Endangered Species Act 2003 Check-In Report for the Federal Columbia River Power System

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

US Army Corps of Engineers
Northwestern Division

BONNEVILLE POWER ADMINISTRATION

September 2003

2000 BiOp undergoing revisions per court ruling

Recently, the 2000 BiOp was invalidated in Federal District Court in *National Wildlife Federation vs. National Marine Fisheries Service*. The court found NOAA Fisheries improperly relied on actions that had not undergone ESA consultation or were otherwise not "reasonably certain to occur." The court remanded the 2000 BiOp to NOAA Fisheries for revisions by early June 2004. In the meantime, the court left the 2000 BiOp in place, including ongoing implementation and reporting by the Action Agencies. The court also expressed direct interest in this Check-In Report, encouraging its submission as part of an October 1, 2003, status report.

This report was prepared to meet the Action Agencies' reporting requirements under the existing 2000 BiOp, not the directives of the court for revision of that BiOp.

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I. What is the Purpose of This Report?

The Bonneville Power Administration (BPA), Corps of Engineers (Corps), and Bureau of Reclamation (Reclamation) – collectively, the Action Agencies – are approaching the end of their third year implementing fish protection actions recommended under NOAA Fisheries'[1] 2000 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp). The BiOp's 199 Reasonable and Prudent Alternative (RPA) actions are intended to avoid further jeopardy to, and aid recovery of, threatened and endangered salmon and steelhead populations in the Columbia River basin. To date, the Action Agencies have implemented hundreds of actions and spent hundreds of millions of dollars to benefit endangered fish.

As called for in the BiOp, the Action Agencies have annually produced one- and five-year implementation plans guiding and coordinating these efforts, as well as annual progress reports. This year, the Action Agencies are required to provide a more detailed assessment of RPA implementation. Specifically, Section 9.5.2 of the BiOp calls for the Action Agencies' 2003 annual progress report to provide a "comprehensive and cumulative" assessment of RPA actions to date, with a focus on hydro measures, offsite mitigation and research, monitoring and evaluation (RM&E) activities identified as most crucial for implementation by 2003 (identified as "Category II" in the BiOp's Appendix F). It asks primarily for a programmatic review – evaluation of whether programs are implemented or moving forward as expected in these key areas – at this point in the 10-year BiOp schedule. The status of listed fish affected by these actions will be more thoroughly evaluated at future check-ins in 2005 and 2008.

To differentiate this document from previous annual progress reports, it has been titled the *2003 Check-In Report*. Given the close timing of this report and the *2002 Progress Report*, the quantity of new information for 2003 is limited. We expect to prepare a 2003 Progress Report in spring 2004 to fully document progress occurring in FY 2003.

Organization of the Report

The *2003 Check-In Report* includes the following sections:

Section I –What is the Purpose of this Report? A general description of this report's purpose and the Action Agencies' approach to BiOp implementation

Section II – What Have We Accomplished for Fish Conservation?

Section III — How Are Listed Salmon and Steelhead Doing? A summary of adult returns and juvenile survival through the FCRPS as of August 2003.

Section IV — What is the Status of Performance Standards and Measures? A summary of progress made in developing performance standards and measures, which are critical for managing available resources to achieve species recovery.

Section V – Conclusions. An overall assessment of BiOp implementation progress to date, including a summary of actions benefiting specific ESUs and the Action Agencies' findings about its progress meeting specific 2003 Check-In requirements.

[1] NOAA Fisheries is the new official name for the former National Marine Fisheries Service, or NMFS.

Section VI – Reports Addressing Individual Check-In Criteria. Additional information on authorization and funding issues; research, monitoring and evaluation (RM&E) studies; the progress of subbasin planning and implementation of offsite mitigation plans; development of performance standards and measures; and returns/survival status of listed fish.

Strategy and Implementation Structure

This *2003 Check-In Report* is focused on the Action Agencies implementation of the RPA actions in the BiOp. The Action Agencies BiOp implementation is guided by a fundamental strategy – the implementation of recovery actions broadly and comprehensively across all aspects of the salmon life cycle. This "All-H" approach (hydro, habitat, hatchery and harvest) is supported by scientific reviews, and is consistent with principles in the Northwest Power and Conservation Council (Council) Fish and Wildlife Program, the Tribal Salmon Recovery Plan, the Four Governors' Recommendations, and other state plans.

To guide our BiOp implementation efforts, the Action Agencies are using a disciplined, structured approach designed to ensure clear direction, effective use of resources, accountability for results, and adaptive management techniques. Our implementation plans reflect this structured approach, described below and illustrated in Figure 1.

The structure includes:

- **Goals** that summarize what we want to accomplish to meet our ESA obligations, working in combination with other recovery efforts in the Columbia Basin.
- **Strategies** and substrategies, which explain how we propose to achieve performance standards for each H-category – **hydrosystem** improvements**, habitat** protection and enhancement**, hatchery** and **harvest** reforms – as well as strategies for **resident fish** and **research, monitoring, and evaluation.** These strategies and substrategies support the *All-H Strategy* approach.
- **Priorities** within each strategy that identify desired outcomes and specify targets for implementation for the next five-year period.
- **Performance standards** that provide measures of success at several levels. Performance standards are expected to be adjusted over time as new information becomes available

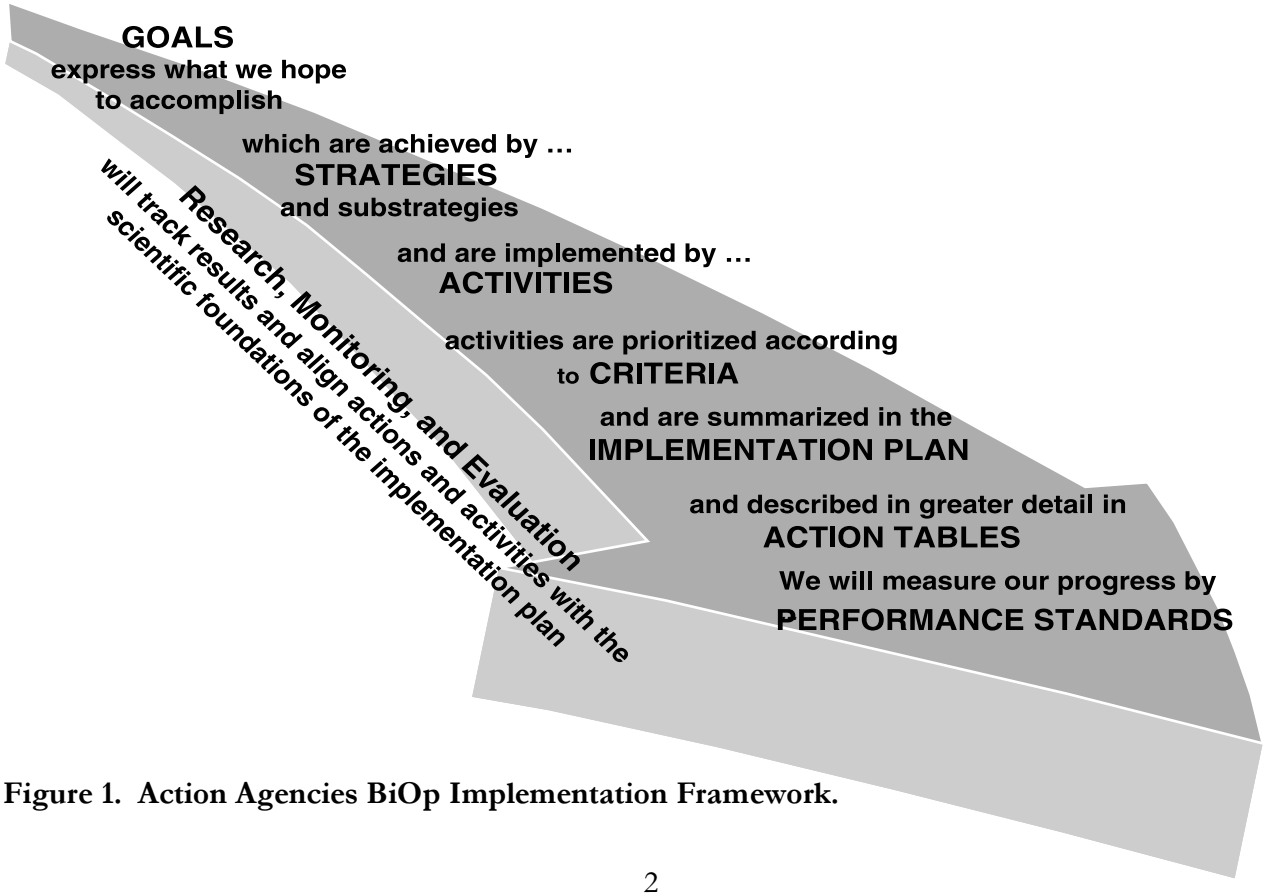


Figure 1. Action Agencies BiOp Implementation Framework.

Strategies used by the Action Agencies to implement the BiOp support the approach of the *All-H Strategy* and are listed by "H" in Table 1. Complete descriptions of the various strategies and substrategies can be found in our implementation plans.

Table 1. Action Agencies' Strategies for BiOp Implementation

Hydrosystem Strategies
- Configure dam facilities to improve adult and juvenile fish passage and survival.
- Manage water to improve juvenile and adult fish survival.
- Operate and maintain fish passage facilities to improve fish survival.

Habitat Strategies
- Protect and enhance tributary habitat.
- Protect and enhance mainstem habitat.
- Protect and enhance estuary habitat.

Hatchery Strategies
- Implement a safety-net program as an interim measure to avoid extinction.
- Reduce potentially harmful effects of artificial production to aid recovery through hatchery reform.
- Contribute to the development and implementation of a comprehensive marking plan.

Harvest Strategies
- Develop fishing techniques to enable fisheries to target non-listed fish while reducing harvest-related mortality of ESA-listed species.
- Improve harvest management assessments, decisions, and evaluations.
- Support sustainable fisheries for the meaningful exercise of tribal fishing rights and non-tribal fishing opportunities consistent with the recovery effort.
- Fishery effort reduction program

Research, Monitoring & Evaluation Strategies
- Population status monitoring.
- Action effectiveness monitoring and research.
- Critical uncertainties research.
- Project implementation monitoring.
- Data management system.
- Regional coordination.

II. What Have We Accomplished for Fish Conservation?

Implementation is on Track

Collectively, the Action Agencies are spending approximately $400 million for fish and wildlife mitigation annually, not including foregone power revenues and costs of purchasing replacement power which average over $300 million annually. This represents an increase of approximately 28% since the 2000 BiOp was issued. The three agencies' combined program for Columbia basin fish and wildlife is one of the nation's – and possibly the world's – largest conservation programs for natural resources. The actions the agencies take using these funds and their legal authorities have far-reaching effects on all fish and wildlife, but especially on listed salmon and steelhead, which receive the bulk of all money spent.

Implementation has been timely overall, with the great majority of RPA actions proceeding on schedule. The exceptions are actions that have been delayed by one to three years due to appropriations processes or lack of authority (for the Corps); regional coordination (for BPA projects funded through the Northwest Power and Conservation Council or requiring additional input from NOAA Fisheries); or necessary environmental reviews. The Action Agencies fully support the need for regionally coordinated fish recovery efforts. However, the mechanics and resource commitments needed to allow for an adequate level of regional coordination contribute to a slower pace of implementation than was anticipated in the BiOp.

In its *May 2003 Findings Letter*, NOAA Fisheries found that 117 of the 124 key (Category II) actions identified by the BiOps as crucial for implementation on or before 2003 are being "implemented as expected" or otherwise on track (modified, but still fulfilling BiOp expectations). Although the Action Agencies recognize that a simple tally of RPA Actions implemented is not an accurate measure of success, we believe we are addressing issues that are hindering full implementation of the BiOp.

In this *2003 Check-In Report* and the *2004-08 Implementation Plan*, the Action Agencies include remedies for these areas of concern. For example, in Report 2 of this Check-In Report, we discuss efforts to address RM&E issues. In Report 3, we discuss an interim framework to identify habitat actions and priorities while subbasin plans are being developed. Other areas of concern are addressed primarily through the Implementation Plan. Among important actions completed or moving forward during the first three years of BiOp implementation:

- **Dam improvements.** Building on activities in the earlier BiOp implementation years, the Action Agencies have now completed 17 reconfiguration projects at federal dams to improve fish passage and survival, as well as monitoring. These projects will assist adult fish passage at Bonneville and John Day, Ice Harbor and Lower Granite dams, and will enable drafting of cold water from the Dworshak Dam reservoir to aid summertime adult migration in the lower Snake River. Juvenile fish passage improvements have been made at Bonneville, McNary, Lower Monumental and Lower Granite dams. In addition, funds were obtained to begin detailed design
- **Water management.** In 2002 and spring 2003, the Action Agencies were able to operate federal reservoirs to supplement natural stream flows for migrating fish as called for in the BiOp. Drought conditions in 2001 resulted in flows less than flow objectives for both the spring or summer seasons. Dry conditions in summer 2003 did not allow summer objectives to be realized at Lower Granite, Priest Rapids or McNary, though for

spring 2003, average flows exceeded objectives at those projects. NEPA documentation was completed to allow VARQ flood control (and resulting stream flow improvements) to begin on an interim basis at Libby Dam in 2003, and Hungry Horse Dam in 2002. Specified levels of spring and summer spill to improve juvenile fish passage and survival occurred at all Columbia and Snake river dams except Lower Monumental in 2002 (due to ongoing repairs of the spillway stilling basin) and in 2003 at McNary (due to spill gate outage) and Ice Harbor due to the need to evaluate causes for lower than anticipated spillway survival. Also, the specified spill levels were not met in 2001 due to a long-term power system emergency. Limited spill was provided in spring and summer at Bonneville and The Dalles, while limited summer spill was provided at John Day and McNary.

- **Fish transportation.** The Juvenile Fish Transportation Programs continue to assist juvenile salmon and steelhead to bypass federal dams in the lower Snake and Columbia rivers. The number of juveniles transported in 2001 totaled 22,331,085; in 2002 the total was 14,097,124; in 2003 (as of mid-August) the total was 17,000,953. In accordance with the BiOp, the 2001 program was "aggressive" and maximized juvenile fish transportation during the drought, but the opposite occurred in 2002, with emphasis on "spread the risk" management.

- **Tributary habitat improvements.** Hundreds of projects to improve habitat for listed and jeopardized fish have been completed during the past three years. In 2002 alone, nearly 250 habitat projects were undertaken in 20 subbasins throughout Oregon, Washington and Idaho. By the end of 2003, many of the existing projects will continue and new projects will be initiated throughout the Columbia basin.

  Tributary project priorities are to increase water in streams and reduce barriers to fish passage. For example, the Action Agencies continue to fund measures to increase flows during critical fish migration periods, such as during the late summer in the lower Lemhi River in Idaho, and have established an innovative, experimental "water brokerage" that will coordinate state and local efforts to increase tributary flows.

  To improve fish passage in the tributaries, Reclamation has initiated programs to address flow, passage and diversion screening problems in nine priority subbasins identified in the BiOp. These include the upper Salmon, Little Salmon, and Lemhi subbasins in Idaho; the middle Fork John Day, North Fork John Day, and upper John Day in Oregon; and the Methow, Wenatchee and Entiat subbasins in Washington.

  BPA has funded projects to acquire 165 cubic feet per second in additional stream flows for fish throughout nine subbasins and removed or improved passage barriers to reopen nearly 700 miles of stream in 12 subbasins.

  In addition to in-stream projects, the Action Agencies have helped restore and/or protect adjacent "riparian buffer" lands around streams. In 2002, for example, nearly 200 miles of important stream-side habitat (more than 19,000 acres total) was protected from future erosion or contamination.

- **Mainstem habitat improvements and related actions.** The Action Agencies are funding studies and projects geared toward improving the lower Columbia and Snake Rivers environment, particularly for spawning chum salmon. Actions include restoring woody riparian habitat in the lower Snake River, reintroducing chum into Duncan Creek near Skamania, Washington, and continuing to minimize the impact of predators like Caspian terns and northern pikeminnows through various control measures.

- **Estuary habitat improvements.** The Corps is planning multiple estuary habitat restoration projects. When completed by 2007, these projects will restore and/or protect more than 1,500 acres of estuary habitat. For example, a project on Crims Island near Clatskanie, Oregon, has acquired and will protect about 451 acres of tidal emergent marsh, swamp, slough and riparian forest habitat to benefit fish. The Action Agencies continue to ad-

dress issues regarding acquisition of additional land (see Report 1). In addition, the Corps and BPA are working with regional groups to develop an overall plan addressing the habitat needs of salmon and steelhead in the estuary, to be completed this year. To guide future actions, research continues on where and how salmon use the estuary for feeding and rearing.

- **Hatchery reforms.** The Action Agencies, working with federal and regional partners, made considerable progress toward developing new hatchery and genetic management plans (HGMPs) to guide hatchery reform and aid recovery of listed fish. Phase 1 plans summarizing current operations and reforms needed to comply with the ESA were drafted for all 169 hatchery programs in July 2003. Phase II HGMPs, covering proposed improvement options that will also be incorporated into subbasin planning, will be completed by December 2003 and, following regional and technical review, will culminate in Phase III (final) plans in spring 2004.

- **Safety-net programs.** The four-step Safety-Net Artificial Propagation Program (SNAPP) to identify and aid the most severely endangered fish populations continues to gather steam. A report analyzing the extinction risk of some 77 populations will be completed this year. The next step will be development of intervention options using artificial propagation (for example, supplementation or captive breeding programs). In the meantime, BPA continues to fund ongoing artificial propagation programs that function as safety-nets for populations of Snake River sockeye, spring/summer and fall Chinook, and mid- and lower Columbia steelhead.

- **Marking plans.** The Action Agencies continue to fund tagging ("marking") of hatchery fish, which allows biologists and commercial/recreational fishers to more easily identify hatchery versus wild salmon and minimize risks to the latter. Work on a comprehensive marking plan continues.

- **Wild fish harvest reduction.** The Action Agencies continued to test alternative fishing gear in non-tribal fisheries and provide improved gill nets to tribal commercial fishers to reduce the incidental catch of endangered steelhead and salmon. Using sonar, the agencies located and removed eight submerged fishing nets that could have posed risks to listed fish. In addition, the Action Agencies continued supporting the Columbia River Terminal Fisheries Project, a hatchery fish targeting effort to protect wild Chinook and coho salmon in Youngs Bay and other lower Columbia sites below Bonneville Dam. Increased returns resulting, in part, from this program represented a value of about $1.5 million for commercial and recreational fisheries in 2002.

- **Regional research, monitoring and evaluation (RM&E) plan.** The Action Agencies are spending roughly $70 million annually on studies to help improve our understanding of how various actions affect fish survival, in order to fine-tune future actions and better measure their results. These RM&E studies are guided by a comprehensive RM&E Plan being jointly developed by the Federal Caucus agencies and coordinated with other regional, state, tribal, and federal monitoring programs. This plan represents a significant advancement in the region's monitoring and evaluation efforts because it provides a means for the federal agencies to synchronize their approaches to salmon study, especially for habitat-related actions, and to work jointly with states and tribes to develop common monitoring methods and study designs. Many of the studies are on the cutting-edge of scientific inquiry and will require multiple years of investigation to provide definitive results.

