federal projects upstream. BPA would deliver Grant PUD amounts of energy to mitigate generation losses that Grant would incur from the limited flow fluctuation operation.

As noted in Table 2 above, we are proposing to claim 50 percent of the estimated benefit of this operation as an offset for summer spill reductions. The federal agencies believe it is appropriate to split the benefits of the operation with Grant PUD. This operation, when combined with Grant County PUD's hatchery program, spill program, and its juvenile bypass systems at Priest Rapids and Wanapum Dams, is intended to mitigate for the existence and operation of Grant's projects. However, Grant has indicated that it could not unilaterally provide this operation without BPA participation in the Protection Program.

This action is appropriate as an offset because it results in a 10-year BPA commitment to the operation (instead of the annual ad-hoc operation of the past several years); and, the operational regime has additional actions beyond those implemented annually in the recent past.

Initially, federal agencies estimated the total benefits of this operation to range from producing 8,000 to 66,000 additional Hanford Reach fall chinook adult returns. During the comment period, multiple parties suggested changes to improve the estimation method. Taking these comments into account, we have revised our estimate to approximately 3,916 to 80,662 additional adult returns.

### **3. Other mitigation actions that could enhance salmon survival**

The following specific actions are also under consideration as possible offsets. Some are extensions of existing programs currently being implemented, while others would be new activities. We note that there may be distinctions between those actions that likely have a biological benefit but the benefit is difficult to quantify, and those that are more easily quantified in terms of life stage survival. It would be particularly beneficial to receive input on the benefit of these actions and how they may be quantified.

- Council Fish and Wildlife Program funding increase – This would provide additional funding of \$5 million per year in each of FY 2005 and FY 2006 would enable BPA to implement additional mitigation actions that would not have otherwise been able to be funded in those years. Our objective is for this

funding to go toward actions that benefit stocks affected by summer spill reductions; however, the region may also prioritize projects targeted toward stocks that are in greater need. Federal agencies believe inclusion of this mitigation action in the final package of offsets is likely to advance our objectives of achieving similar or greater biological benefits.

- Additional flow augmentation from Dworshak – Additional water released from Dworshak could help moderate temperatures in the Snake River. There may be a benefit to increasing flow as well. It is recognized that this operation may result in cultural resources impacts for which mitigation would be required. Hydro regulation modeling indicates deeper drafts at Dworshak could also result in at least one additional year when spring refill would not be achieved and could substantially increase the volume of all refill misses.
- Tribal harvest enforcement funding – Funding for tribal law enforcement contracts could deter illegal take through increased compliance with regulations and laws and reduce illegal fishing through gear confiscation.
- Additional or improved artificial production – Hatchery supplementation could help offset survival impacts associated with spill reductions for affected stocks of hatchery origin.
- Avian predation research – Avian predation research may lead to management actions that reduce smolt mortality due to cormorants and caspian tern predation.
- Additional water acquisitions – Additional water acquisitions could provide a way to deliver additional flow and improved water quality in tributaries.
- Habitat protection – Habitat improvements could benefit both juvenile and adult salmon, providing a long-term benefit to affected species, as well as other stocks.
- Commercial harvest reductions (non-tribal), as available – Any regionally supported reduction in commercial harvest, as either a main offset or as a safety net in future years, would result in greater numbers of returning adults to other fisheries or to spawning grounds.
- Additional RSWs – This would involve prioritizing surface passage technologies at the lower Columbia River projects to offset the impacts of spill reductions and improve juvenile project survival.

## **C. Monitoring and evaluation**

### **1. Approach**

As described above, systemwide survival studies are not available to inform decisions in the short term. Project-specific studies provide a reasonable analysis of the relative differences in configuration or operational treatments, and the federal agencies rely extensively on them to support these decisions on the hydrosystem. While they are less accurate in predicting absolute survival, combined with modeling, project-specific studies allow us to apply the best available scientific information to evaluate relative differences among alternatives.

In 2004, project survival studies are planned at Bonneville, The Dalles, and Ice Harbor dams. They will rely on current methods and approaches, as described in this section. The studies will occur during the early part of the summer spill season. Project-specific studies are not feasible during the late summer when the proposed operation includes no spill. In August, water temperatures warm to the point that fish managers and researchers are concerned about the risk of increased mortality during fish handling and marking. The Corps has developed a pilot approach to address these issues that is being coordinated through their AFEP process.