Key Actions Benefiting ESUs

The following table summarizes key actions undertaken by the Action Agencies by ESU:

Table 1. Key Actions Benefiting ESUs, 2001-2003

	Upper Columbia ESUs	Mid-Columbia ESUs	Lower Columbia ESUs	Snake River ESUs
	Chinook (spring) **Steelhead**	**Steelhead**	**Chinook** **Chum** **Steelhead**	**Chinook (spring, summer & fall)** **Sockeye** **Steelhead**
Hydropower Actions				
Reconfigure dams to improve fish passage				
	Reconfigured exit control section of the fish ladder at John Day Dam. Added spillway deflectors at Bonneville Dam to decrease gas impacts to juvenile and adult fish. Installed corner collector at Bonneville 2nd powerhouse to improve juvenile passage. Installed spillway training wall at The Dalles Dam.	Added spillway deflectors at Bonneville Dam to decrease gas impacts to juvenile and adult fish. Installed corner collector at Bonneville 2nd powerhouse to improve juvenile passage.	Added spillway deflectors at Bonneville Dam to decrease gas impacts to juvenile and adult fish. Installed corner collector at Bonneville 2nd powerhouse to improve juvenile passage.	Reconfigured exit control section of the fish ladder at John Day Dam. Added spillway deflectors at Bonneville Dam to decrease gas impacts to juvenile and adult fish. Installed corner collector at Bonneville 2nd powerhouse to improve juvenile passage. Installed spillway training wall at The Dalles Dam. Installed and tested a removable spillway weir to enable surfaces pill passage at Lower Granite.
Manage water to improve juvenile and adult fish survival				
	Managed storage reservoirs to enable refill and enable flow to aid juvenile fish migration and passage. Implemented VARQ on interim basis. Provided summer spill at Ice Harbor, John Day, the Dalles and Bonneville dams. Operated Bonneville 2nd powerhouse as priority to aid juvenile fish passage.	Managed storage reservoirs to enable refill and enable flow to aid juvenile fish migration and passage. Implemented VARQ on interim basis. Provided summer spill at Ice Harbor, John Day, the Dalles and Bonneville dams. Operated Bonneville 2nd powerhouse as priority to aid juvenile fish passage.	Managed storage reservoirs to enable refill and enable flow to aid juvenile fish migration and passage. Implemented VARQ on interim basis. Provided summer spill at Ice Harbor, John Day, the Dalles and Bonneville dams. Operated BOnneville 2nd powerhouse as priority to aid juvenile fish passage. Managed flows to aid adult chum spawning and protect pre-emergent chum.	Managed storage reservoirs to enable refill and enable flow to aid juvenile fish migration and passage. Implemented VARQ on interim basis. Provided summer spill at Ice Harbor, John Day, the Dalles and Bonneville dams. Operated Bonneville 2nd powerhouse as priority to aid juvenile fish passage. Drafted cold water from Dworshak dam to aid adult fish migration to aid juvenile fish passage.

	Upper Columbia ESUs	Mid-Columbia ESUs	Lower Columbia ESUs	Snake River ESUs
Operate and maintain fish passage facilities to improve fish survival				
	Continued operation and maintenance of fish screens and ladders.	Continued operation and maintenance of fish screens and ladders.	Continued operation and maintenance of fish screens and ladders.	Continued operation and maintenance of fish screens and ladders.
	Rehabilitated Bonneville 2nd powerhouse juvenile bypass system.	Rehabilitated Bonneville 2nd powerhouse juvenile bypass system.	Rehabilitated Bonneville 2nd powerhouse juvenile bypass system.	Rehabilitated Bonneville 2nd powerhouse juvenile bypass system.
	Continued rehab of Bradford Island & Cascade Island fish ladder system at Bonneville Dam.	Continued rehab of Bradford Island & Cascade Island fish ladder system at Bonneville Dam.	Continued rehab of Bradford Island & Cascade Island fish ladder system at Bonneville Dam.	Continued rehab of Bradford Island & Cascade Island fish ladder system at Bonneville Dam.
				Continued juvenile fish transportation program.
Tributary Habitat Actions				
Subbasins (BiOp priority subbasins are shown in bold. NOAA's Lemhi, Little Salmon, and Upper Salmon subbasins are contained within the Council's larger **Salmon** subbasin)				
	Columbia Lower Middle, Columbia Upper, Columbia Upper Middle, **Entiat**, **Methow**, Okanogan, **Wenatchee**	Big White Salmon, Columbia Gorge, Columbia Lower Middle, Deschutes, Fifteenmile, Hood, **John Day**, Klickitat, Umatilla, Walla Walla, Yakima	Big White Salmon, **Columbia Estuary**, Columbia Gorge, **Columbia Lower**, Cowlitz, Elochoman, Grays, Hood, Kalama, Klickitat, Lewis, Little White Salmon, Sandy, Washougal, Willamette, Wind	Asotin, Clearwater, Coeur D'Alene, Grande Ronde, Imnaha, **Salmon**, Snake Hells Canyon, Snake Lower, Snake Upper
Enhance fish flows				
	Acquired 25 cfs of instream flows in the **Methow** subbasin.	Acquired more than 40 cfs of instream flows in the John Day subbasin and more than 60 cfs in 5 other subbasins.		Acquired more than 30 cfs of instream flows in the Salmon subbasin. Replaced a pumped diversion from the upper Salmon River to allow fish passage during low flow periods.

	Upper Columbia ESUs	Mid-Columbia ESUs	Lower Columbia ESUs	Snake River ESUs
Improve fish passage				
	Removed 8 fish passage barriers and opened 2-1/2 stream miles of fish habitat in the Wenatchee subbasin. Removed fish passage barriers and opened 8 stream miles in the Methow subbasin.	Removed or improved 8 diversion dams and installed 10 irrigation diversions in the John Day subbasin; removed more than 35 barriers and opened more than 435 stream miles in other subbasins.	Removed fish passage barriers and opened more than 300 stream miles in the Hood, Klickitat, and Willamette subbasins.	Replaced or installed 118 screens, removed 4 push-up dams and 28 barriers, and opened 16 stream miles in the Salmon subbasin.
Protect and enhance fish habitat				
	Protected over 60 acres of high-quality, self-sustaining riparian habitat in the Okanogan subbasin.	The Wagner Ranch and Forrest Ranch acquisitions in the John Day subbasin secured 25.2 cfs of water rights and protection for over 14 river miles and 13,800 acres of productive habitat. Additional lease agreements in the John Day are protecting at least 1022 acres and 43 river miles of habitat. Acquisitions and agreements in 6 other subbasins are protecting over 4,700 acres and 75 stream miles.	Secured a conservation easement to protect 3.6 acres of riparian habitat and opened 110 river miles in the Hood subbasin.	Protected over 50 river miles and 3,000 acres of high-quality, self-sustaining riparian habitat in priority and non-priority subbasins. Opened 13 miles of stream, fenced 6 miles of stream banks, and protected 14 acres of riparian habitat in the Salmon subbasin. Secured conservation easements to protect over 20 river miles in the Grande Ronde subbasin. Installed 9 sediment basins, enhanced 370 acres of habitat, and protected 1 river mile of riparian buffers in the Asotin subbasin. Protected, restored and enhanced riparian and in-stream habitat in the Clearwater subbasin.
Mainstem Habitat Actions				
Improve spawning conditions				
	N/A	N/A	Reintroduced chum into Duncan Creek which provided a protected spawning and incubation environment.	N/A

	Upper Columbia ESUs	Mid-Columbia ESUs	Lower Columbia ESUs	Snake River ESUs
Estuary Habitat Actions				
Protect and enhance habitat in the estuary				
	Acquired 451 acres of tidal emergent marsh, swamp, slough, and riparian forest habitat on Crims Island in the upper Columbia River Estuary.	Acquired 451 acres of tidal emergent marsh, swamp, slough, and riparian forest habitat on Crims Island in the upper Columbia River Estuary.	Acquired 451 acres of tidal emergent marsh, swamp, slough, and riparian forest habitat on Crims Island in the upper Columbia River Estuary.	Acquired 451 acres of tidal emergent marsh, swamp, slough, and riparian forest habitat on Crims Island in the upper Columbia River Estuary.
Hatchery Actions				
Use safety-net programs to prevent extinction of critically depressed fish populations				
	The Mid Columbia PUDs, not the Action Agencies, manage captive broodstock for these ESUs.	Collected and spawned steelhead populations through the Umatilla Hatchery Program.	Collected and spawned steelhead populations through the Parkdale Fish Facility and Hood River Powerdale/ Oak Springs hatchery program.	Through captive breeding and rearing programs, supplemented 7 Snake River spring/summer Chinook populations and Snake River sockeye. In 2002, the Grande Ronde program produced 710 mature spring Chinook, and released 408,000 smolts. The Idaho Chinook program released adult fish that constructed 33 redds (nests). The spring Chinook program generated more than 357 adults for the Salmon River basin and over 313 adults for the Grand Ronde River basin. The Redfish Lake Sockeye program produced adults and juveniles for release in Idaho.
Mark hatchery produced salmon				
	All federally owned hatcheries are marking fish intended for harvest.	All federally owned hatcheries are marking fish intended for harvest.	All federally owned hatcheries are marking fish intended for harvest.	All federally owned hatcheries are marking fish intended for harvest.

	Upper Columbia ESUs	Mid-Columbia ESUs	Lower Columbia ESUs	Snake River ESUs
Harvest Actions				
Support sustainable fisheries				
	The Youngs Bay and Tongue Point select area fisheries projects and implementation of live capture selective methods reduced harvest impacts to Chinook populations.	The Youngs Bay and Tongue Point select area fisheries projects and implementation of live capture selective methods reduced harvest impacts to Chinook and steelhead populations.	The Youngs Bay and Tongue Point select area fisheries projects and implementation of live capture selective methods reduced harvest impacts to Chinook and steelhead populations.	The Youngs Bay and Tongue Point select area fisheries projects and implementation of live capture selective methods reduced harvest impacts to Chinook and steelhead populations.
Improve fishing techniques/gear to reduce mortality				
	Use of larger mesh gillnets reduced incidental harvest impacts to steelhead.	Use of larger mesh gillnets reduced incidental harvest impacts to steelhead.	Use of larger mesh gillnets reduced incidental harvest impacts to steelhead.	Use of larger mesh gillnets reduced incidental harvest impacts to steelhead.
Other Actions				
Predator Control				
	Relocated Caspian terns to East Sand Island and implemented other avian deterrent actions to reduce consumption of juvenile salmon.	Relocated Caspian terns to East Sand Island and implemented other avian deterrent actions to reduce consumption of juvenile salmon.	Relocated Caspian terns to East Sand Island and implemented other avian deterrent actions to reduce consumption of juvenile salmon.	Relocated Caspian terns to East Sand Island and implemented other avian deterrent actions to reduce consumption of juvenile salmon.
	Continued sport reward and directed fisheries to decrease Northern Pikeminnow predation of juvenile Chinook (est. 25% annual reduction in predation losses from northern pikeminnow).	Continued sport reward and directed fisheries to decrease Northern Pikeminnow predation of juvenile Chinook (est. 25% annual reduction in predation losses from northern pikeminnow).	Continued sport reward and directed fisheries to decrease Northern Pikeminnow predation of juvenile Chinook (est. 25% annual reduction in predation losses from northern pikeminnow).	Continued sport reward and directed fisheries to decrease Northern Pikeminnow predation of juvenile Chinook (est. 25% annual reduction in predation losses from northern pikeminnow).

Regional Coordination

The Action Agencies have coordinated BiOp implementation actions with a number of regional, state and tribal fish recovery programs and organizations. These include the State-Tribal-Federal Partnership, the Northwest Power and Conservation Council (Council) and its Fish and Wildlife Program, the NOAA Regional Implementation Forum for hydropower actions, the Columbia Basin Fish and Wildlife Authority (CBFWA), the Lower Columbia River Estuary Partnership (LCREP), and many more, as listed throughout this report.

The Action Agencies' goal has been to integrate ESA priorities and needs under the NOAA and U.S. Fish and Wildlife Service BiOps with ongoing regional efforts to conserve fish and wildlife. While there are sometimes differences in views among the Action Agencies and other regional interests, these various regional forums provide an excellent opportunity to recognize

these differences and collectively work on resolutions. We believe most regional interests support the current performance-based, "all-H" approach for improving Columbia basin salmon and steelhead runs, and regional coordination is improving and strengthening over time.

The Four Governors' Recommendations

In June 2003 the governors of Idaho, Washington, Montana and Oregon sent a joint letter to the region recommending a consensus policy for protecting and restoring Columbia Basin fish and wildlife while preserving the benefits of the FCRPS. The 2003 letter built on earlier recommendations submitted by the governors in July 2000 on the same topic. The Action Agencies' implementation of ESA actions under the BiOp reflects the important advice provided by the region's Governors. We strongly support the governors' recommendations for a comprehensive approach to fish and wildlife recovery, an emphasis on subbasin planning, accountability for results, coordinated research and monitoring, and the development cost effective approaches for fish and wildlife mitigation measures.

Implementation Challenges

A number of institutional hurdles have been encountered as the Action Agencies have implemented required actions under the BiOp. As stated in the Action Agencies' Records of Decision, certain implementation actions required additional funding and /or authorization. As noted below, the schedule can be impacted by delays.

- Funding appropriations are not always timely or sufficient to carry out even widely supported actions, such as construction of the Chief Joseph flow deflectors. Funding limitations also affect NOAA Fisheries' efforts to analyze data that apply to performance standards. In general, both major sources of funding for BiOp actions—Congressional appropriations and BPA revenues—are often constrained and not under complete control of the Action Agencies.
- There are gaps in authorization to address other requirements; for example, lack of authority for Reclamation to construct screens and retrofit passage barriers on non-federal projects, and lack of land acquisition authority for the Corps in carrying out habitat restoration.
- Some federally funded RPA actions utilize information and the planning processes of other entities'. In some instances there have been delays in planned development, which in turn may compromise full and timely completion. An example of this is subbasin planning.
- Regional coordination often results in broader regional buy-in, but takes time. It necessarily involves a large number of organizations with a complex framework of jurisdictions and goals. Several forums and committees exist to address issues, which may be cast in such terms as "upstream" vs. "downstream" interests, resident vs. anadromous fish, and biological benefits vs. economic costs. Inevitably, debates occur as parties express their interests.
- Litigation on aspects of the BiOp, its implementation, and related issues often diverts resources and slows progress on implementation.

We must acknowledge that salmon and steelhead conservation is a complex undertaking, involving multiple interests, jurisdictions, and conflicts within the region. Despite these hurdles, it's encouraging that the various interests with resource management responsibilities continue to work together to address the needs of listed species along with the other demands placed on the Columbia system.

III. How Are Listed Salmon and Steelhead Doing?

Overall, salmon and steelhead populations in the Columbia River basin have made a dramatic rebound in their abundance. Many of the runs in 2001 and 2002 were several times greater than their 10-year averages. Early 2003 runs of most listed ESUs have been strong and predictions for remaining 2003 runs are also very positive. Additionally, the age structures of this year's spring and summer runs indicate strong runs are likely again in 2004.

A dominant cause of these increasing returns appears to be a turnaround in ocean productivity (see Report 6). This improved ocean environment can enhance our efforts to improve conditions for salmon and steelhead in freshwater. Improved fish passage at Columbia and Snake River dams and better habitat, hatchery and harvest practices are also contributing. In many locales, the adult fish are encountering improved spawning habitat and the potential for even greater runs of wild fish in future years continues to improve.

Of the eight ESA-listed "evolutionarily significant units" (ESUs) that NOAA Fisheries determined were jeopardized by FCRPS operations in the 2000 BiOp, seven are demonstrating increased abundance and trend estimates, as shown in Figures 2 and 3. These are Snake River spring/summer Chinook, Snake River fall Chinook, upper Columbia River spring Chinook, Snake River steelhead, upper Columbia River steelhead, mid-Columbia River steelhead and Snake River sockeye. With the trends of these seven ESUs now positive, their short-term risk of extinction has lessened considerably. Nevertheless, the Snake River sockeye continues in a precarious status due to the very small numbers of remaining fish in that ESU. Although there were small increases in recent runs, the substantial survival improvement of the other salmon ESUs has not manifested itself in this limited population. Its future continues to rest on success of the captive broodstock program.

Of the four listed ESUs that NOAA Fisheries determined were not jeopardized by the FCRPS, two (upper Willamette River Chinook and steelhead) are demonstrating increasing population abundances. The populations that comprise the lower Columbia River Chinook ESU have shown a mixed status, with some increasing and others decreasing. Abundance of the lower Columbia River steelhead ESU continues to decline and merits further attention.

The BiOp also included ESU-specific estimates of population growth rate that were based on adult fish returns through 1999. Recently revised estimates of population growth rate for ESUs (Snake River steelhead and fall Chinook) include adult returns through 2001 and show marked improvements.

The Action Agencies continue to monitor the status of salmon and steelhead ESUs that have not been ESA-listed to ensure that the FCRPS does not jeopardize their viability.

A more complete view of the status of listed fish is provided in Report 6.

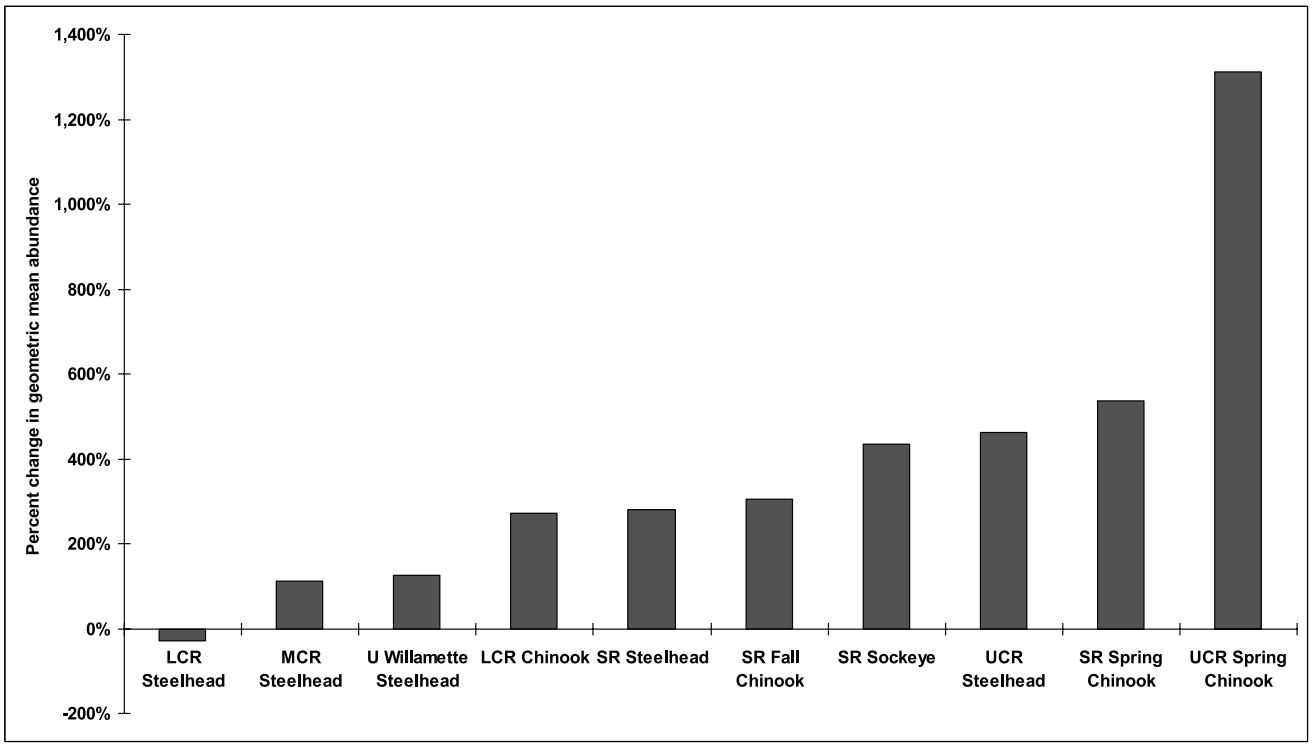


Figure 2. Percent change in adult abundance for listed ESUs from the pre- to the post-BiOp period (data not available for lower Columbia River chum and upper Willamette River spring Chinook).