### **General Evaluation Methods**

Smolt monitoring -- Routine annual sampling of guided fish at Bonneville, John Day, McNary, Lower Monumental, Little Goose, and Lower Granite dams. Information includes daily sampling to identify species, count, general condition, marks/tags, and signs of gas bubble disease. Subsamples of guided fish are anesthetized, observed, allowed to recover, and then returned to continue their migration (either in-river, or in some cases by transportation in barge or truck).

Hydroacoustic monitoring -- Research-related monitoring is conducted to determine relative magnitude and distribution of passage through various routes, including turbines, bypass, spillways, and other available routes (e.g., Bonneville second powerhouse corner collector, Lower Granite removable spillway weir). Hydroacoustic monitoring is totally passive, with no impact on migrating fish. However, hydroacoustic monitoring beyond early August is problematic because of the presence of out-migrating juvenile shad and the limited capability for discerning species composition of observed fishes.

Radio Telemetry -- Radio-telemetry (2- or 3-dimensional tracking of radio-tagged fish) is conducted at selected sites to determine fish behavior, passage distribution, and project passage survival (including route-specific survival). Once fish are tagged, radio tracking is a passive monitoring activity. However, fish tagging requires capture, anesthetization, tagging, recovery, and subsequent release. Radio telemetry is problematic when water temperatures warm and risks to fish from handling increase.

PIT tag detection -- Juvenile out-migrants are tagged throughout the Columbia River Basin for smolt monitoring or more specific research on in-river migration and factors affecting stock performance (e.g., extra mortality, multiple bypass), juvenile fish transportation (including delayed mortality), and site-specific evaluations of project passage alternatives. Juvenile PIT-tagged fish are passively interrogated at Bonneville, John Day, McNary, Lower Monumental, Little Goose, and Lower Granite dams, while returning adults are interrogated for PIT tags at Bonneville, McNary, Ice Harbor, Lower Granite, and Priest Rapids dams. Juvenile PIT tag interrogation is not able to resolve passage at specific routes through the projects.

## **2. Ongoing project-specific evaluations and monitoring activities**

In order to monitor summer spill modifications, information from the following evaluations will be used. Many of these are ongoing evaluations used routinely to assess program effectiveness and identify problem areas.

**Bonneville** - Radio telemetry and hydroacoustic monitoring will be used to assess the effectiveness of the newly installed second powerhouse corner collector under two different spill operations (BiOp spill vs. a lower level). The evaluations will assess project- and route-specific passage distribution and survival. Data on out-migrating fall chinook will be collected from late June through late July. Results will be available following the fish passage season, beginning in approximately November 2004. The studies will continue in 2005 and 2006, pending preliminary results of previous years' research.

**The Dalles** - Radio telemetry and hydroacoustic monitoring will be used to assess effectiveness of the newly-installed spillway training wall under BiOp spill. The evaluations will assess project- and route-specific passage distribution and survival. Data on out-migrating fall chinook will be collected from late June through late July. Results will be available following the fish passage season, beginning in approximately November 2004. The studies will continue in 2005 and 2006, pending preliminary results of previous years' research.

**Ice Harbor** – Radio telemetry monitoring will be conducted to assess two different spill patterns (small gate opening versus larger gate openings). This is a follow-up to the 2003 study that suggested a potential survival improvement with larger gate openings. Studies evaluating the new RSW will continue in 2005 and 2006.

**Estimate survival for the passage of juvenile salmonids through dams and reservoirs of the Lower Snake and Columbia rivers:** Hatchery subyearling fall chinook salmon will be PIT tagged and released above Lower Granite Dam to estimate their survival through the Snake River. River-run subyearling fall chinook salmon (mostly wild Hanford stock) will be PIT tagged and released at McNary Dam to estimate their survival through the lower Columbia River. We will explore the relationships among survival, travel time, environmental variables, and dam operations using the expanding data base generated by this study. As PIT-tagged adult fish return, we will continue to explore survival-to-adult for fish with different passage histories.

**Fall Chinook transportation effects (Lower Granite and McNary dams)** – Out-migrating juvenile fall chinook will be PIT tagged at Lower Granite and McNary dams. One group will be left to migrate in-river and another group will be transported to below Bonneville Dam by barge. Smolt-to-adult return rates will be assessed for the two groups to determine the effectiveness of

transportation and in-river migration. Studies of fall chinook transportation began in 2001 and will require several years. Preliminary results are reported annually in approximately November, with complete results available upon adult return of all year-classes in approximately 2010.

### **3. Monitoring the effectiveness of offsets**

Established monitoring activities associated with existing measures will provide feedback on the effectiveness of enhancements as offsets. Any new measures implemented under the Fish and Wildlife Program as offsets will include annual reporting of accomplishments as part of the usual reporting requirements for projects funded under the Program. Where existing monitoring programs exist, they will be used or modified.

**Northern Pikeminnow Management Program** – Routine NPMP monitoring will assess the effectiveness of this offset, including total annual effort (typically reported as number of angler-days), catch per unit effort, exploitation rate, and actual catch compared to projected catch (based on historic performance). Results will be reported annually.

**Hanford Reach Fall Chinook Protection Program** – Routine monitoring by Grant PUD, Washington Department of Fisheries, and others has historically provided information annually on stranding of fall chinook fry in the Hanford Reach. Five years of field monitoring while flow fluctuation limits have been in place has led to refinement of operating limits for Priest Rapids that have been incorporated in the proposed long-term Protection Program. That monitoring program provided adequate information; additional monitoring is not needed.

### **4. Final assessment in 2006**

At the end of the three-year period, results of the annual monitoring and evaluation efforts would be available. At that point, the Council has stated in its Mainstem Amendments that it plans to conduct a public review at the end of this evaluation “with the goal of providing recommendations to the federal agencies for the most biologically effective spill actions at the lowest possible cost.”<sup>11</sup> The federal agencies intend to assess the monitoring and evaluation information collected and collaborate with the Council on its public process. Our expectation is for this effort to lead to a regional recommendation for a long-term summer spill operation.

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<sup>11</sup> See footnote 1, page 1.

**V. Assessment of Biological and Economic Impacts of the Summer Spill Proposal**

**A. Summary of estimated biological impacts**

Overall system survival under the proposed operation is estimated to be less than 2 percent lower than under the BiOp spill operation. Table 4 summarizes the estimated system survival impact of the proposed operation by stock.

ESA-listed Snake River fall chinook are the least impacted, at about 0.4 percent. On average, approximately 62 percent of these juveniles migrate during July and 28 percent migrate in August. However, about 90 percent of juvenile Snake River fall chinook are transported, leaving a very small percentage in-river and subject to the impacts of the proposed spill operation. The federal agencies believe the proposed enhancement of the pikeminnow program can mitigate approximately half the survival impacts to the listed Snake River fall chinook resulting from the proposed operation.

System survival for non-listed Hanford Reach fall chinook is projected to decrease by approximately 1.7 percent under the proposed operation. Approximately 50 percent of the Hanford Reach juveniles are transported at McNary Dam, with about 80 percent migrating through the lower river by July 31. These fish are considered the basin’s healthiest salmonid population and make up a substantial portion of the overall fall chinook population. They are harvested in the ocean and in-river at approximately a 50 percent rate.

For those non-listed summer migrants that enter the FCRPS below McNary Dam and do not have the opportunity to be transported, impacts of the proposed operation range from less than 0.5 percent reduction in juvenile system survival to nearly 5 percent, with the highest impact occurring to the juvenile summer migrants originating from the Umatilla River.

**TABLE 4: Est. Survival Reduction of Proposed Operation vs. BiOp Spill**

Affected Stock	Estimated Impacts	
	Juvenile Numbers	% Reduction
<b>FALL CHINOOK</b>		
<b>Upriver Bright</b>		
Priest Rapids & Ringold Springs Hatcheries	72,000	1.7%
Hanford Reach Natural	177,000	1.7%
Yakima River & Marion Drain	5,000	1.7%
<b>Snake River Bright</b>		
Listed Wild Snake River	500	0.4%
Unlisted Lyons Ferry Hatchery	2,000	0.5%
Unlisted Nez Perce and Big Canyon Hatcheries	1,000	0.4%
<b>Mid-Columbia Bright</b>		
Deschutes River	10,000	2.4%
Klickitat River	13,000	1.0%