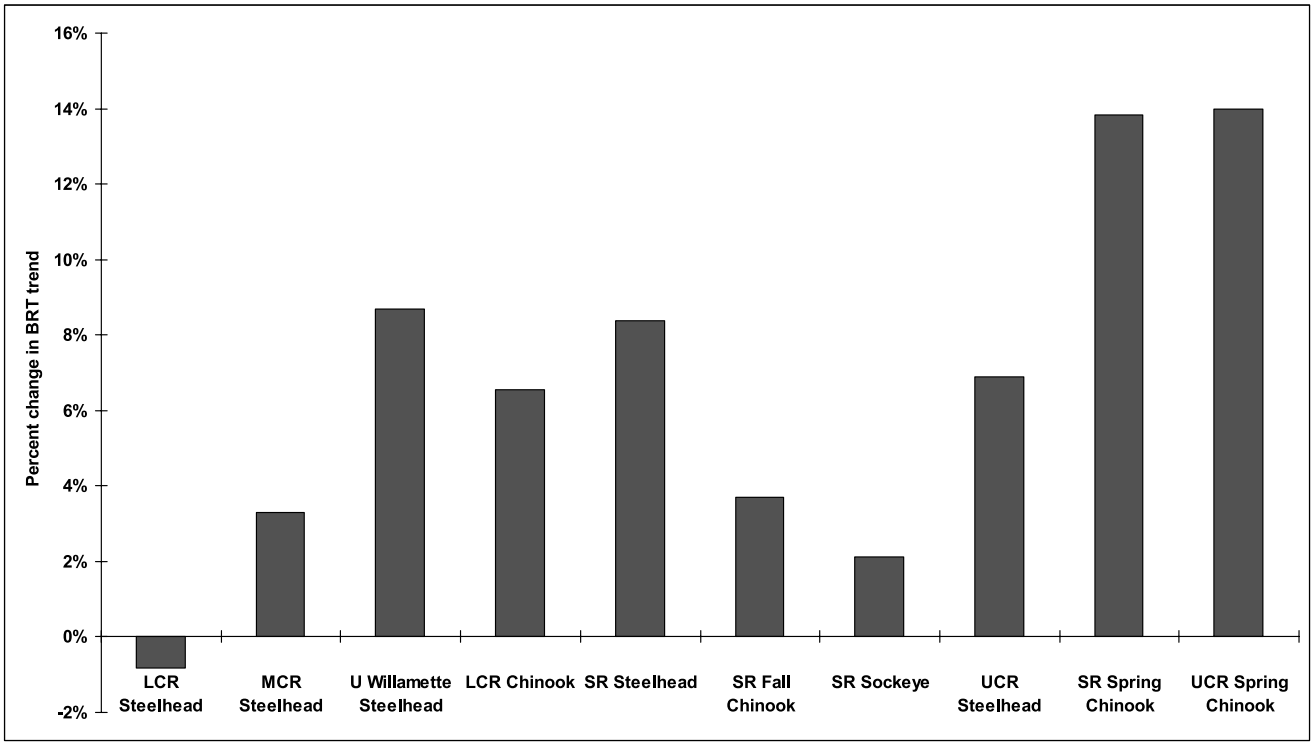


Figure 3. Percent change in the adult abundance trend slope for listed ESUs from the pre- to the post-BiOp period (data not available for lower Columbia River chum and upper Willamette River spring Chinook).

IV. What is the Status of Performance Standards and Measures?

Performance standards and measures are critical for managing available resources to achieve species recovery under the Endangered Species Act. *Performance standards* establish the level of improvement needed for survival and recovery, while *performance measures* are the pulse that is monitored to assess progress towards or compliance with specified standards. A complete description of the performance reporting system developed by the federal agencies is provided in Report 4.

Performance measurement for ESA implementation needs to occur at multiple levels, from programmatic responses (called Tier 4), physical and biological responses (Tier 3), and life-stage survivals (Tier 2), to actual population responses (Tier 1). These are described more fully in Report 4.

Population performance measures.

The Action Agencies are using the best available information on adult abundance and population trends and are attempting to standardize how we present and use this information from year to year. We also consider changes in population growth rate, as determined by NOAA Fisheries, as a longer-term measure of success. The ESU abundance standards developed by NOAA Fisheries are interim de-listing targets. When final de-listing and recovery criteria are developed by NOAA Fisheries, these criteria will supersede the interim population standards included here.

Hydrosystem performance standards.

As noted, performance standards and measures for both juvenile and adult fish passage through the FCRPS are described in Report 4. Current survival results are provided in Report 6. We continue to support and apply the adult and juvenile survival standards set by the BiOp. The Action Agencies believe the primary performance standard should be juvenile total system survival, with in-river juvenile survival as a secondary standard.

Habitat performance measures.

For habitat improvements, the Action Agencies have developed an initial set of performance measures accounting for Tier 3 biological and physical conditions and Tier 4 programmatic actions. More detailed, standards for these metrics are currently being developed through the RM&E Program and will be available in future progress reports. Habitat physical and biological performance measurements relative to these standards will help identify where and what kinds of additional habitat improvements need to be implemented (*i.e.* limiting factors for tributary habitat). The measurement of physical and biological performance and the effectiveness of habitat actions will be accomplished through the RM&E Program, but it will take several years for reliable information from these efforts. In the interim, the Action Agencies are using a biologically based framework to prioritize habitat actions with the highest potential benefits to the most at-risk ESUs.

Hatchery performance standards.

For hatchery reforms, the Action Agencies are providing an initial set of performance standards and measures directed at Tier 3 and 4 actions. These performance guidelines are intended to serve until a more comprehensive set is developed through the NOAA Fisheries'

process to develop Phase III Hatchery and Genetic Management Plans. The Action Agencies' performance standards address the priority hatchery reforms outlined in the 2000 BiOp and are repeated in Table 4-4. Additionally, the Action Agencies have proposed a prioritization system for implementing hatchery reforms to pursue the most cost-effective actions with the highest potential benefits to those ESUs most in need of better performance.

Harvest performance standards.

The Action Agencies continue to consider harvest measures that will benefit ESA-listed fish, but currently do not have further performance standards or measures for harvest.

Ocean environment.

In considering performance measurement, it is clear that the ocean environment greatly affects the life-cycle survival of salmon and steelhead (see Report 6). As a result, the Action Agencies will routinely report on ocean conditions as they evaluate their ESA performance.

Cost-effectiveness.

While comprehensive performance management is critical to successfully achieve ESA goals, long-term management should also be cost-effective, as the Council, the four Northwest Governors, and others have noted. Clearly defined performance standards and biological objectives should be met through "least cost" alternatives, so that we are getting the most we can for the region's investment in fish conservation. Achieving performance standards and measures at least cost is relevant to the upcoming RM&E Program, the Council's Fish and Wildlife Program, and future BiOps.

V. Conclusions on Cumulative Implementation

Have We Met 2003 Check-In Requirements?

Section 9.5.2.2 of the 2000 BiOps requests that, in this *2003 Check-In Report*, the Action Agencies provide a cumulative assessment of their success implementing actions in six specified areas. Below is a summary of the Action Agencies' conclusions for each area. A full assessment of implementation progress in these areas is provided in Reports 1 through 5 that follow.

Funding and Authorizations for Timely Implementation

The Action Agencies have obtained funding and authorizations necessary to implement most key actions under the BiOp. Collectively, we are annually spending about $400 million per year for fish and wildlife mitigation. This represents an increase of approximately 28% since the 2000 BiOp was issued. Where they have occurred, neither funding nor authorization delays are expected to adversely affect near-term survival of listed fish. Prospective solutions developed during delays caused by regional coordination and environmental reviews should ultimately result in improved implementation.

Initiation of Adequate Pilot Studies, Research and Monitoring Projects

The draft RM&E Plan represents a significant advance in monitoring and evaluation because it provides a vehicle for the federal agencies to synchronize their approaches to salmon study, especially for habitat-related actions, and to work jointly with the states and tribes to develop common monitoring protocols and study designs. The Action Agencies are annually implementing approximately $70 million (the amount varies in any given year based on availability of funds and priority work) in research and monitoring projects. These studies include research and monitoring of juvenile and adult hydro survival, hatchery management changes, habitat status, effectiveness of off-site mitigation actions and critical uncertainties identified in the BiOp. Many of these studies are on the cutting-edge of scientific inquiry and will require multiple years of investigation to provide definitive results. The Action Agencies acknowledge, however, that the pilot studies, research and monitoring have not been implemented in accordance with schedules anticipated in the BiOp, because of regional coordination needs.

Development of Subbasin Assessments, Hatchery Genetic Management Plans (HGMPs) and Safety-Net Plans

Development of subbasin plans and hatchery genetic management plans have taken longer than originally anticipated in the BiOp. Delays have been encountered due to the need to ensure appropriate regional coordination. This requires collaboration with numerous interests, including states and tribes. All planning actions are underway according to revised schedules described in our implementation plans. In the meantime, the Action Agencies have funded hundreds of improvement actions targeted at high priority habitats and projects, and to fund ongoing hatchery programs, so that biological benefits are not lost while planning is underway.

The hatchery-based Safety Net Program, for fish populations facing a severe risk of extinction, has been successful. A number of safety net programs are being implemented, and others are being investigated. Given the improved

condition of many ESUs, the numbers of additional safety net efforts may be lower than anticipated when the BiOp was written.

Adoption of Detailed Site-Specific Plans to Meet Offsite Mitigation Performance Standards

Even though detailed off-site plans developed through subbasin planning and the HGMPs are not yet complete, the Action Agencies are prioritizing and implementing habitat actions using an interim biologically based framework. The Action Agencies have used this framework to rank ESUs and priority subbasin as reflected in the annual and five-year implementation plans. These plans are formulated to improve habitat conditions in all anadromous subbasins, ensuring important biological priorities for listed fish are addressed. In 2004 these plans will be further informed by subbasin planning. Additional coordination with the Council's review process will be needed to allocate funding in accordance with BiOp priorities and achieve maximum benefits for the ranked ESUs. In the longer term, the TRT "limiting factors" assessments, subbasin plans, the monitoring program for biological and physical performance relative to performance standards, and research results on the effectiveness of actions will help advance the Action Agencies' development of habitat action plans.

Development and Adoption of Biological and Physical Performance Standards

The Action Agencies are using adult abundance and trends in adult abundance as primary measures of population performance. The population growth rate (lambda) is also used as a longer-term performance metric. Further development of ESU specific recovery targets that incorporate measures of abundance, productivity trends, species diversity, and population distribution are expected from ongoing work of NOAA's Technical Recovery Teams that is being funded by the Action Agencies. Hydro survival standards are being used for adult and juvenile passage through the system, based on the BiOp. However, the Action Agencies believe the primary performance standard should be juvenile total system survival, with in-river juvenile survival as a secondary standard. Interim performance measures have been developed for habitat actions, addressing items such as passage improvements, fish screening, water quality increases, and riparian and estuary improvements. More specific physical and biological measures for habitat and hatcheries have been identified and are being addressed through the NOAA and Action Agency RME Program. Further development of performance standards utilizing these metrics is still under development and coordination.

Funding and Authorizations Obtained by Federal Caucus Agencies for Timely Implementation of Basinwide Recovery Strategy Actions

The Federal Caucus agencies have made considerable progress implementing measures identified in the Basinwide Salmon Recovery Strategy. Funding has been timely overall, although some uncontrollable factors (*e.g.,* fire suppression costs) have caused some funding resources to be redirected or reduced. Although most agencies are budgeting a steady or increasing amount of funds for fish recovery efforts each year, some agency requests have not been fully funded. For example, NOAA's RM&E requests have not been funded and this has contributed to a slower pace of development of the RM&E Plan than anticipated in the BiOp. See Report 5 and Table 5-1, *Fiscal Year 2001-2004 Funding for Columbia and Snake River and Coastal Salmon Recovery*, for full details.

Action Agencies' Conclusions on Cumulative Implementation

We believe that overall implementation of the NOAA Fisheries BiOp is on track. Almost all of the hundreds of actions we committed to implement to conserve ESA listed are underway. Where problems have arisen, most have been delays rather than inaction, caused by the nature of regional coordination, funding, or environmental review processes.

At the same time, the status of ESA-listed salmon and steelhead populations found in the Columbia River basin is improved over pre-BiOp conditions. Most are showing increased abundance, some dramatically. Runs of most listed fish were several times greater than their 10-year averages during the first 2 years after the 2000 BiOp was issued. ***In particular, seven of eight ESUs determined by NOAA Fisheries to be jeopardized by the FCRPS are showing significant improvement.***

Accountability for biological results, measured through performance standards and our research and monitoring program, remains a centerpiece of our efforts. We will continue to update and adjust our hydro, habitat, hatchery, and harvest actions through our annual progress reports and implementation plans to ensure that the Action Agencies collectively do their part for recovery of salmon and steelhead.

Report 1
RPA Action Funding and Authorizations Update

1. BiOp Expectations

The BiOp specifies that this 2003 Check-In Report will document *"whether the Action Agencies have obtained the funding and authorizations necessary for timely implementation of key actions identified in this RPA and the annual planning processes and whether those actions are being implemented as expected or in a manner likely to be effective and timely as outlined in this biological opinion. Key actions are those that 1) are expected to result in near term survival benefits for the listed stocks, 2) are preparations for implementation of additional survival improvements measures, or3) are planning, research, and monitoring actions that are important for implementation and evaluation of progress by 2005 and 2008. These expectations are the programmatic standards against which implementation success will, in part, be evaluated. Modification of the list of actions in (BiOps) Appendix F is expected through the 1- and 5-year planning consistent with these criteria above."*

2. Progress Summary and Conclusion

The Action Agencies have obtained funding and authorizations necessary to implement most key actions under the BiOp. Funding levels for each agency, and for selected RPA actions, are discussed in the following sections.

Funding: Collectively, the Action Agencies are annually spending about $400 million for fish and wildlife mitigation, in addition to costs of purchased power and foregone power revenues which average over $300 million annually. (See Table 5-1, *Fiscal Year 2001-2004 Funding for Columbia and Snake River and Coastal Salmon Recovery,* in Report 5) This represents an increase of approximately 28 percent since the 2000 BiOp was issued. Funding has been sufficient overall, with a few exceptions where actions have been delayed by one to three years due to appropriations processes.

Authorizations: Agency authority to implement the BiOp has also been generally adequate. In 2001, the Corps received new authority and funding for the estuary program as a "new start." However, the new authority does not include land acquisition capability that appears to be needed to meet the 10,000 acre restoration requirement for the estuary. Another exception is Reclamation's authority to implement tributary habitat protection. Reclamation has authority to provide technical assistance, but does not yet have authority for on-the-ground project construction. Legislation to provide this authority has been endorsed by the Administration and introduced in Congress. In the meantime, as an interim measure, BPA and others have been funding irrigation screening and passage barrier removal actions in NOAA-designated high priority subbasins for which Reclamation has provided technical assistance for survey work, design, permits, construction inspection, and other activities necessary to accomplish projects.

Conclusion: Neither funding nor authorization delays are expected to adversely affect near-term survival of listed fish and long-term effects are speculative. Prospective solutions developed during delays caused by regional coordination and environmental reviews should ultimately result in improved implementation. The Action Agencies have modified their implementation plans to reflect these new schedules.

3. Funding, Appropriations and Authorizations Update

3.1 Appropriations for the Corps of Engineers

The Corps receives Congressional appropriations and direct funding from BPA. Since issuance of the BiOp, the Corps has spent an aver-

age of $108.3 million a year on fish recovery actions. For FY 2003, the Corps received $113.5 million in funding for these efforts.

The BiOp calls for seeking funding in several areas, notably for the Columbia River Fish Mitigation (CRFM) Project, Chief Joseph Dam spillway deflectors, estuary habitat work, and a system flood control evaluation. The status of these actions is summarized here, with additional discussion by RPA action number later in this report.

CRFM. Funding for configuration actions at Corps dams, including those with specific Category II check-in requirements, has generally been carried out through the Corps' CRFM program. Annual Congressional appropriations for this program since the 2000 BiOp have been between $80 and $85 million per year, with initial work allowances somewhat reduced from these levels. Generally, these appropriations have been sufficient to provide consistent funding for high and medium priority measures, thereby allowing for reasonable progress toward the most important BiOp requirements. If similar appropriations levels continued, this should provide for the bulk of the priority research and configuration improvements anticipated to achieve performance standards within the BiOp period (by 2010).

Prioritization of CRFM measures is coordinated through the Regional Forum at several levels. The Studies Review Workgroup assists the Corps to establish priorities for specific research objectives within the overall program. The Fish Facility Design Review Workgroup helps provide direction and priorities for fish facility improvements, including development of alternatives, model studies, prototype evaluations, and final design and construction. The System Configuration Team (SCT) addresses funding priorities for the total package of potential research and facility improvement measures, generally numbering between 60 and 80 per year.

Regional Coordination

For the BiOp actions/issues discussed in this report, the Action Agencies coordinated fish recovery efforts with the following regional partners:

NOAA Fisheries Regional Forum work groups and teams – to help determine prioritization of CRFM measures for funding.

Council's Fish & Wildlife Program – through which offsite habitat improvement projects are coordinated.

Lower Columbia River Estuary Partnership (LCREP) – with which the Action Agencies coordinate estuary actions.

Chief Joseph Dam spillway deflectors. Congress appropriated $400,000 in FY 2003 to initiate detailed design. The Corps is seeking additional appropriations to fully implement this RPA action.

Estuary habitat work. As part of the Corps' Estuary Program, $2 million in funding was received for a key authority to implement restoration actions in fiscal year 2003. In addition, the CRFM project has funded research-related activities in the estuary. The Corps is developing a long-term estuary restoration program with a proposed budget of $2-5 million each year. The Corps is also developing a long term strategy for restoration in the estuary in cooperation with BPA, LCREP and the states of Oregon and Washington through the General Investigations Feasibility Study.

System flood control. The Corps received $300,000 to complete a reconnaissance study, of which $200,000 was programmed for FY 2003 and $100,000 for FY 2004.

Upper Columbia studies and NEPA documentation. Congressional appropriations and BPA direct funding support BiOp-related documentation and studies in the upper Columbia basin required by the National Environmental Policy Act (NEPA). In addition, Reclamation is providing some funding for VARQ NEPA work.

Other major actions. The Corps has funded several other major items, including the Bonneville Dam corner collector, removable spillway weirs, and VARQ flood control evaluation.

3.2 Appropriations for the Bureau of Reclamation

Reclamation also receives funding to implement BiOp activities through the Congressional appropriations process. It has received sufficient appropriations since the issuance of the 2000 BiOp to fund the required actions. The appropriation for the Columbia/Snake Salmon Recovery Program has risen from $5.6 million in FY 2001 to $15 million in FY 2003. The President's proposed level of funding is $19 million for FY 2004. Most of this increase is being used to fund Reclamation off-site habitat improvements (RPA Action 149) and research, monitoring and evaluation (RM&E) activities. About $6 million of the current funding level is for in-season hydro activities, water acquisition, and environmental reviews such as the Banks Lake Drawdown Environmental Impact Statement (EIS) and Upper Columbia Flood Control (VARQ) EIS.

3.3 BPA Funding for Hydro and Offsite Actions

BPA generates revenue through power sales to fund, among other activities, its fish and wildlife mitigation actions. The agency's fish and wildlife funding has increased significantly since issuance of the BiOp, from an annual budget of $252 million in 2000 to an average of $338 million annually from 2002 to 2006. BPA's fish funding includes repayment to the Federal Treasury of the power share of Corps and Reclamation capital expenditures[1]; direct funding agreements with the Corps, Reclamation and the U.S. Fish and Wildlife Service (USFWS) for the power share of related operations and maintenance[2]; and direct expense and capital for implementation of the offsite program. In addition, BPA makes power purchases to support implementation of fish operations at hydropower projects and experiences foregone revenues[3] which average over $300 million annually.

BPA integrates funding of BiOp offsite actions with the Council's Fish and Wildlife Program (Integrated Program). Prior to the 2000 BiOp, BPA's fish and wildlife funding was directed by a multi-agency Memorandum of Agreement (FY 1996-2001) that provided an average of $252 million per year for Columbia basin fish and wildlife activities (plus the cost of system operations for fish such as spill, flow augmentation, and the costs of power purchases required by spill and flow actions). The $252 million consisted of an annual average budget of $100 million for the direct fish and wildlife programs, $40 million for reimbursable expenses paid to other agencies, and $112 million for debt service on capital investments such as bypass facilities and hatcheries. Of this $252 million, all but the resident fish and wildlife portions of the Council program was for anadromous fish.

When the MOA expired and the Integrated Program began in December 2001, BPA began spending an average of $139 million annually in expenses and made $36 million available for capital expenditures on direct fish and wildlife activities or projects. The 39 percent increase in expense in this category above the MOA period ($100 million) was intended primarily to implement offsite BiOp actions above and beyond those already being implemented under the Council's Fish and Wildlife Program when the BiOp was issued. The $36 million in available capital for the Integrated Program represented an increase of 33 percent above the previous period. In addition, BPA's direct funding of the power share of fish operations and maintenance for the Corps, Reclamation and USFWS increased from $35.5 million in 2000 to $45.7 in 2002 and is expected to average approximately $53.7 million annually for the 2002-2006 period[4]. BPA's debt service on capital investments is expected to average $113.8 million annually for the 2002-2006 period.

BPA has the benefit of several recently completed processes and years of actual implementation experience to guide its program spending levels for fish and wildlife. The agency believes its current annual budgets of approximately $338 million (exclusive of power purchase costs and foregone revenues) are adequate for timely implementation of key BiOp actions. To ensure this is the case, the agency has made clear to all regional parties that Endangered Species Act (ESA) needs have priority for BPA expenditures.

4. Specific RPA Actions with Funding or Authorization Issues

The following RPA actions have specific funding or authorization issues that have affected their implementation. In some cases, resulting

modifications of these actions has put them off track according to the BiOp schedule. In other cases, the delay in schedule has not been a matter of concern. Here is the status of each:

4.1 Hydro Actions

Feasibility analysis of modifying current system flood control operations (RPA Action 35). This study began in 2003, delayed a year by a failure to receive appropriations in 2002. (NOAA Fisheries has determined this is an acceptable modification.) With the receipt of $300,000 in 2003, the Corps' Seattle District will complete a Section 905(b) analysis (under the Water Resources Development Act) during the first quarter of FY 2004 and a project management plan during the third quarter of FY 2004.

Chief Joseph spillway deflector (gas abatement) appropriations (RPA Action 136). Design and construction of spillway deflectors were delayed by lack of Congressional appropriations for FY 2002 "new start" projects. Subsequently, the Corps reprogrammed operation and maintenance funds to initiate modeling and then initiated detailed design after receiving Congressional funds in FY 2003 ($400,000). Hydraulic modeling and structural design are expected to conclude by FY 2004. Pending funding in FY 2004, construction contracts will be awarded for the right bank abutment, staging area, cofferdam fabrication and other activities related to pre-deflector construction. Deflector construction would begin in FY 2005, with completion expected in FY 2006.

Pending completion of the spillway deflectors, the Corps, NOAA Fisheries, and Reclamation have continued to investigate alternative ways to reduce total dissolved gas saturation in the Columbia River below Chief Joseph and Grand Coulee dams by shifting power generation from Chief Joseph to Grand Coulee and spill from Grand Coulee to Chief Joseph during times of involuntary spill involving those projects. The Interagency Water Quality Team drafted a report on such a shift.

4.2 Habitat Actions

Initiation of programs in priority subbasins (RPA Action 149). This action calls for Reclamation to initiate programs in three priority subbasins annually over five years. Reclamation is on schedule, having initiated programs in nine subbasins in three years. Reclamation is providing technical assistance in those subbasins for activities such as modifying screens and retrofitting passage barriers, but still lacks the authority to fund construction On October 30, 2002, a proposed bill was submitted to Congress to "*authorize the Secretary of the Interior to assist in the implementation of fish passage and screening facilities and habitat improvements at non-Federal water projects and on non-Federal lands when required for a Federal reclamation project in the Columbia River basin to comply with the Endangered Species Act.*" The bill was redrafted by Senate staff (S. 1307), introduced on June 20, 2003, and subsequently referred to the Senate Committee on Energy and Natural Resources. It is scheduled for a subcommittee hearing on October 8, 2003.

Estuary actions (RPA Actions 158-162). Corps appropriations of $2 million in FY 2003 are sufficient to substantially implement estuary RPA actions outlined in the BiOps, with the possible exception of RPA Action 160. This action requires the Action Agencies to protect and enhance 10,000 acres of tidal wetlands and other key habitats below River Mile 46. In order to meet RPA Action 160, a mechanism to acquire willing seller land will be necessary. Land acquisition will be the limiting factor in demonstrating progress toward the 10,000-acre figure. There is limited public land available in the lower river and much that is in public ownership is already in a productive state for fish and wildlife. The federal planning processes either through the Corps or BPA and the Council typically requires lead times on the order of years (although this can progress more quickly under certain circumstances). This timeline generally does not allow for ready acquisition of private land as it becomes available.

While the Corps has capital programs to implement actions required to restore the acreage, it does not have land acquisition authority. Land acquisition activities necessary to build restoration projects are a requirement of the non-federal sponsor under existing Corps authorities (a public or non-profit entity must own fee title or an easement on the project land). To overcome this limitation, the Corps is pursuing actions on public land as well as in areas where

existing landowners are willing to sell an interest in their property to a non-profit group. To facilitate the latter, the Corps and partner agencies are exploring the viability of a land acquisition fund. The program concept is to develop a funding source with associated criteria and process to allow a non-profit land trust to negotiate and purchase "willing seller" land as it becomes available. Corps restoration authorities, among other partners' capabilities, can then be used to implement restoration actions once the land is acquired. The advantage of this approach is that the time necessary to gain funding approval either through a grant process or the federal planning process would be significantly reduced. It would also engage local non-profits familiar with local interests and best suited to pursue land acquisition actions. The concept of the fund has been outlined before the Council's Independent Scientific Review Panel and its Independent Scientific Advisory Board. Coordination is still occurring among interested organizations.

Additionally, the Action Agencies are working to leverage their respective authorities and funding to implement habitat actions in response to RPA Action 160. BPA funding is being used to meet the non-federal requirement for Corps programs. The Crims Island acquisition, being undertaken by the Columbia Land Trust and funded by BPA, is one example of the Action Agencies working together to secure property and implement restoration actions. With the land acquisition, the Corps will fund the restoration actions on Crims Island without additional cost-share requirements once the land has transferred to USFWS. In implementing the estuary actions, the Action Agencies coordinate with LCREP to ensure the most efficient and effective use of funds and their partners' organizational capacity.

Footnotes for Report 1

[1] **Hydro Capital Expenditures:** Costs for hydro capital expenditures consist of the projected depreciation and interest payments for 1. the portion of past fish and wildlife capital investments by the Corps and Reclamation for which BPA already is obligated to repay the Treasury; and 2. the hydroelectric share of future fish and wildlife related capital investments by the Corps and Reclamation that will be funded through appropriations and then repaid to the Treasury by BPA, based on activities called for in the 2000 BiOps.

[2] **Direct Funding Agreements:** These agreements between BPA and the Corps, Reclamation and USFWS cover costs of the hydropower share of operations and maintenance and other non-capital expenditures for fish and wildlife activities that previously were funded by Congressional appropriations, recovered from FCRPS ratepayers on a current basis, and then repaid to the U.S. Treasury by BPA at the end of each fiscal year. Separate agreements have been signed with each federal agency for FY 2002 through FY 2006.

[3] **Power Purchases and Foregone Revenues:** BPA is responsible for marketing the electric power generated by the dams in the FCRPS. In doing so, it is also obligated by the Northwest Power Act to consider the needs of salmon and steelhead in its power planning. In addition, the FCRPS BiOp recommends specific project operations to avoid jeopardy to ESA listed fish, including releasing water over the dams to facilitate juvenile passage and releasing water from reservoirs to provide flows for spawning, incubation, and to aid downstream passage. In complying with these operational requirements, BPA must purchase replacement power and foregoes some power revenues.

[4] For example, during the first three years of the BiOp, funding to the Corps has increased from $23.2 million to $31.8 million.

Report 2
Pilot Studies, Research and Monitoring Projects Update

1. BiOp Expectations

The BiOp specifies that the 2003 Check-In Report will document "*whether the Action Agencies have initiated adequate pilot studies, research, and monitoring projects identified pursuant to Section 9.6.5.3 to confirm or rebut key assumptions. This documentation will include studies of the survival response to habitat actions identified pursuant to the RPA and the Federal Basinwide Salmon Recovery Strategy (All-H Strategy) as necessary to improve life-stage survivals of listed fish species*." Section 9.6.5.3, in turn, calls for more specific studies to address uncertainties regarding the impact of management actions and compliance with performance standards. In particular, this BiOp section identifies studies needed to assess the benefits to listed ESUs from hydropower corridor actions, hydropower actions outside of the corridor, and offsite mitigation, and to reduce uncertainty around the reproductive success of naturally spawning hatchery fish (and, therefore, the current status of wild populations).

2. Progress Summary and Conclusion

Regional RM&E Plan: The Action Agencies, NOAA Fisheries, and other federal agencies are working together to develop and implement the research, monitoring and evaluation (RM&E) program called for under the BiOp and All-H Strategy. By evaluating uncertainties and key assumptions in the BiOp, the RM&E program is providing information needed to assess listed Columbia River basin salmon and steelhead population trends at the 2005 and 2008 check-in evaluations.

The RM&E Program is guided by a plan jointly developed by federal agencies and coordinated across other regional, state, tribal, and federal monitoring programs. The RM&E plan identifies six principal components to address BiOp requirements:

1. *Populations and environmental status monitoring* – abundance, trend, and condition of fish populations and key environmental attributes.
2. *Action effectiveness research* – effects of hydro and offsite mitigation actions on fish survival and habitat attributes.
3. *Critical uncertainty research* – population survival assessments (*e.g.,* delayed transportation mortality "D," extra mortality, reproductive success of hatchery spawners, etc.).
4. *Implementation/compliance monitoring* – tracking execution of management actions.
5. *Data management* – support system for data storage and access.
6. *Regional coordination* – across the various federal, state, and tribal RM&E programs.

Conclusion: The draft RM&E Plan represents a significant advance in monitoring and evaluation because it provides a vehicle for the federal agencies to synchronize their approaches to salmon study, especially for habitat-related actions, and to work jointly with the states and tribes to develop common monitoring protocols and study designs. The Action Agencies are annually implementing approximately $70 million (the amount varies in any given year based on availability of funds and priority work) in research and monitoring projects. These studies include research and monitoring of juvenile and adult hydro survival, hatchery management changes, habitat status, effectiveness of off-site mitigation actions and critical uncertainties identified in the BiOp. Many of these studies are on the cutting edge of scientific inquiry and will require multiple years of investigation to provide definitive results. The Action Agencies acknowledge, however, that the pilot studies, research and

monitoring have not been implemented in accordance with schedules anticipated in the BiOp, because of regional coordination needs.

3. RM&E Status by Key Issue and RPA Action

3.1 Recovery Planning

Through a $1.2 million interagency agreement, the Action Agencies and NOAA Fisheries are implementing RPA Action 179, which calls for development of recovery goals for listed salmon ESUs in the Columbia River basin by 2003. For each ESU, the agreement requires NOAA Fisheries' Technical Recovery Teams (TRTs) to identify distinct populations, establish viable population criteria, and identify specific limiting factors for each population. The TRTs are responsible for setting priorities for effectiveness monitoring by population, and for using the findings of the RM&E program to develop recovery goals.

The Interior Columbia TRT has produced a working draft report titled "*Independent Populations of Chinook, Steelhead, and Sockeye for Listed Evolutionarily Significant Units Within the Interior Columbia River Domain*." In addition to identifying independent populations, this report (viewable at *http://www.nwfsc.noaa.gov/trt/index.html*) identifies related RM&E needs. The Action Agencies are reviewing this TRT document and will be amending their RM&E program as needed.

In addition to the population definition report, the TRT and NOAA Fisheries' Biological Review Team (BRT) have reviewed existing status information for listed ESUs of West Coast salmon and steelhead. This review draft may be accessed at *http://161.55.120.162/trt/brtrpt.htm*. Among other things, the report identifies substantial improvements in most ESUs over the past couple years (see also Report 6 of this Check-in Report).

3.2 Hatchery Studies

Reproductive success of naturally spawning hatchery fish (RPA Action 182)**.** The BiOp commits NOAA Fisheries to work with the Action Agencies on studies to determine the reproductive success of hatchery fish relative to wild fish, with priority studies to be initiated by the three-year check-in. A joint agency Hatchery/Harvest Workgroup (HHWG) was established in 2002 to prepare an RM&E Plan for implementing this action as well as other BiOp hatchery and harvest RM&E actions. Based on its survey of existing studies and studies proposed in the Mainstem/Systemwide Provincial Review (and likely to be funded), the HHWG identified certain research gaps. They recommended additional studies to quantify the relative reproductive success of hatchery fish spawning in the wild for the following ESUs or populations: Upper Columbia steelhead, mid-Columbia steelhead; an ocean-type Chinook (either directly involving the Snake River fall Chinook ESU or a suitable representative population of ocean-type fall Chinook), and Columbia River chum, the latter primarily to better inform the development of recovery options.

Regional Coordination

For the BiOp actions/issues discussed in this report, the Action Agencies coordinated fish recovery efforts with the following regional partners:

- **NOAA Fisheries' Technical Recovery Teams (TRTs), Biological Review Team (BRT), joint Hatchery/Harvest Work Group (HHWG),** and joint **Tributary Habitat Action Effectiveness Work Group**.
- **The Northwest Power and Conservation Council (Council).**
- **Columbia Basin Fish and Wildlife Authority (CBFWA).**
- **Independent Scientific Review Panel (ISRP)**.
- **State-Federal-Tribal Partnership on Aquatic Monitoring.**
- **Washington Department of Fisheries** Fish Counting Protocols Project.
- **Pacific Coast Salmon Recovery Fund –** Effectiveness Monitoring Policy Group.
- **John Day** and **Wenatchee pilot project multi-agency technical groups**.
- **Pacific Northwest National Laboratory (PNNL)**.
- **Lower Columbia River Estuary Partnership (LCREP)**.

The HHWG then prepared technical descriptions of the needed studies for a targeted solicitation (Request for Studies, or RFS) issued in March 2003. The Independent Scientific Review Panel (ISRP) reviewed both the technical descriptions and resulting study proposals. Implementation of selected proposals is expected to be underway by September 2003. The new studies obtained through this RFS and the Mainstem/ Systemwide Provincial Review use state-of-the-art "DNA pedigree" analysis techniques and should contribute greatly to resolving the uncertainty of hatchery fish reproductive success.

Hatchery research, monitoring and evaluation program (RPA Action 184). Under the BiOp, NOAA Fisheries and the Action Agencies are committed to work together to determine whether hatchery reforms reduce the risk of extinction for Columbia River basin salmonids and whether conservation hatcheries contribute to recovery. The BiOp advises that priority studies be identified or initiated by the three-year check-in.

Based on its assessment of existing studies and relevant studies proposed in the Mainstem/ Systemwide Provincial Review, the HHWG concluded that sufficient studies are underway to address the effectiveness of conservation hatchery activities. However, several research gaps were identified relating to the effectiveness of hatchery reforms in reducing extinction risk.

The most urgent research needs (*i.e.,* needed for the 2003 Check-In) included evaluating the relative reproductive success of reconditioned steelhead kelts and developing methodologies or analytical models for synthesizing the results (at population and ESU levels) of myriad hatchery reforms and conservation hatchery activities on extinction risk and/or recovery. Less urgent (not needed for the 2003 Check-In) research needs included evaluating the effects of predation by hatchery steelhead and spring Chinook smolts on naturally-produced salmonid fry and evaluating the effects of short-term competition for food and space among hatchery releases of steelhead smolts and Chinook smolts and fingerlings and natural-origin fish in tributary spawning and rearing habitat.

To obtain the most urgent new studies, the HHWG and ISRP drafted technical descriptions for inclusion in the same March 2003 RFS discussed under RPA Action 182 above.

There is already a wide-ranging regional effort underway to test the effectiveness of hatchery reform techniques on reducing ecological, genetic, and management risks to listed species. As results from these studies become available, they will be used to guide the implementation of hatchery reforms. Because many studies will require observations over several salmon/steelhead generations, results will not be available for several years.

3.3 Tributary Habitat Action Effectiveness Research

Tributary habitat action effectiveness research (RPA Action 183). One of the most challenging areas of research required under the BiOp has been evaluating the effects of the off-site mitigation (*i.e.* tributary habitat) actions. Because of the challenges posed by study design and coordination, and because of the complexity of regional funding processes through the Northwest Power and Conservation Council (Council), these studies are currently being implemented through pilot projects and undergoing additional independent scientific review.

Substantial work has been performed by the Action Agencies' and NOAA Fisheries' joint Tributary Habitat Action Effectiveness Work Group to develop two parallel approaches, "top-down" and "bottom-up," to tributary habitat action effectiveness research. A "top-down" approach evaluates the effects – on salmonid survival and distribution, and on local habitat conditions – of all recent and ongoing habitat actions in a watershed (by comparing those effects with salmonid survival in a similar "control" watershed with no ongoing habitat work). The bottom-up approach is similar in the effects evaluated, but treatments are assigned at random, to minimize the potential for inadvertent confounding with other factors.

The top-down approach has received funding support in ISRP review. It is currently being implemented through pilot programs in the Wenatchee and John Day subbasins. A third pilot is planned for the Upper Salmon in 2004. These pilot projects are also testing a programmatic approach to population and environmental status monitoring called for under RPA Action 180. Field work on the bottom-up approach is

planned pending scientific review by the ISAB. Other research projects initiated earlier have been under additional review and modification to be consistent with the requirements of RPA Action 183.

All of these approaches are being reviewed by state and tribal fish agencies under a multi-million dollar project with the Columbia Basin Fish and Wildlife Authority (CBFWA). The CBFWA project will also suggest any needed modifications to the study designs. Other relevant projects being funded by BPA include a study assessing the effects of three alternative methods of nutrient enhancement on biological communities, and a watershed monitoring and evaluation plan by the Nez Perce Tribe on the effectiveness of restoration projects for producing long-term watershed improvements.

The Bureau of Reclamation (Reclamation) has also initiated work to assess how removing push-up dams affects survival and production of juvenile mid-Columbia steelhead and survival and reproductive success of adult mid-Columbia steelhead in the John Day River basin. Under the Effectiveness Monitoring Prioritization Project, Reclamation has initiated work to evaluate the accuracy of information reported in standard databases on river restoration projects and to synthesize the information for use by policy-makers and scientists to better inform future restoration projects. Accomplishments for 2003 included hiring a coordinator, developing a work plan, and initiating funding for evaluation of a restoration projects database.

3.4 Hydrosystem Critical Uncertainty Research

The Action Agencies' and NOAA Fisheries' RM&E Plan classifies Hydro Passage RPA Actions 185-189 and 195 as Critical Uncertainty Research (CUR). Two primary areas of hydrosystem CUR emerged in the BiOp Cumulative Risk Initiative (CRI) analysis that are linked to FCRPS effects on listed stocks: the extent of delayed effects associated with transporting smolts (D), and the existence and extent of extra mortality (EM) associated with smolt passage in-river or via different routes that may be expressed in-river or following saltwater entry. Both of these topics are being investigated as thoroughly as practical. The CUR RPA actions from the BiOp are summarized in Table 2-1.