**TABLE 4: Est. Survival Reduction of Proposed Operation vs. BiOp Spill**

Affected Stock	Estimated Impacts	
	Juvenile Numbers	% Reduction
<b>FALL CHINOOK</b>		
Umatilla River	10,000	4.8%
Little White Salmon River	7,000	1.0%
<b>SUMMER CHINOOK</b>		
Upper-Columbia	18,000	1.7%
<b>TOTAL LISTED Juveniles</b>	500	0.4%
converted to adults with 0.5% SAR	3	0.4%
converted to adults with 1% SAR	5	0.4%
converted to adults with 2% SAR	10	0.4%
converted to adults with 4% SAR	20	0.4%
<b>TOTAL UNLISTED Juveniles</b>	315,000	1.6%
converted to adults with 0.5% SAR	1,575	1.6%
converted to adults with 1% SAR	3,150	1.6%
converted to adults with 2% SAR	6,300	1.6%
converted to adults with 4% SAR	12,600	1.6%

**B. Summary of Economic Impacts**

When water is passed over dam spillways and not through turbines, there is an opportunity cost to the power system. BPA estimates these foregone revenues by calculating the number of megawatt-hours the volume of spilled water could have produced, and applies a power market value (mid-Columbia power market price) to that foregone generation. In the summer months, BPA has estimated the power market value of BiOp spill to average \$77 million. (The cost estimates vary based on projected water conditions, from \$55 million to \$92 million, with 31 out of 50 water years falling between \$75 million and \$85 million.) Table 5 compares the power market value of BiOp spill to that of the proposed summer spill operation.

**TABLE 5: Power Market Value of Summer Spill (50 year average in \$ millions)**

	July	August	Total
BiOp Spill	\$ 35	\$ 42	\$ 77
Proposed Spill	\$ 30	\$ 0	\$ 30
Difference	\$ 5	\$ 42	\$ 47

Funding for the offset actions would be provided from the additional power revenues resulting from the proposed spill reduction. Table 6 describes the FCRPS revenue impacts associated with the proposed spill operation and the offset actions by year.

**TABLE 6: Revenue Impact of the Proposal** *(in \$ millions)*

	2004	2005	2006
<b>Value of Additional Generation</b> (50 water-year average)	<b>\$47</b>	<b>\$47</b>	<b>\$47</b>
Offsets			
Enhanced Pikeminnow Program	\$1 – 3	\$1– 3	\$1 – 3
Hanford Reach anti-stranding	\$0.1	\$0.1	\$0.1
Placeholder estimate for offsets under consideration	\$2 – 5	\$2 – 5	\$2 – 5
Council Fish & Wildlife Program Enhancement	\$0	\$5	\$5
<b>Offsets Total</b>	<b>(\$3.1 – 8.1)</b>	<b>(\$8.1 – 13.1)</b>	<b>(\$8.1 – 13.1)</b>
<b>FCRPS Net Revenue Impact</b>	<b>\$43.9– 38.9</b>	<b>\$38.9 – 33.9</b>	<b>\$38.9 – 33.9</b>

## VI. Conclusion

It is the federal agencies' policy to find the most cost-effective means to meet our obligations. Cost-effectiveness is also considered in evaluating mitigation. We believe a cost-effective, performance-based approach will ultimately lead to greater overall benefits to salmon. Working within the BiOp's performance-based framework, the federal agencies have attempted to respond to the technical input we have received and to design a proposal that provides similar or better biological benefits at less cost. This is consistent with our policy to provide for the multiple uses of the FCRPS benefiting the people and resources of the Pacific Northwest.

## VII. Libby and Hungry Horse Summer Operations Proposal

In its Mainstem Amendments, the Council recommends summer reservoir operations at Libby and Hungry Horse Dams that differ from the 2000 BiOp. Specifically, the Council recommends that on an experimental basis, these reservoirs be drafted at a steady rate from July 1 through September 30 until they reach 10 feet from full pool. This operation is recommended for all years except the lowest 20th percentile water supply years. In those low water years, the Council recommends that these reservoirs be drafted 20 feet from full pool.

The Action Agencies and NOAA Fisheries are considering the impacts and benefits of implementing this aspect of the Council's Mainstem Amendments. A federal proposal for implementation is not sufficiently developed for release simultaneously with the summer spill proposal. However, the federal agencies anticipate providing a recommended approach ahead of the summer operations season.