Table 2-1. Hydrosystem Critical Uncertainty Research RPA Actions

RPA Action	Description	Funding Agency	RM&E Actions
185	Estimate D	Corps	Ongoing
186	Determine where D-mortality is expressed	Corps	Ongoing
187	Examine the relation of D to timing of seawater (estuary) entry	Corps/BPA	Ongoing
188	Investigate potential hydro system EM on stock productivity	Corps/BPA	Planned & Ongoing
189	Study effects of passage history on smolt-to-adult return rate (SAR)	Corps	Ongoing
195	Estimate and geographically partition post-Bonneville smolt mortality	Corps	Planned & Ongoing

All hydro CUR RPA actions are being actively pursued and every RPA action is being addressed by more than one research effort. Table 2-2 displays project coverage across the hydro-related CUR RPA actions.

Table 2-2. Research or Support Activities that Address the Hydro Critical Uncertainty Research RPA Actions.

	Hydrosystem RPA Actions					
Project	**185**	**186**	**187**	**188**	**189**	**195**
Corps-Funded						
Transport from Snake River and McNary projects	X	X	X			
PIT-tag recovery – estuary and avian	X	X	X			X
Ocean entry timing			X			
Barge post release survival		X				
Acoustic tag technology				X		X
Delayed mortality in estuary and plume		X				
Migration histories		X			X	
Physiology and bypass history					X	
Physiology and transport		X			X	
BPA Funded Council F&W Program						
NOAA Fisheries PIT survival	X		X		X	
Comparative Survival Studies	X		X	X	X	
Extra mortality experiment				X		X
New tag methods					X	
FCRPS-plume			X			
Plume use – micro acoustic tag		X				X
Avian predation		X				X
PTAGIS data base	X		X		X	
Wild Chinook juvenile tagging (NOAA)	X		X	X		
Fish Passage Center operations	X				X	
Smolt monitoring	X				X	
Statistical support Univ. of Washington (UW)	X				X	

3.4.1 CUR Studies of Delayed Mortality (D) Associated with Transportation

Estimate delayed mortality (D) (RPA Action 185). This RPA action encourages expanded marking efforts to improve and refine estimates of D, critical to resolving key assumptions inherent in population modeling and extinction risk assessments. Three projects underway will provide better estimates of D, with greater stock coverage: an evaluation of transportation benefits from the Snake River/McNary, a system in-river survival study (both by NOAA Fisheries), and a comparative survival study of the Snake, upper and mid-Columbia rivers, conducted by CBFWA. By generating survival estimates for transported and in-river groups, including hatchery, wild and run-of-river stocks through different river segments, these projects will provide the majority of information on the performance of juvenile salmon through the hydrosystem. Al-

Delayed mortality (D) defined

'D' is shorthand for *differential delayed mortality of transported fish*. Although defined as mortality, 'D' is actually used as the relative difference (as a ratio) in the survival of juvenile fish that are transported relative to those that migrate in-river after both have passed Bonneville Dam on their way to the ocean. The differential mortality can occur any time after a fish passes below Bonneville Dam, through its estuary and ocean life stage, and during adult upriver migration to the specific dam from which it was transported.

though these projects were initiated prior to BiOp release, work has been expanded to increase coverage of listed salmon stocks.

Concerns exist about whether the precision and stock coverage proposed on these studies will be sufficient to determine hydrosystem survival and population growth rates for the 2005 and 2008 check-ins. This problem is being addressed by the RM&E Hydro and Status Monitoring Work Groups. They will assess the adequacy of D estimates resulting from these studies with respect to ESU coverage, statistical properties, and reliance on estimates derived from hatchery fish. The latter is critical because hatchery stocks are likely the only groups that can be tagged in sufficient numbers to provide D estimates with suitable precision.

Determine where D is expressed (RPA Action 186). Several projects are underway to address if and how passage route through the hydrosystem, specifically transportation or in-river migration, impacts fish physiology. NOAA Fisheries evaluated short-term survival rates over a six-month period in 2002 to determine the effect of migration route (multiple bypass, transport, and spill-bypass) on D. Data were correlated to migration history to determine the long-term contribution that route of passage has on the estimate of D.

Two projects conducted by Oregon State University in 2000-2003 were specifically designed to evaluate the effects of transport on changes in migration behavior in the post-release environment. These studies evaluated the differences in migration behavior of post-release transported fish vs. in-river migrants, and survival (travel time, predation rates and migration routes) in the estuary and near-shore ocean environment. This information will help determine improvements to transportation programs, including possible changes in release location and/or timing with tidal cycles, to reduce D.

Several other studies provide PIT tag data to help assess losses in the estuary, as well as information on improved technology to track fish through the estuarine and near-shore ocean environment.

3.4.2 CUR Studies of Extra Mortality (EM)

Within the Council's Fish and Wildlife Program and the Corps' Anadromous Fish Evaluation Program (AFEP) forum, several projects are moving forward to resolve important aspects of EM. The projects cover the physiological effects of passage on survival, estimates of in-river survival required to estimate the magnitude of EM, and developing systems to estimate survival in the estuary.

Investigate potential hydro system EM on stock productivity (RPA Action 188). Progress has been made to compare the productivity of and hydrosystem effects on wild, lower river stocks with upper river stocks currently being PIT-tagged. Among several projects directed at estimating or identifying causes of EM, one by NOAA Fisheries is most clearly focused on hydro-related EM. That project is quantifying delayed effects associated with passage through the hydrosystem. Another project will estimate survival associated with screen-bypassed fish, but not other routes separately. The collective research will expand our understanding of delayed effects associated with dam passage, but not necessarily resolve all outstanding EM issues identified in the BiOp.

Study effects of passage history on smolt-to-adult returns (SAR) (RPA Action 189). This RPA Action focuses on establishing the cause and effect of particular passage routes on existence and magnitude of EM. To this end, BPA installed adult PIT tag detection systems in all ladders at Ice Harbor, Lower Granite, and Priest Rapids dams in FY 2003. Plans are to design and install an additional PIT detection system at Bonneville Dam by FY 2004. Additionally, the Corps began marking fish for a Lower Granite transport study in 2003.

Estimate and geographically partition post-Bonneville smolt mortality (RPA Action 195)**.** Pending funding decisions, the Corps anticipates implementation of a new acoustic tagging system in 2004 and 2005 to help determine survival below Bonneville through the estuary and early ocean. Results will follow through at least 2008 and provide additional information on the geographic locations of post-Bonneville mortality.

3.5 Hydrosystem Status Monitoring (SM)

The Action Agencies' and NOAA Fisheries' RM&E Plan classifies Hydro Passage RPA actions 190 through 193 as Hydro Status Monitoring (SM). The BiOp presents specific survival standards that smolts and adults should ultimately achieve once the FCRPS is entirely upgraded with respect to fish passage (Section 9.2.2.2.1 of the BiOp; table 9.2-3). To assess whether survival standards (juvenile and adult) are being achieved requires annual estimates of survival. The SM RPA actions from the BiOp are summarized in Table 2-3.

Table 2-3. Hydro Status Monitoring Actions

RPA Action	Description	Funding Agency	RM&E Actions
190	Snake River fall Chinook - early life history	BPA	Ongoing
191	Improve adult counts	Corps	Ongoing
192	Install adult detectors	Corps & BPA	Ongoing
193	New tagging systems	Corps & BPA	Ongoing

All hydrosystem SM RPA actions are being actively pursued at some level and every RPA action is being addressed by more than one research effort. Table 2-4 displays project coverage across the hydro-related SM RPA actions.

Table 2-4. Research or Support Activities that Address Hydro Status Monitoring

	Hydrosystem RPA Actions			
Project	**190**	**191**	**192**	**193**
Summer flow augmentation effects on Snake River fall Chinook juveniles	X			
Wintertime juvenile fall Chinook passage at Lower Granite	X			
Juvenile survival estimates through dams & reservoirs	X			
Adult fish counting at mainstem Columbia & Snake river projects		X		
Operations/maintenance of mainstem dam fish passage facilities		X		
AFEP adult fish evaluations, inc. kelt research, unaccounted adult loss & straying; marine mammal monitoring		X		
Installation of adult PIT tag detection systems			X	X
Statistical support for salmonid survival studies			X	
Columbia River Basin PIT tag information system			X	X
Statistical Support for Salmonid Survival studies			X	
New marking and monitoring techniques				X
Pacific ocean salmon tracking (POST)				X
Adult steelhead status monitoring – Imnaha River subbasin				X
High flow PIT tag detector				X

Early life history of Snake River fall Chinook (RPA Action 190). Two projects are collecting information and generating estimates for this RPA action. One ongoing study by NOAA Fisheries is generating survival estimates for hatchery fall Chinook above Lower Granite Dam and through part of the FCRPS. A second by USFWS is also an ongoing research effort that describes a variety of early life history characteristics of fall Chinook in the Snake and Clearwater drainage. In addition to these studies, a Snake River fall Chinook transportation study was initiated in 2001 that will provide additional information regarding their early life history.

Improve adult counts (RPA Action 191). The Corps is developing a new, streamlined reporting system using special computer terminals to directly input count data and send them to the Corps' Web site (which provides daily and annual fish passage counts). The new prototype system will first be installed at The Dalles north fishway count station in FY 2004.

In addition, the fish counting schedules at some projects have been expanded to collect

additional fish passage information during the normal non-counting season. The fish counting season at Lower Monumental and Little Goose dams has been expanded to year-round for bull trout.

Install adult detectors (RPA Action 192). Adult PIT tag detection systems have been installed at Bonneville, McNary, Ice Harbor, and Lower Granite dams. PIT tag efficiency is being evaluated at all sites in 2003 as part of adult telemetry studies being conducted collaboratively by NOAA Fisheries and the University of Idaho. Meanwhile, based on the results of a 2002 test of Bonneville's PIT system that determined relatively poor detection efficiency for coho and fall Chinook salmon, Bonneville's adult PIT system will be redesigned in 2004 and a new system installed in 2005.

New tagging systems (RPA Action 193). The BiOp identified key areas needing technological development to better assess three key uncertainties. These are the ability to discriminate between hatchery and wild fish, to differentiate populations and their use of different ocean productivity zones, and to determine growth and survival characteristics based on population, location and oceanographic characteristics. The BiOp did not describe what would constitute success in meeting this RPA action, but considerable work has been done to develop techniques to evaluate survival in the estuary and, potentially, the ocean.

The Corps initiated efforts in 2000 to develop an acoustic tagging system that will help determine survival below Bonneville Dam through the estuary and into early ocean residence. Existing tag systems were too large to evaluate subyearling downstream migrants. Efforts from 2000 through 2003 focused on developing a tag and detection array system to evaluate key uncertainties identified in the RPA actions for various stocks of fish or to assess migrants with different exposure histories through the hydro system. Pending funding decisions, the Corps expects to implement this new tagging system in 2004 and 2005.

The High-Q (high-flow) PIT tag detection system was developed in 2002 in response to regional agencies' and tribes' requests to improve detection capability at Bonneville Dam. Installation of a new Bonneville corner collector, scheduled for completion in December 2003, is expected to significantly reduce the juvenile PIT tag reading capability at Bonneville. Design of an extensively upgraded PIT tag detection system will be completed in 2003, with a prototype test of the system planned in 2004 and installation in 2005.

3.6 Estuary and Ocean Research

The Estuary/Ocean (EOS) RM&E Work Group, established in summer 2002, will complete an estuary RM&E plan by September 30, 2003, that includes draft performance standards, a needs assessment, and an implementation plan for estuary-related RM&E actions. This group includes representatives from NOAA Fisheries, the Corps, BPA, and Pacific Northwest National Laboratory (PNNL). The Lower Columbia River Estuary Partnership (LCREP) and its Science Work Group are kept informed of the Estuary RM&E subgroup's efforts.

Monitoring recommendations will be a component of the EOS RM&E plan. The Action Agencies will implement these recommendations to the extent that individual projects warrant. While study protocols are being developed, the Action Agencies will continue to fund monitoring actions in the estuary at Chinook River, Brownsmead, and Crims Island.

Remaining estuary research needs concern adult studies. In 2003 as in 2002, adult studies were given a low priority by AFEP's Studies Review Work Group (SRWG). One proposal was included for adult studies in 2003; none were received in 2002. The Action Agencies continue to work with NOAA Fisheries to establish the scope and responsibilities for Columbia River estuary research. Meanwhile, a number of estuary studies funded by the Action Agencies are ongoing.

Develop a physical model of the lower Columbia River (RPA Action 194). Development of a model to physically characterize the plume is ongoing. The Action Agencies are evaluating available models in the lower Columbia River and assessing their abilities to characterize changes in the estuarine environment; this evaluation will be the basis for a study plan to be completed in September 2003.

Study juvenile and adult salmon use of the estuary (RPA Action 196). Studies discussed in the 2002 Progress Report are ongoing. One focuses on estimating survival through the estuary and another on evaluating current and historical use and linkages. A third is evaluating the relationship among time of ocean entry, physical and biological characteristics of the estuary, and adult returns.

Study juvenile and adult salmon use of the plume (RPA Action 197). Studies discussed in the 2002 Progress Report continue to develop an understanding of juvenile use of the Columbia River plume. Studies are underway to evaluate the relationship among time of ocean entry, physical and biological characteristics of the estuary, adult returns, and survival and growth of juvenile salmon in the plume.

3.7 Other RM&E Activities

Common data management system (RPA Action 198). The RM&E Plan identifies a general strategy and needed steps to achieve a common data management system. Developing this system has been challenged by the need to coordinate and integrate with other regional data bases and information systems across multi federal, state, and tribal organizations. Work is being pursued both through policy/executive level coordination efforts and through on-the-ground work under the status and action effectiveness pilot projects noted above. A major first step had been development of common monitoring protocols and sampling designs, accomplished through multi-agency technical and policy level working groups. Partnering with the Action Agencies and NOAA Fisheries on this effort are the John Day and Wenatchee pilot project technical groups, the State-Tribal-Federal Partnership on Aquatic Monitoring, the CBFWA Project work groups, the Washington Department of Fisheries Fish Counting Protocols Project, and the Pacific Coast Salmon Recovery Board Effectiveness Monitoring Policy Group.

Paralleling these efforts are administrative and technical support strategies for a regional data support system being developed through the Columbia Basin Coordinated Information System (CBCIS) Project Management Group. Substantial advancements are expected over the next year as regional coordination continues on this effort.

Report 3

Part A: Status of Subbasin Assessments, HGMPs and Safety-Net Plans

1. BiOp Expectations

Part A: The BiOp specifies that this 2003 Check-In Report should document "*whether subbasin assessments have been developed in accordance with Section 9.6.2.1 and hatchery genetic management plans and safety net planning have been completed pursuant to Section 9.6.4.2, as well as whether the results of these planning actions have been incorporated into site-specific plans for offsite mitigation.*"

Part B: The BiOp requires documentation of "*whether the Action Agencies have adopted detailed site-specific, offsite mitigation plans to meet the offsite mitigation performance standard described in (BiOp) Table 9.2-4, based on completed subbasin assessments, finer scale analyses and the best available science, are implementing such plans in accordance with their provisions, and have adequate monitoring in place to evaluate their effectiveness.*"

Regional Coordination

For the BiOp actions/issues discussed in this report, the Action Agencies coordinated fish recovery efforts with the following regional partners:

- **Council's subbasin planning process** – to help identify and develop offsite habitat mitigation opportunities.
- **Council's Artificial Production Review Evaluation (APRE)** and **NOAA Fisheries' Technical Recovery Teams (TRTs)** – HGMP development.
- **NOAA Fisheries, USFWS, states, tribes** – SNAPP and other safety net programs.
- **Lower Columbia River Estuary Partnership** – to identify, coordinate, and prioritize projects in the estuary.

A1. Progress Summary and Conclusion

Subbasin plans. Subbasin summaries and work plans were prepared in 2001 through 2003 to support the selection of biologically sound projects in the Regional Provincial Review process that implemented the Council's Fish and Wildlife Program and integrated BPA's offsite mitigation and research, monitoring and evaluation actions of the BiOp. Subbasin plans based on the summaries as well as more detailed assessments are under development through the Council, under state and tribal sponsorship, for all jeopardized salmon and steelhead areas. The BiOp anticipated that subbasin plans following the first round of Provincial Reviews would be completed for the NOAA-designated priority subbasins by the end of 2003. However, the extensive regional coordination and initial organization required for the subbasin planning effort took longer than anticipated by the 2000 BiOp.

Of particular note were two critical regional coordination requirements that involved considerable time in their completion: 1. final agreement between the Council and NOAA on the template to be used for subbasin plans to ensure adequate ESA coverage for anadromous subbasins; and 2. Council coordination with regional parties to ensure that the description of the subbasin planning process and priorities were satisfactorily described in the Council's contract with BPA. Extensive regional effort is being applied to the timely completion of subbasin plans. Federal agency involvement in their development, primarily through participation in the regional coordination group as well as some state-level participation, is ongoing. Thus far, nine priority hydrologic subbasins have been selected in accord with the BiOp. These nine priority areas are within five Council subbasins

(Salmon, John Day, Methow, Entiat, Wenatchee). In each of these subbasins, a work plan is in place and subbasin assessments and plans are being developed. Per the Council's current schedule, completion of plans for the high priority subbasins and for 52 other Council subbasins is expected in 2004, although some further schedule slippage is possible.

Hatchery genetic management plans (HGMPs). HGMPs are also progressing. Phase I HGMPs, summarizing current purpose and operation for each of 169 salmon and steelhead hatchery programs, were drafted in July 2003. Phase II, covering options for improvement to be incorporated into subbasin and recovery planning, is now underway, with completion expected in March 2004. Hatchery reforms will be implemented after prioritization.

Safety Net hatcheries. The hatchery-based Safety Net Program, for fish populations facing a severe risk of extinction, has been successful. Safety net programs are currently being implemented for Snake River sockeye, spring/summer and fall Chinook, as well as mid- and lower Columbia steelhead. The Action Agencies are also funding a Safety Net Program Coordinator and a planning process for additional populations. Analysis for additional populations has been delayed by the time involved in reaching consensus among all regional interests (regional coordination), independent scientific review, and completion of the Technical Recovery Teams' (TRTs') identification of distinct populations; a final report on the analysis is due early next year. Given the improved condition of many ESUs, the numbers of additional safety net efforts may be much lower than anticipated when the BiOp was written.

Habitat program results: Hundreds of projects to improve stream flows and passage for listed fish in important habitat areas have been completed during the past three years. The Action Agencies continue to fund measures to increase flows during critical fish migration periods and have established an innovative, experimental "water brokerage" that will coordinate state and local efforts to increase tributary flows. Reclamation has initiated programs to address flow, passage and diversion screening problems in nine priority subbasins identified in the BiOp. In addition to in-stream projects, the Action Agencies have helped restore or protect adjacent "riparian buffer" lands around streams. In 2002, more than 19,000 acres in stream-side habitat was protected from future erosion or contamination.

Conclusion: Planning actions for future habitat and hatchery improvements have taken longer than originally anticipated in the BiOp. Delays have been encountered due to the need to ensure appropriate regional coordination. This includes collaboration with numerous interests, including states and tribes. Nevertheless, all planning actions are underway according to revised schedules described in our implementation plans.

A2. Subbasin Planning Progress Report

The subbasin planning process, led by the Council and funded by BPA, is now well underway. Through this process, local fish and wildlife managers, local governments and interest groups, and other stakeholders are helping to define the goals for fish, wildlife, and habitat in each subbasin, define objectives that measure progress toward those goals, and establish strategies to meet objectives. The plans will reflect needs identified through subbasin assessments, will be informed by local policies and priorities, and will incorporate all existing information related to fish and wildlife activities in each subbasin in a single document. A plan that has been adopted through the subbasin planning process indicates a greater understanding and acceptance of fish and wildlife needs in a subbasin, as well as legal and political realities.

With $15 million in BPA funds committed to support the initial planning effort, work plans for 58 of the 62 subbasins are now in place. Thirty-nine of those subbasins have jeopardized ESUs. Work plans are not being developed for the Bitterroot, Blackfoot, Clark Fork and Sandy subbasins (only the Sandy provides habitat for ESA-listed or jeopardized ESUs).

Work plans detail how the local subbasin planning groups will draft subbasin plans for submission to the Council by May 28, 2004. Council approval of a work plan is an important milestone because it indicates the planning infrastructure for a subbasin is in place and that

work can begin once the contracts are in place. Details about subbasin planning may be viewed at *http://www.nwppc.org/fw/subbasinplanning/*.

The May 2004 deadline for submitting draft subbasin plans is a departure from the Council's original schedule in which roughly half of the subbasins were to submit draft plans for review during 2003. However, the Council found that local planners need 12 to 14 months to create draft plans, which is why most (50) subbasins will not be submitting plans before next spring.

The Action Agencies intend to use Council-approved subbasin plans to guide future priorities for funding fish and wildlife projects to meet obligations under the BiOps and the Council's Fish and Wildlife Program. Meanwhile, the Council's Provincial Review Process and the interim habitat framework described in Part B of this report are being used and will continue to guide selection of projects to benefit jeopardized ESUs.

A3. Hatchery Reforms (HGMP Development)

The BiOp calls for development of HGMPs for all Columbia basin hatchery programs and facilities. HGMPs for 169 Columbia River basin salmon and steelhead hatchery programs, including programs affecting the eight jeopardy ESUs, are underway to establish updated hatchery program requirements, including any adjustments or reforms necessary to comply with the ESA. An HGMP is required for each artificial production program at a hatchery facility. For example, separate HGMPs would be needed for the steelhead and spring Chinook programs at the same hatchery.

As of July 2003, hatchery operators and all relevant parties had completed Phase I HGMPs for each facility/program. Phase I entailed data collection on each program's current purpose and operation, providing focus for the collaborative Phase II part of the process. Phase II options will be provided to subbasin planners and appropriate TRTs for consideration and interaction with those groups. Draft Phase II HGMPs are expected to be completed by December 2003. All HGMPs relevant to an ESU will be considered together, allowing for ESU-wide perspective and feedback with the TRT/recovery planning processes. The HGMP collaborators will incorporate TRT advice as appropriate to ensure consistency with broader recovery objectives. This last step will culminate in Phase III drafts, which become final and ready to implement after approval by NOAA Fisheries, expected around May 2004.[5]

Early in the developmental process, it became clear that similar data would be collected from the same people for Phase I HGMPs and the Council's Artificial Production Review Evaluation (APRE). Toward this end, NOAA Fisheries and Council staff collaborated on an approach where APRE and HGMP processes worked together to assemble the necessary information. Once this "in-common" step was completed for APRE and Phase I HGMPs, the two processes separated to meet their different, but parallel, obligations and requirements.

Although HGMPs for Lower Snake River Compensation Plan (LSRCP) hatchery programs are being funded under a memorandum of agreement (MOA) with the USFWS (separate from the budget approved by the Council), the development of LSRCP Phase II and III HGMPs will follow the schedule prescribed for the other HGMPs.

Other BiOp actions involving implementation of hatchery reforms by the Corps, Reclamation, and BPA will be accomplished once the HGMPs are complete and approved by NOAA Fisheries.

Individual HGMPs will indicate needed hatchery reforms and potential funding sources. Hatchery operators and fish co-managers will then have the opportunity to address funding issues by prioritizing reforms among hatcheries and seeking funding from appropriate entities.

A substantial number of potential hatchery reform actions in the Phase III HGMPs are likely to be approved by NOAA Fisheries. The Action Agencies propose the following implementation criteria, to achieve the greatest biological benefits as rapidly as possible:

- The hatchery program considered for reform must be funded by BPA (*i.e.,* it must be an artificial propagation program at an LSRCP, Reclamation, Corps, or Council Fish and Wildlife Program hatchery facility).
- The hatchery reform actions must benefit one of the eight ESUs jeopardized by the FCRPS. Reform actions affecting those ESUs in greatest jeopardy (see Report 6) are highest priority.

- Based on the best available science, the reform action must have a clear biological benefit to a population or populations in the jeopardy ESU. Those actions with the greatest certainty to provide biological benefits or reduce biological risks are highest priority.
- Actions that meet the above criteria will also be prioritized based on cost-effectiveness, *i.e.*, actions that achieve similar biological benefit at lower cost will receive higher priority.

NOAA Fisheries' forthcoming new artificial propagation policy may influence the Action Agencies' implementation of reform actions.

A4. Safety-Net Hatchery Program

The Safety-Net Program is intended to prevent further decline in the status of the most at-risk ESA-listed populations, to "buy time" for recovery measures to take effect. The program would intervene with artificial propagation for severely depressed and declining populations when an extensive planning process determines this to be necessary, effective, and feasible. BPA worked with NOAA Fisheries and USFWS to initiate the Safety-Net Artificial Propagation Program (SNAPP) in 2001. The effort resulted in BPA funding a SNAPP coordinator to facilitate a planning process consisting of four basic steps:

- Perform extinction risk analysis on depressed fish populations.
- Develop intervention options and a recommended strategy.
- Perform benefit-risk analysis on options to determine the recommended strategy.
- Develop Hatchery and Genetic Management Plans (HGMPs) to guide implementation.

Table 3-1. ESU Populations Undergoing Extinction Risk Analysis

Snake River Spring/Summer Chinook ESU

Alturas Lake Cr (Salmon)	Lemhi R (Salmon R)	Upper Salmon R sum Chinook
Bear Valley/Elk Cr	Lick Cr (Imnaha)	Secesh R sum Chinook
Big Cr sp (M Fk Salmon)	Lookingglass Cr	Sheep Cr (GR*) sp Chinook
Big Cr sum (M Fk Salmon)	Loon Cr (M Fk Salmon)	Snake R sp Chinook
Big Sheep Cr	Lostine R index area	Snake R sum Chinook
Camas Cr (M Fk Salmon)	Marsh Cr	Sulphur Cr sp Chinook
Catherine Cr	Minam R	Tucannon R sp Chinook
Catherine Cr index area	Minam R upper	Upper Valley Cr sp Chinook
Catherine Cr N Fk	Minam R lower	Upper Valley Cr sum Chinook
Catherine Cr S Fk	Pahsimeroi R	Wallowa Cr sp Chinook
Chamberlain Cr (Salmon R)	Poverty Flat (also in SF salmon data set)	Wenaha R sp Chinook index area
Grande Ronde, upper	Rapid River (Little Salmon R)	Wenaha R sp Chinook
Grande Ronde, upper index area	EF Salmon R sp Chinook SF	Wenaha sp Chinook
Herd Cr	EF Salmon sum Chinook	Yankee Fk sum Chinook
Imnaha R	SF Salmon sum Chinook	Yankee Fk sp Chinook
Johnson Cr	NF Salmon R sp Chinook	WF Yankee Fk sum Chinook
Lake Cr (Secesh R)	Upper Salmon R sp Chinook	WF Yankee Fk sp Chinook

Snake River Steelhead ESU

Snake River A-Run totals	Devils Run Cr (GR) sum A run	Phillips Cr (GR) sum
Snake River B-Run totals	Five Points Cr (GR) sum A run	Prairie Cr (GR) sum
Butte Cr sum A	Fly Cr (GR) sum A run	Spring Cr (GR) sum A run
Imnaha (Zumwalt/Camp Cr) sum	Upper mainstem GR	Summit Cr (GR) sum A run
Camp Cr sum	Joseph Cr (GR) sum	Swamp Cr. (GR) sum A run
Chesnimnus Cr (GR) sum A run	Little Sheep Creek (Imnaha) Hatchery	Tucannon River
SF Chesnimnus Cr (GR) sum A run	Little Sheep Creek (Imnaha) wild	Wallowa R (GR) sum A run
Clearwater sum A run	Meadow Cr (GR) Sum A run	Whiskey Cr (GR) sum A run
Crow Cr (GR) sum A run	Peavine Cr (GR) sum A run	

*GR = Grand Ronde

BPA provided $202,000 in FY 2003 to fund the first step in coordination with NOAA Fisheries, USFWS, and relevant state and tribal co-managers.

The population data sets shown in Table 3-1, provided by the TRT, are currently undergoing extinction risk analysis as part of the Safety-Net program.

A preliminary report on the extinction risk analysis was presented to the TRT and collaborating SNAPP agencies and tribes for review in June 2003. Two mechanistic models – a stochastic exponential growth model and the Wiener-Drift process model – were used to infer the risk level to a stock. The results from both models were used to prioritize stocks in order of severity of risk. Following technical review and additional analysis using any alternative methods recommended by reviewers for assessing risk, the final report will be completed by March 2004. The next step of SNAPP planning will be development of contingency intervention options using artificial propagation for the populations most at risk of extinction. If adequate population data can be located, additional Snake River steelhead populations will be analyzed.

During the term of the BiOp, BPA has continued to fund a number of ongoing artificial propagation safety-net programs designed to prevent extinction of critically depressed populations of ESA-listed salmon and steelhead. State and tribal fishery co-managers identified these populations as high priority for safety-net intervention with artificial propagation and obtained BPA funding through the Council's Fish and Wildlife Program. Current BPA-funded safety-net projects and populations are listed in Table 3-2. BPA spent approximately $12 million in FY 2003 implementing these safety-net programs, including facility planning, design, construction, operation and maintenance, as well as monitoring and evaluation of program effectiveness.

Table 3-2. Current BPA-Funded Safety-Net Projects

ESU	Population(s)	Project
Snake R sockeye	Snake R (Redfish Lake) sockeye	Redfish Lake Sockeye Captive Broodstock Rearing/ ResearchGenetic Analysis of *Oncorhynchus nerka* Sockeye Salmon Habitat and Limnological Research
Snake R spring /summer Chinook	Grande Ronde RUp Grande Ronde R Catherine Cr Lostine RImnaha R	Grande Ronde basin Sp Chinook Captive Broodstock ProgramNortheast Oregon Hatchery Master Plan (2 projects) Grande Ronde Supplementation - Lostine River Spring Chinook Grande Ronde Endemic Spring Chinook Acclimation Grande Ronde Supplementation Program – Grande Ronde and Catherine Creek Captive Broodstock Artificial Propagation
	Johnson Cr	Johnson Creek Artificial Propagation and Enhancement
	Lemhi RWF Yankee FkEF Salmon R	Idaho Chinook Salmon Captive Rearing Manchester Spring Chinook Broodstock Project
	Tucannon R	Tucannon R Spring Chinook Captive Broodstock Program
	Multiple populations	Listed Stock Gamete Preservation
Snake R fall Chinook	Snake R fall Chinook	Pittsburgh Landing Fall Chinook Acclimation Facility Captain John Rapids Fall Chinook Acclimation Facility Big Canyon Fall Chinook Acclimation Facility Nez Perce Tribal Hatchery (Fall Chinook program)
Snake R steelhead	Grande Ronde R	Northeast Oregon Hatchery Master Plan
	Multiple populations	Listed Stock Gamete Preservation
Mid-Columbia R steelhead	Umatilla R	Umatilla Hatchery O&M (mid-Columbia R steelhead program)
Lower Columbia R steelhead	Hood R	Parkdale Fish Facility O&MHood River Powerdale /Oak Springs O&M

BPA believes that the SNAPP planning process has progressed at the most rapid pace possible. Since the safety-net RPA actions were conceived in 1999-2000, the short-term abundance and productivity of Columbia River salmon and steelhead runs have improved remarkably. Given the recent overall improvements, the SNAPP process can now proceed at a more measured pace and schedule. However, the growth rates of certain populations within the ESUs, while improved, are not demonstrating short-term sustainability. The SNAPP planning process will be applied to these populations to determine if a safety-net project is warranted.

Part B: Detailed Site-Specific Plans Being Implemented to Meet Offsite Mitigation Performance Standards

(based on Subbasin Assessments & Other Planning Actions in Part A)

B1. Progress Summary and Conclusion

Interim biological framework for habitat actions. The Action Agencies have developed an interim prioritization selection framework for habitat actions based on biological needs of ESUs most threatened, the priority of subbasins for these ESUs, and the expected near-term and long-term biological benefits of actions. This framework will be further developed over the next year. The Action Agencies are using this structure as a guide for habitat action and project funding decisions until final subbasin plans provide more direction on the specific habitat improvement needs within each subbasin. In the longer term, identifying and prioritizing habitat actions within the subbasins will be further informed by the TRT's "limiting factors" analyses and the tracking of biological and physical performance metrics relative to performance standards through the NOAA Fisheries' and Action Agencies' RM&E program. This future monitoring and evaluation information on habitat needs will be used with research on the effects of habitat actions to develop more scientifically informed offsite mitigation plans and provide the basis for adaptive management.

Detailed plans for off-site mitigation. Our detailed plans for off-site actions are presented in our one- and five-year implementation plans. The implementation plans identify fish recovery actions the Action Agencies intend to complete over a five-year period, provide work plans with strategies and corresponding projects for the upcoming year, and highlight key work planned for following years. The implementation plans also provide detailed project level information,

including location, benefited ESUs, and planned deliverables. These detailed plans are annually adjusted as new information becomes available.

Habitat action effectiveness. The effectiveness of tributary habitat actions is being addressed through the RM&E Program, which is currently being reviewed by the Council's Independent Scientific Advisory Board (ISAB), Independent Scientific Review Panel (ISRP), and regional state and tribal fish agencies. Pilot studies are being implemented to test these scientific approaches and additional projects are evaluating past data to further identify and quantify the linkages between habitat actions and changes in habitat and fish survival conditions. Progress of the development of studies to measure and evaluate the effect of habitat actions on fish survival is discussed further in Reports 2 and 4.

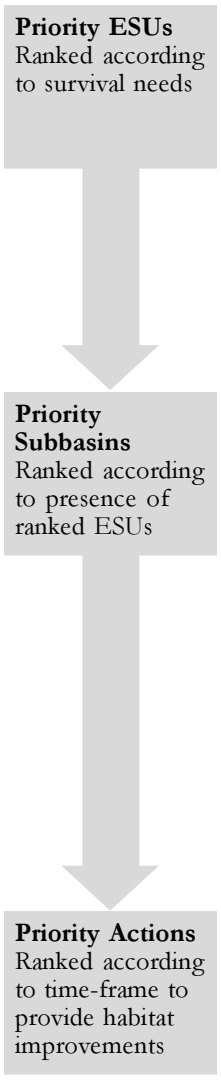
Conclusion: Although desirable, detailed offsite plans developed through subbasin planning and the HGMPs are not yet complete. However, the Action Agencies are prioritizing and implementing habitat actions using an interim biologically based framework. The Action Agencies have used this framework to rank ESUs and priority subbasin as reflected in the annual and five-year implementation plans. These plans are formulated to improve habitat conditions in all anadromous subbasins, ensuring important biological priorities for listed fish are addressed. In 2004 these plans will be further informed by subbasin planning. Additional coordination with the Council's provincial review process will be needed to allocate funding according to BiOp priorities and achieve maximum benefits for the ranked ESUs. In the longer term, the TRT "limiting factors" assessments, subbasin plans, the monitoring program for biological and physical performance relative to performance standards, and research results on the effectiveness of actions will help advance the Action Agencies' development of habitat action plans.

B2. Interim Biologically Based Framework for Habitat Actions

The BiOp states that NOAA Fisheries "*expects to rely heavily on the Council's subbasin planning process for the identification and development of offsite habitat mitigation opportunities*." However, as noted previously, the need for regional collaboration between the Council, states, tribes, and local groups to organize the subbasin planning process resulted in a deadline extension so that all subbasin plans are now due to the Council for independent science review by the end of May 2004. Involvement by NOAA Fisheries is needed in the current subbasin planning review process to ensure the plans meet ESA goals for identifying offsite mitigation opportunities for jeopardized ESUs while informing NOAA Fisheries' efforts to develop a recovery plan for Columbia basin salmon.

Absent completed subbasin plans, the Action Agencies are using an interim biological framework for identifying habitat actions and priorities until subbasin plans are completed. This interim framework assumes the following:

- **Priority ESUs**: Actions to improve habitat conditions are focused on the eight ESUs found to be jeopardized by the operation of the FCRPS. Within this ranking, greater emphasis should be placed on those ESUs in relatively greater need of survival improvements.
- **Priority subbasins:** For the priority ESUs, actions to improve habitat conditions are focused in the priority subbasins identified by NOAA Fisheries under Action 149. The subbasins contain populations within a jeopardized ESU that are at the greatest risk of extinction. The framework focuses on the nine subbasins currently being addressed for non-federal lands.
- **Priority habitat actions:** Actions that provide near-term survival improvements are given higher priority than those actions that provide long-term survival improvements.



- **Non-priority subbasins**: Subbasins in which jeopardized ESUs spawn and rear also need survival improvement efforts but with a relatively lower ranking than the priority subbasins.

The biological rationale for each of these framework elements is described next.

B2.1 Priority ESUs

Ranked according to the estimated lambda in the 2000 BiOp (20-80 percent hatchery spawner effectiveness), the ESUs jeopardized by FCRPS operations are prioritized for habitat improvements as shown in Table 3-3. The ESU rankings may be modified after NOAA Fisheries issues new lambda figures that take into account recent improvements in several jeopardized stocks. In addition, the Action Agencies will be using information on abundance (adult run sizes) and simple trends in abundance as additional indicators to lambda for the status and priority of the ESUs.

B2.2 Priority Subbasins

The BiOp identified priority subbasins for tributary habitat improvement activities that address passage, screening, and flow problems. NOAA Fisheries selected these subbasins in coordination with Reclamation and the other Federal Caucus agencies because habitat improvements in these subbasins provide near-term benefits by extending migration and spawning corridors in areas with significant federal land ownership. As of FY 2003, there were nine active priority subbasins for tributary habitat, including the upper John Day, middle Fork John Day, and North Fork John Day subbasins in Oregon; the Entiat, Wenatchee, and Methow River subbasins in Washington; and the Lemhi, upper Salmon, and Little Salmon River subbasins in Idaho. These priority subbasins are also considered the highest priority tributary subbasins for near-term development of subbasin assessments and plans under the Council program (RPA Action 154).

Chum salmon use the lower Columbia River mainstem and estuary subbasins for spawning and rearing. Chum habitat improvement actions are identified separately in the BiOp. Further, all of the jeopardized species use the mainstem and estuary subbasins as juvenile and adult migration corridors with variable reliance (depending on

Table 3-3. Jeopardized ESUs Ranked by BiOp Lambda Values[6]

ESU	Est. Lambda (BiOp)	Est. Lambda(July 2003)[7]	Rank[8]
Upper Columbia River steelhead	0.83-0.69	Not available	1
Snake River steelhead	0.83-0.72	0.89-0.76	2
Mid-Columbia River steelhead	0.84-0.72	Not available	3
Upper Columbia River spring Chinook	0.85-0.84	Not available	4
Snake River spring/summer Chinook	0.91-0.82	Not available	5
Snake River fall Chinook	0.92-0.87	1.02-0.94	6
Columbia River chum salmon	1.04	Not available	7
Snake River sockeye	Not available	Not available	Not ranked

Table 3-4—Priority Subbasins for Jeopardized ESUs

Rank	ESU	Priority Subbasins[9]
1	Upper Columbia River steelhead	Methow, Entiat, Wenatchee
2	Snake River steelhead	Upper Salmon, Lemhi, Little Salmon
3	Mid-Columbia River steelhead	Upper John Day, middle Fork John Day, North Fork John Day
4	Upper Columbia River spring Chinook	Methow, Entiat, Wenatchee
5	Snake River spring/summer Chinook	Upper Salmon, Lemhi, Little Salmon
6	Snake River fall Chinook	none
7	Columbia River chum salmon	Estuary and Lower Mainstem
Unranked	Snake River sockeye	Upper Salmon

the ESU) on the estuary for staging or acclimation.

The priority tributary subbasins and the ESUs that use them are shown in Table 3-4 by ESU rank.

B2.3 Priority Habitat Actions

As referenced above, the Action Agencies' interim plan for prioritizing projects focuses on those types of habitat actions that provide near-term survival improvement impacts, including actions preventing mortality. Actions that provide longer-term survival improvements are a lower priority, but are also pursued to meet certain quantifiable RPA action goals.

The Action Agencies are tracking both near-term and longer term survival improvement actions to ensure that they are on track with implementation of the habitat action plans. The Federal Habitat Team, working in concert with

Table 3.5. Near and Longer-term Survival Improvement Actions

Near Term Survival Improvement Actions
Barrier removal by removing diversions, dams, mine tailings, and low water crossings; installing fish ladders; and upgrading or eliminating culverts (RPA Action 149). Barrier removal and installation of fish ladders enable fish to more easily pass into existing and new areas for spawning, rearing, and migration. Passage improvements create additional travel corridors and increase the likelihood of survival by decreasing predation and food pressures on migrating fish.
Screening irrigation diversions (RPA Action 149). This is an important step to avoid taking fish when water is pumped from surface diversions. With a screen in place, fish remain in the water and are not killed or diverted when flow is diverted to a pipe or other conveyance for out-of-stream uses.
Leasing or purchasing in-stream tributary flows (RPA Actions 149 and 151). This action can provide additional water in areas where flow or water quality is a limiting factor to fish survival. By securing additional water in-stream through targeted acquisitions of water rights and efficiency transfers, the streamflow in a particular reach can be enhanced to provide sufficient aquatic habitat for effective spawning, rearing, and migration. Leasing and purchasing flow can also improve water quality and improve temperature for fish by adding cleaner and cooler water to tributaries that would otherwise be diverted for out-of-stream purposes.
Altering predator abundance/distribution (RPA Actions 100-106). Reducing the impact of natural predators increases the likelihood that juvenile salmon will live to adulthood. By funding projects to move predators from areas with significant salmon populations and encouraging fishing of salmon predators, the Action Agencies seek to reduce the mortality rates to salmon due to natural conditions.
Longer-term Survival Improvement Actions
Protecting currently productive tributary riparian habitats from potential degradation through conservation easements or land acquisitions (RPA Action 150). By protecting lands next to tributaries that are productive for salmon, the Action Agencies help ensure the long term survival of jeopardized ESUs. Development of the riparian zone could increase pollution, fishing, and stream morphology to adversely affect salmon. Acquiring lands in areas known to be used by salmon substantially can create a refuge corridor and buffer the impacts of increasing development in the region.
Securing long-term protection/conservation easements in the tributaries to restore riparian habitat by working with agricultural incentive programs (RPA Action 153). Conserving land in conjunction with incentive programs for farmers helps ensure agrarian lands do not adversely impact salmon. These programs generally require habitat improvement plans establishing minimum buffer lengths, fences to exclude cattle and development, and restoration of natural vegetation, including the planting of trees and shrubs. By restoring natural ecosystems in these previously utilized areas, runoff from fields is buffered and previous inputs of fertilizer and sediment are reduced and naturally filtered. This helps create healthier waterways for salmon in the long term while permitting valuable use of land in the adjacent areas.
Acquiring productive mainstem fish habitat (RPA Action 157). As in the tributaries, mainstem habitat is also important to fish survival. Improving flows and establishing terrestrial buffers can also create healthier waterways and passage conditions for salmon. Given the much greater amount of flow in the mainstem, the biological benefits to salmon through habitat acquisition along the mainstem will generally have a lesser impact than similarly scaled projects in tributaries. As a result, off-site habitat actions to acquire productive habitat focus more in tributary areas with jeopardized ESUs.
Protecting and restoring tidal wetlands in the estuary (RPA Action 160). Ecological complexity in the estuary can be improved by protecting and restoring acres of estuarine habitat, especially shallow water tidal wetlands. By breaching levees, developing wetland habitats in sand flats, and creating shallow channels in intertidal areas, the Action Agencies will improve watershed health and provide additional habitat in an important migratory area for jeopardized ESUs returning from the ocean.

the RM&E Work Group, has developed programmatic and biological/physical habitat metrics to track comparable measurements of habitat changes. A detailed discussion of these is included in Report 4.

Near-term and longer term survival improvement actions being tracked with programmatic level metrics that apply to the BiOp RPA actions[10] are shown in Table 3.5.

B3. Actions-To-Date in Priority Tributary Subbasins for Ranked Tributary ESUs

Tables 3-6 through 3-10 show implementation actions in priority tributary subbasins but may not show all accomplishments from the date of the BiOp to present since reporting for FY 2003 will not be complete by the time this report is submitted. These tables are listed in ranked order.

Several of the ESUs use the same subbasins for spawning and rearing. Habitat improvements for one ESU will also usually improve survival for the other ESUs in that subbasin. As noted with Table 3-3, the priority rankings are based on BiOp populations.

Upper Columbia River steelhead, listed as endangered under the ESA, ranked most in need of survival improvements with a lambda range of 0.83-0.69. Upper Columbia River steelhead use the Methow, Entiat, and Wenatchee priority subbasins. The ESU's known range also includes the Okanogan River subbasin and some small tributaries to the mainstem Columbia River. The number of actions taken by the Action Agencies since December 2000, by category of near-term and long-term survival impacts, for upper Columbia River steelhead in the priority subbasins is summarized in Table 3-6.

Table 3-6. Upper Columbia River Steelhead Actions—Methow, Entiat, and Wenatchee Priority Subbasins

Near-Term Survival Improvement Actions	Number of Actions
Barrier removal (149)	18
Screen diversions (149)	6
Lease or purchase in-stream flows (149 & 151)	1
Long-Term Survival Improvement Actions	
Establish riparian buffers and/or obtain long-term easements to restore riparian habitat through agricultural incentive programs (153)	3

Snake River steelhead have a lambda range of 0.83-0.72. Though the lambda based on 20 percent hatchery-origin spawner efficiency is the same as that of upper Columbia steelhead (0.83), Snake River steelhead ranked second for purposes of this Check-In Report because they are listed as threatened under the ESA rather than endangered. Priority subbasins for this ESU are the Lemhi, upper Salmon, and Little Salmon. The known range of the ESU also includes the other subbasins in the Salmon River, the Clearwater River and its tributaries, the Grande Ronde River drainage basin, Imnaha River, and Tucannon River. The number of actions taken by the Action Agencies since December 2000, by category of near-term and long-term survival impacts, for Snake River steelhead in the priority subbasins, is summarized in Table 3-7.

Table 3-7. Snake River Steelhead Actions—Upper Salmon, Lemhi, Little Salmon Priority Subbasins

Near-Term Survival Improvement Actions	Number of Actions
Barrier removal (149)	23
Screen diversions (149)	114
Lease or purchase in-stream flows (149 and 151)	4
Long-Term Survival Improvement Actions	
Conservation easements or land acquisition to protect riparian habitat from degradation (150)	3
Establish riparian buffers and/or obtain long-term easements to restore riparian habitat through agricultural incentive programs (153)	2

Mid-Columbia River steelhead have a lambda range of 0.84-0.77 and are ranked third. Priority subbasins for this ESU are the upper John Day, middle Fork John Day, and North Fork John Day. The ESU is also found in other subbasins including the Umatilla River, lower Deschutes River and its tributaries, the Walla Walla River, the Touchet River, Yakima River and its tributaries, and Klickitat River. The number of actions taken by the Action Agencies since December 2000, by category of near-term and long-term survival impacts, for mid-Columbia steelhead in the priority subbasins is summarized in Table 3-8.

Table 3-8. Mid Columbia River Steelhead Actions—Upper John Day, Middle Fork John Day, and North Fork John Day Priority Subbasins

Near-Term Survival Improvement Actions	Number of Actions
Barrier removal (149)	9
Screen diversions (149)	3
Lease or purchase in-stream flows (149 and 151)	2
Long-Term Survival Improvement Actions	
Conservation easements or land acquisition to protect riparian habitat from degradation (150)	6
Establish riparian buffers and/or obtain long-term easements to restore riparian habitat through agricultural incentive programs (153)	5

Upper Columbia River spring Chinook have a lambda range of 0.85-0.84 and are ranked fourth for the purposes of this report. Their total range is virtually identical to the upper Columbia River steelhead ESU. The priority subbasins for this ESU are the Methow River, Entiat River, and Wenatchee River. Near-term and long-term survival improvement actions taken by the Action Agencies since December 2000 for upper Columbia steelhead provide similar benefits to upper Columbia spring Chinook. (See Table 3-9.)

Table 3-9. Upper Columbia River Spring Chinook Actions—Methow, Entiat, and Wenatchee Priority Subbasins

Near-Term Survival Improvement Actions	Number of Actions
Barrier removal (149)	18
Screen diversions (149)	6
Lease or purchase in-stream flows (149 & 151)	1
Long-Term Survival Improvement Actions	
Establish riparian buffers and/or obtain long-term easements to restore riparian habitat through agricultural incentive programs (153)	3

Snake River spring/summer Chinook have a lambda range of 0.91-0.82 and are ranked fifth. The priority subbasins for this ESU are the Lemhi, upper Salmon, and Little Salmon, the same as the Snake River steelhead. The range of the ESU is also virtually the same as Snake River steelhead and near-term and long-term survival improvement actions taken by the Action Agencies since December 2000 for Snake River steelhead) also benefit Snake River spring/summer Chinook (See Table 3-10.)

Table 3-10. Snake River Spring/Summer Chinook Actions—Upper Salmon, Lemhi, Little Salmon Priority Subbasins

Near-Term Survival Improvement Actions	Number of Actions
Barrier removal (149)	23
Screen diversions (149)	114
Lease or purchase in-stream flows (149 and 151)	4
Long-Term Survival Improvement Actions	
Conservation easements or land acquisition to protect riparian habitat from degradation (150)	3
Establish riparian buffers and/or obtain long-term easements to restore riparian habitat through agricultural incentive programs (153)	2

Snake River fall Chinook have a lambda range of 0.92-0.87 and are ranked sixth. None of the priority subbasins are within the critical habitat identified for Snake River fall Chinook. This ESU spawns in the larger rivers and does not use most tributaries. Non-priority subbasins within the range of the ESU include the lower Clearwater, Hells Canyon, Imnaha River, lower Grande Ronde River, lower Salmon River, and lower Snake River including lower portions of certain tributaries of the lower Snake. Near term

and long term survival improvement actions for this ESU are totaled with the actions taken to date to benefit all ranked ESUs in non-priority subbasins (see Table 3-11)

Snake River sockeye salmon are not ranked because lambda has not been established due to the very small surviving population. Their critical habitat includes the ESU's spawning lakes of the upper Salmon priority subbasin. Near- and long-term actions that improve habitat in the migration corridor of the upper Salmon subbasin also benefit Snake River sockeye salmon.

B4. Actions-To-Date in Other Tributary Subbasins for the Ranked ESUs

The Action Agencies have conducted significant efforts outside of the priority subbasins identified by RPA Action 149. Cumulative actions for jeopardized ESUs across the other subbasins are also expected to provide biological benefits for ranked ESUs. The number of actions taken by the Action Agencies since December 2000, by category of near-term and long-term survival impacts, for the ranked ESUs in other subbasins is summarized in Table 3-11.

Table 3-11. Actions Benefiting Ranked ESUs in Other Tributary Subbasins

Near-Term Survival Improvement Actions	Number of Actions
Barrier removal (149)	68
Screen diversions (149)	211
Lease or purchase in-stream flows (149 and 151)	18
Long-Term Survival Improvement Actions	
Conservation easements or land acquisition to protect riparian habitat from degradation (150)	20
Establish riparian buffers and/or obtain long-term easements to restore riparian habitat through agricultural incentive programs (153)	34

B5. Actions-To-Date in the Estuary and Mainstem Subbasins for the Aggregated Ranked ESUs

Columbia River chum salmon (threatened) have a lambda of 1.04 (no range defined). Chum salmon use the mainstem Columbia River below Bonneville Dam, the estuary, and lower reaches of certain lower Columbia River tributaries for spawning and rearing.

The Columbia River estuary is also used by the other ESUs during migration for holding and staging areas. Near-term and long-term survival improvement actions taken in the estuary benefit chum salmon as well as the upriver ESUs. Actions accomplished since December 2000 in the estuary and lower mainstem for chum and other ESUs are shown in Table 3-12.

Table 3-12. Columbia River Actions—Lower Mainstem and Estuary Subbasins

Near-Term Survival Improvement Actions	Number of Actions
Predator treatments	1
Long-Term Survival Improvement Actions	
Conservation easements or land acquisition to protect riparian habitat from degradation	1[11]
Protect and restore tidal wetlands	1[12]

B5.1 Estuary Action Summary

Estuary habitat acquisition and restoration. In August 2003, the Action Agencies acquired 451 acres of wetland habitat on Crims Island. This acquisition of important estuary habitat represents a significant accomplishment toward implementing RPA Action 160 (to protect and enhance up to 10,000 acres in the estuary. Furthermore, the Corps and its local partners, including BPA, are discussing the viability of establishing a land trust fund or other efficient funding mechanism. The concept of the program is to develop a funding source and process with associated criteria and flexibility to help enable non-profit land trusts to secure willing seller land as it becomes available to meet estuary habitat protection goals.

While work continues on a lower Columbia River subbasin plan, the Action Agencies are pursuing restoration projects that are scientifically justifiable and have established local and resource agency involvement. Planning activities are ongoing but no construction activities have yet commenced. The Action Agencies are also developing monitoring and evaluation tasks for site-specific projects that are consistent with more comprehensive studies.

RPA Action 160 currently states that estuary

habitat projects should rebuild productivity of listed populations in the lower 46 river miles of the Columbia River, but NOAA Fisheries may provide credit to Action Agency efforts within the total range of the estuary on a case-by-case basis. The Columbia River estuary has often been defined as the area from the mouth of the Columbia River to the base of the Bonneville Dam at river mile 146. LCREP's study area, for example, extends from the Pacific Ocean to Bonneville Dam because effects of ocean tides reach upriver to that point.

The Action Agencies remain concerned about the Corps' lack of land acquisition authority, which may be needed to meet the full 10,000-acre estuary restoration requirement of the BiOp.

Estuary action plan. The Actions Agencies, in coordination with NOAA, are developing a programmatic action plan *(Action Plan for the Federal Columbia River Power System Biological Opinion in the Lower Columbia River and Estuary)* for the estuary program under RPA Action 158 that takes into account related efforts for the restoration plan under RPA Action 159, estuary habitat improvement projects under RPA Action 160, monitoring and research under RPA Action 161 (as well as 196 and 197), conceptual modeling under RPA Action 162, and numeric modeling under RPA Action 194. This programmatic action plan will articulate the Action Agencies' vision for the estuary program, including implementation of BiOp actions and interrelationships with other estuary efforts in the lower Columbia River.

Estuary habitat restoration plan. The BiOp (Action 159) calls for a plan addressing the habitat needs of salmon in the Columbia River estuary. The Action Agencies, in coordination with NOAA and LCREP, have drafted a report entitled *An Ecosystem-Based Approach to Restoration Projects in the Columbia River Estuary with Emphasis on Salmonid Habitats*. The report provides a scientific basis for restoration projects in the estuary along with guidelines for project implementation and addresses the estuary habitat needs of salmon. Future work under the Corps' general investigation study for estuary ecosystem restoration, estuary related subbasin plans, and other efforts will build on the plan as more detailed habitat inventories and research results become available. The draft report was submitted to the ISRP for review; a final report is expected by September 30, 2003.

Habitat mapping. The Action Agencies have funded a habitat mapping project in the lower Columbia River. Information generated will provide baseline data for a systematic, effective, and scientifically grounded habitat protection and restoration program.

Estuary models. The BiOp (Action 162) calls for development of a conceptual ecosystem model for the Columbia River estuary. Two such conceptual models exist, each developed for a different purpose. In *Salmon at River's End*, NOAA Fisheries developed a conceptual model for juvenile salmon usage in the estuary that is being used to guide basic research. In the Corps' *Biological Assessment for the Channel Improvements Project*, a conceptual model was developed for various ecosystem processes in the estuary. While both of these models meet the requirements of Action 162, they should be consolidated and integrated into a larger model that addresses the factors controlling habitat development and maintenance. This enhanced model is needed for planning and design of 1) habitat restoration projects and 2) research, monitoring, and evaluation efforts, because for habitats supportive of salmon to be self-maintaining in the long run, a clear and explicit understanding of the factors controlling habitat-forming processes is critical.

The Action Agencies are also currently developing a work plan to develop a physical (numeric) model of the lower Columbia River and plume. There are two available multi-dimensional hydraulic computer models of the lower Columbia River and plume. One is a two- and three-dimensional model developed by the Corps' Hydraulics Laboratory at its Engineering Research and Development Center. The Oregon Graduate Institute (OGI) developed the other model. Both are capable of modeling estuary currents and salinity intrusion, but differ in their spatial and temporal scales. From initial cursory technical analysis, it appears the OGI model is better suited to evaluate potential impacts from basin-scale actions in the Columbia River. However, neither model is ideal for designing site-

specific ecosystem restoration actions.

Estuary RM&E work group. The Estuary/Ocean (EOS) RM&E Work Group continues work as detailed in Report 2. (See *Estuary and Ocean Research* section of that report.) The estuary RM&E plan expected by September 30, 2003, will be critical to inform planning and restoration efforts as a greater understanding of the estuary and plume is achieved. In addition, the Action Agencies continue to work with the LCREP Science Work Group and interested parties to ensure that efforts in the lower Columbia River are as consistent as practicable. For example, the Corps, in cooperation with BPA, LCREP and the states of Oregon and Washington, is nearing an agreement on a lower Columbia River general investigations study. Expected to be completed by 2007, the study will build on the subbasin plan for the lower Columbia River.

B5.2 Mainstem Action Summary

The Action Agencies have funded efforts to develop improvement plans for mainstem reaches and improved spawning conditions for chum salmon under RPA Actions 155, 156 and 157. BPA is funding efforts to evaluate limiting factors for chum production in Hamilton and Hardy Creeks, evaluate the relationship between mainstem and tributary spawning chum salmon, and enhance and restore production in Hamilton and Hardy Creeks and nearby tributaries. BPA also funded a project to improve habitat and reintroduce chum salmon into Duncan Creek and a project to evaluate factors limiting Columbia River Gorge chum salmon populations.

The Corps initiated a study in March 2002 to examine the feasibility of habitat modification to improve spawning conditions for chum salmon in the Ives Island area. The feasibility report will be complete in September 2003. As a result of the study, the Corps and USFWS are developing a plan to rehabilitate Lena's Lake to a spring-fed chum salmon spawning channel while maintaining and enhancing adjacent riparian and wetland areas.

Additionally, BPA and the Corps are implementing avian predation deterrent actions and monitoring in the estuary and at Crescent Island near McNary Dam.

Footnotes for Report 3

[5] Total estimated cost for Phases I through III of the HGMP effort is $2 million. The estimated cost of Phase I is $440,000. Estimated Phase II/III costs are $617,000 for LSRCP hatcheries and $937,000 at non-LSRCP hatcheries.

[6] Estimated lambda based upon range of 20-80 percent efficiency in spawning of hatchery-origin fish; higher efficiency results in lower lambda value.

[7] July 2003 lambda values from C. Toole (NOAA Fisheries, pers. comm..)

[8] Rankings based on BiOp lambda value for 20 percent efficiency of spawning by hatchery-origin fish.

[9] The geographic boundaries for these priority subbasins are based on hydrologic boundaries determined by NOAA Fisheries, and thus tend to be smaller and form a subset of a larger Council subbasin in Idaho and Oregon. For instance, the Lemhi, Little Salmon, and upper Salmon are all Action 149 priority subbasins in Idaho but their boundaries are all within the larger Salmon subbasin delineated by the Council. In Oregon, the middle Fork John Day, North Fork John Day, and upper John Day are three separate Action 149 priority subbasins but their boundaries fall within the larger John Day subbasin delineated by the Council. In Washington, however, the boundaries for the Entiat, Methow, and Wenatchee are the same as the boundaries for the Council subbasins with the same names.

[10] The other actions in the habitat section of the RPA tend to address institutional issues, studies and plan development, and procedural issues such as data collection, monitoring and research, and inventories. These actions do not, in themselves, improve survival, although they are necessary to inform future decision-making for project implementation. Many of the habitat actions focus on planning processes that provide a context for future decision-making but do not necessarily create near-term or long-term survival improvements. These include (a) Action 152 which addresses coordination for TMDL implementation, (b) Action 154 which addresses support for the Council's subbasin plans, (c) Action 155 which addresses mainstem habitat improvement planning, and (d) Action 156 for feasibility studies of habitat improvements in the Ives Island area. Significant accomplishments have been made for these actions, as reported in the 2002 progress report and indicated in the 2004-2008 Implementation Plan. For Action 156, several supporting projects have been implemented and the Corps is expected to complete the feasibility study for improving spawning conditions in the fall of 2003. The aforementioned actions are not described in the context of this specific report because they do not directly result in projects that reduce fish mortality or improve survival.

[11] This action represents the acquisition of 451 acres at Crims Island.

[12] This single action includes the Crims Island acquisition of 451 acres of wetlands habitat in the estuary.

Report 4
Status of Biological and Physical Performance Standards

1. BiOp Expectations

The BiOp requests the Action Agencies report on progress in developing and adopting biological and physical performance standards, specifically:

- "W*hether the Action Agencies, in coordination with other federal agencies, have adopted biological performance standards determined by (NOAA Fisheries), based on the best science available, as sufficient 1) to evaluate the status of each ESU relative to survival and recovery indicator criteria using, in particular, ESU-specific recovery standards that incorporate measures of abundance, productivity trends, species diversity, and population distribution, and 2) to evaluate how effectively the actions produce survival improvements to meet the offsite mitigation performance standard described in (BiOp) Table 9.2-4."*
- "Whether the Action Agencies have established measurable, objective physical performance standards approved by (NOAA Fisheries) based on the best available science to achieve habitat attributes and hatchery reforms through management actions that provide the life cycle survival improvements needed to achieve survival and recovery indicator criteria consistent with Sections 9.2.2.2.2 and 9.2.3."

2. Progress Summary and Conclusion

Conclusion: Only preliminary recovery performance targets were identified in the BiOp. Further development of ESU specific recovery targets that incorporate measures of abundance, productivity trends, species diversity, and population distribution are expected from ongoing work of NOAA's Technical Recovery Teams that is being funded by the Action Agencies. The Action Agencies are using adult abundance and

Regional Coordination

For the BiOp actions/issues discussed in this report, the Action Agencies coordinated fish recovery efforts with the following regional partners:

- **NOAA Fisheries** – which carries out most regional coordination for population-level performance standards. NOAA's **Biological Recovery Team** (BRT) recently issued a draft report for review by states and tribes summarizing updated ESU status (both adult trends and population growth rate) through 2001. NOAA Fisheries will be updating performance status through 2002 and 2003 as that information becomes available.
- **Council's Mainstem Amendment process** – where hydro system performance standards were open to regional discussion in the past year.
- **Pacific Coast Salmon Recovery Fund,** and **State-Federal-Tribal Monitoring Partnership–** participants in habitat performance measures' development.
- **Northwest Power & Conservation Council's (Council's) Artificial Production Review Evaluation (APRE)** – involved in completing Phase I (partial) HGMPs for all artificial propagation programs in the Columbia basin. Concurrently, NOAA Fisheries is working with fishery managers and interest groups to refine the Phase I HGMPs into Phase II plans that will be used to determine consistency with the Endangered Species Act, the *U.S. v. Oregon* management process, and provide key information for development of subbasin plans.

trends in abundance as primary measures of population performance. The population growth rate (lambda) is also used as a longer-term performance metric. Hydro and additional (non-hydro) life stage survival needed, are being used as standards for assessment of life-stage performance and needed actions. More specific physical and biological measures for habitat and hatcheries have been identified and are being addressed through the NOAA and Action Agency RME Program. Further development of performance standards for these metrics is still under development and coordination.

Population performance measures and standards: In this and other progress reports, the Action Agencies have presented information on the annual adult abundance (run size) and the trend in annual adult abundance as one measure of overall biological performance for each listed ESU. We are using the best available information on adult trends, and also attempting to standardize how we present and use such trends from year to year. Adult trend information is readily available, responsive to change, and simple enough for practical use in management decisions. We also consider the population growth rate (lambda) as determined by NOAA Fisheries. Because it is not updated as regularly, is more complex, and depends on ongoing research needs to reduce uncertainties, population growth rate (or lambda) is considered every few years as a longer-term measure of success.

Hydro survival performance standards: The BiOp presents two sets of specific survival standards for the hydro system, one for adults and one for juveniles. We continue to support and apply these performance standards, which reflect estimates of the expected survival with aggressive improvements in the hydrosystem. These standards were recently endorsed by the Council. On an annual basis, however, reporting of these data by NOAA Fisheries and others often lags due to competing priorities. There has been some discussion between the Action Agencies and NOAA Fisheries about the use of juvenile in-river performance standards and juvenile total system survival standards, which are viewed as equal standards in the BiOp. We believe that the primary standard should be total system survival, with in-river survival serving as a secondary standard. As a next step, the Action Agencies are considering using some form of the hydro survival standards provided in the recent Habitat Conservation Plan for Douglas and Chelan Public Utility Districts (PUDs) and whether we should establish a uniform, per-dam minimum performance standard such as 93 percent total juvenile survival to help us prioritize hydro improvement actions between dams and between ESUs. We welcome comment and discussion on this point.

Additional survival performance standards: The difference between survival/recovery needs and the results of aggressive hydro actions (and planned harvest reductions for some ESUs) – is the additional survival improvement performance needed for the eight jeopardized ESUs. This performance standard is unallocated and applies to all life stages and all regional actions, not just the offsite mitigation actions of the Action Agencies. Although the BiOp anticipated that NOAA Fisheries would do further work on "additional survival" to develop and allocate

Performance standard – a specified numerical objective or target deemed necessary to improve ecosystem function, improve salmon survival, and ultimately result in recovery for listed fish. A performance standard is the performance-level objective of a performance measure. A performance standard can be expressed as an absolute quantitative target, a change in condition from some baseline, or simply used to verify the proper implementation of a particular management action *(i.e.,* programmatic-level standard). Examples of performance standards include a specific level or quantity of adult fish, measured improvement in habitat conditions, escapement rates, egg-to-smolt productivity, etc.

Performance measure (metric) – the physical or biological parameter, in terms of a condition or response, that is monitored through time. Either an actual measurement or an estimate, a performance measure is the response that is tracked over the course of the RM&E program. It is the pulse that is monitored to assess progress towards or compliance with specified standards. A performance measure will have a performance standard associated with it.

For example, numbers of adult fish would be a metric used to measure performance. A performance standard would be met when these numbers meet or exceed a target set as a performance standard.

performance needed by life-stage or by agency, this work is complex and has not been pursued due to resource constraints. As a result, the survival gap noted in the BiOp for the eight ESUs remains unallocated and represents needed additional survival improvements from all combined federal, state, and tribal actions. The Action Agencies' offsite mitigation actions comprise an unknown part of this additional survival requirement.

Performance measures and standards for habitat: Working with NOAA Fisheries and the federal land management agencies, the Action Agencies have proposed both programmatic level and physical/biological habitat performance measures or indicators. The programmatic level measures include items such as the extent of implementation of passage improvements, fish screening, water quantity increases, and riparian and estuary improvements and will be part of annual progress reporting by the Action Agencies and other federal agencies undertaking habitat actions in the Columbia basin. The physical and biological habitat performance measures include more direct measures of performance such as water temperature, sediment, and juvenile fish abundance.

We present the current version of both the programmatic and the physical/biological habitat measures in this report, but note that they are interim in nature. Although they represent the best available information regarding measurable actions and biological benefit, they are interim because they cannot yet be quantitatively linked to biological results with certainty. Monitoring of both programmatic and physical/biological habitat measures and research linking habitat actions, habitat condition and biological performance are primary objectives of the federal agencies' Research, Monitoring & Evaluation (RM&E) Plan. However, much of this research is very difficult and may take several years to produce results with desired statistical confidence levels.

Performance measures and standards for hatcheries: Several efforts have been undertaken to establish performance measures and standards for artificial propagation programs. The Council's November 1999 report to Congress, "*Artificial Production Review;*" included 24 proposed performance standards and indicators (measures) for assessing benefits and risks. These proposed performance standards and indicators were critiqued by the Independent Scientific Advisory Board (ISAB) and subsequently revised by NOAA Fisheries in December 2000 to produce the draft document, "*Performance Standards and Indicators for the Use of Artificial Production for Anadromous and Resident Fish Populations in the Pacific Northwest*." The hatchery performance standards suggested by NOAA Fisheries in the 2000 BiOp are a prioritized subset of those provided in the December 2000 document – those most pertinent to the Action Agencies' implementation of their ESA responsibilities.

In this report, the Action Agencies present specific hatchery performance measures linked to the performance standards in the 2000 BiOp for consideration and discussion. However, the Action Agencies expect the full range of hatchery performance standards to be reflected in the completed Phase III Hatchery and Genetic Management Plans (HGMPs).

3. Performance Measures and Standards

Performance measures and standards are critical components of performance assessments identified in the BiOp, the All-H Strategy, and the Action Agencies' implementation plans. They establish the level of improvement needed for survival and recovery in each stage of the salmon and steelhead life cycle and provide targets for prioritizing and evaluating actions. Performance measures can be organized as a hierarchy, configured to reflect a chain of physical/environmental and biological responses to management actions. Management actions are implemented (Tier 4) to cause changes in physical conditions and/or biological responses (Tier 3), which in turn affect life-stage specific survival (Tier 2) that collectively are reflected as a population response (Tier 1).

3.1 Tier 1 – Population-Level Performance Standards Update

ESU-based performance standards (Tier 1) are intended to provide long-term measures of success at the level of populations. ESU-level performance standards reflect contributions not only from the federal hydro system, but also

from all other factors in the Columbia basin and the marine environment that affect salmon and steelhead recovery. These include federal, state, local, tribal, and private conservation actions, the effects of harvest, hatcheries, land and water management, as well as natural factors and variations in climate and ocean conditions. Nevertheless, ESU-level population abundance indices represent the ultimate measure of our success under the ESA.

At the outset, there is the question of what ESU population targets should be. Preliminary recovery abundance targets have been identified in NOAA Fisheries' BiOp for several Snake and upper Columbia River ESUs and are reflected in Figures 6.5 through 6.11 in Report 6. Refinement of these targets and development of recovery targets for the remaining ESUs are expected from ongoing work of NOAA's Technical Recovery Teams (TRTs). This work will identify ESU-specific recovery standards that incorporate measures of abundance, productivity trends, species diversity, and population distribution. The Action Agencies have provided funding for this work through a $1.2 million interagency agreement with NOAA Fisheries and expect this work to be completed shortly, resulting in updated ESU performance standards for all involved in Columbia basin activities.

The Action Agencies are currently using ESU abundance indices and the trends in those indices to track the performance of each listed ESU in their progress reports. Data on adult abundance are most readily available and trends can be promptly calculated to allow timely reporting of performance. As risk of extinction generally varies inversely with abundance, such indices both by themselves and in relation to other factors provide a cost-effective measure of ESU performance. Trends in the ESU abundance indicate if the ESU is increasing (trend >1), decreasing (trend <1), or stable (trend =1). Populations with increasing trends are at less risk of extinction.

ESU abundance indices can supplement calculations of population growth rate, or lambda, when it is available to provide additional insights on ESU viability. However, given the more stringent data requirements (*e.g.,* population age structure) and difficult assumptions that are dependent on ongoing research (*e.g.,* relative reproductive success of hatchery-origin fish), lambda generally is not available for annual, short-term use. With respect to lambda, the Action Agencies have placed a high priority on the collection of additional information on the reproductive success of hatchery-origin fish relative to natural-origin fish to help clarify this critical assumption. Once it can be resolved, the use of more sophisticated population viability analysis such as lambda may be appropriate and provide population level assessments with more certainty than is currently possible.

Measurement of ESU abundance and population-specific information will be critical in allocating recovery funding to address needed performance. Using performance-based management, the Action Agencies anticipate recovery actions and funding being targeted to those ESUs or specific populations in greatest need of assistance to achieve delisting of each ESU. Cost-effective methods must be applied to performance reporting in order to achieve actual recovery of the species.

3.2 Tier 2 – Life-Stage Survival Performance Standards Update

3.2.1 Hydrosystem

In developing the RM&E Plan, the Action Agencies'/NOAA Fisheries' joint hydro work group addressed the following issues regarding survival standards for the hydrosystem. (What follows is a summary; full details appear in the RM&E Plan.) The BiOp specified two classes of survival standards (goals) for stocks migrating through the hydrosystem (in-river and project-specific) and a third class for transported stocks (combined survival or system survival).

Survival standards for downstream migrant life stages

- *ESUs being transported* – The Action Agencies' preferred standard is the combined survival, or total survival, attributable to passage through and around the hydrosystem. The standard is preferred because of the relative proportion of juvenile outmigrants that are transported at Snake River dams. This survival standard reflects the composite effects on in-river migrants, as well as those fish transported from collector dams. The survival of the transported fraction of the population

reflects both direct effects and indirect effects ("D") associated with the transportation process. However, accurate and timely estimates of D may not be available for all transported ESUs, at least by the 2005 Check-In. For these stocks, in-river survival may be useful as a secondary standard until D is fully understood.

- *ESUs not subject to transportation* – For these stocks, in-river survival through the hydrosystem is the preferred standard. But PIT tag sampling limitations require that surrogate ESUs be used as indicators for many populations, most notably the use of Snake River stocks to represent mid-Columbia stock survival through the lower Columbia.

For each ESU, Table 4-2 shows estimated smolt survival as well as whether the estimate is empirical or model-derived. The survival performance standard is taken from table 9.2-3 in the BiOp. For most ESUs, hatchery (H) and wild (W) fish would be combined to form one annual estimate. The response zone is that portion of the hydrosystem through which the estimate is obtained. It corresponds to that portion of the hydrosystem each ESU encounters.

Table 4-2. Performance Standards for Smolt Passage Survival for each ESU

ESU	Index stocks	Nature of estimate & response zone	BiOp performance standard Type	Survival %
Snake				
Spring/summer Chinook	H&W originating above LGR	Empirical$_{(LGR-BON)}$	1. combined 2. system (in-river)	57.6 49.6
Fall Chinook	Lyons Ferry Hatchery & periodic validation with wild fish	Empirical $_{(LGR-LMO)}$ & Model$_{(LMO-BON)}$	1. combined 2. system (in-river)	12.7 14.3
Steelhead	H&W originating above LGR	Empirical$_{(LGR-BON)}$	1. combined 2. system (in-river)	50.8 51.6
Sockeye	-	-	-	NA
Upper Columbia				
Spring Chinook	1. H&W originating above LGR 2. UC hatcheries-potential	Empirical$_{(MCN-BON)}$	1. system (in-river) 2. combined (if transported)	66.4 66.4
Steelhead	1. H&W originating above LGR 2. UC hatcheries-potential	Empirical$_{(MCN-BON)}$	1. system (in-river) 2. combined (if transported)	67.7 67.7
Mid-Columbia				
Steelhead	1. H&W origin. above LGR 2. MC hatcheries-potential	Empirical$_{(ENTRY-BON)}$	1. system (in-river)	67.7
Lower Columbia				
Chinook	-	-	-	-
Steelhead	-	-	-	-

Adult passage survival standards

- The preferred survival standard is the overall survival of adult salmonids migrating upstream through the hydrosystem. Monitoring this each year for each ESU is more difficult than it might seem. Historical estimates have been based on radio telemetry estimates that require intercepting and handling large numbers of adults, at considerable cost. As an alternative the RM&E work group recommended implementing and testing a PIT tag based system over the next few years.

Table 4-3 shows proposed index populations that would be used to characterize adult passage survival for each ESU. Hatchery (H) and wild (W) fish would be combined to form one annual estimate. If adequate numbers of PIT-tagged wild fish were detected, a separate estimate could be calculated for the wild component.

Table 4-3. Proposed Index Stocks to Characterize Adult Passage Survival for each ESU

ESU	Index stocks	Response zone	BiOp performance standards (system or reach survival %)
Snake River			
Spring/summer Chinook	H&W originating above LGR	Bonneville to Lower Granite	85.5
Fall Chinook	H&W originating above LGR	Bonneville to Lower Granite	74.0
Steelhead	H&W originating above LGR	Bonneville to Lower Granite	80.3
Sockeye	NA[13]	Bonneville to Lower Granite	88.7
Upper Columbia			
Spring Chinook	1. H&W originating above PR. 2. all H&W originating above MCN	Bonneville to McNary	92.2
Steelhead	1. H&W originating above PR. 2. all H&W originating above MCN	Bonneville to McNary	89.3
Mid-Columbia			
Steelhead	All H&W originating above MCN	Bonneville to McNary	89.3
Lower Columbia			
Chinook	to be determined	Bonneville dam	98.1
Steelhead	to be determined	Bonneville dam	97.3

3.2.2 Additional Survival and Offsite Mitigation

Besides the hydro corridor juvenile and adult life-stage survival performance standards, the BiOp specifies a range of survival improvements needed in all other non-hydro stages of the life cycle (NOAA Fisheries' BiOp Section 9.2.2.2, Table 9.2-4). These are estimated additional improvements in life-cycle survival needed to achieve survival and recovery standards after implementing hydro survival improvements. These survival improvements are to be achieved through a combination of "offsite mitigation" performed by the Action Agencies; actions by other regional, federal, state and tribal entities; and any natural increases in survival conditions (*i.e.,* ocean survival) relative to the base case years of the BiOp analysis. The BiOp states that these values are intended to provide perspective and enable NOAA Fisheries to make a qualitative judgment regarding the potential to improve the productivity of listed ESUs enough to avoid jeopardy. These values have practical limitations for their use as Tier 2 performance standards because they are not specific to particular life stages, but instead are a composite of improvements in all non-hydro life stages.

As noted in the BiOp, NOAA Fisheries planned to quantitatively define and apportion the composite non-hydro life-cycle improvements to specific life stages. However, this work has apparently not been done due to resource constraints. Until this additional guidance is provided by NOAA, this composite has been used by the Action Agencies to identify where (and for what ESU populations) offsite mitigation efforts are most critically needed. This composite will be updated by the 2005 Check-In to assess the combined improvements of all non-hydro life stages.

3.2.3 Harvest

The Action Agencies focus to date has been to support harvest related projects consistent with the harvest strategies articulated in the implementation plans. Currently, all Action Agency funded activities that address the strategies in the implementation plan and are consistent with the five BiOp harvest RPA actions receive Tier 4 programmatic credit. In reevaluating our harvest strategy, the Action Agencies seek to gain credit by improving harvest off site performance measures using a shift from programmatic credit to Tier 2 quantifiable adult life-stage benefits. Priority will be placed on actions that affect ESUs that are in the worst condition through either reconsultation and/or direct negotiation with NOAA Fisheries.

3.2.4 Action Agency Approach

Until the life stage specific standards are further defined by NOAA Fisheries, the Action Agencies are focusing on mitigation needs and priorities at more specific, localized areas by developing and applying performance measures and standards at the Tier 3 physical and biological performance level and the Tier 4 programmatic level. Progress in these areas is identified below for the areas of habitat and hatcheries.

3.3 Tiers 3 & 4 – Update on Performance Measures/Standards for Habitat

Tributary habitat performance standards identify the objectives or targets that need to be achieved through tributary habitat actions. Habitat physical and biological performance measurements relative to these standards identify where and what kinds of additional habitat improvements need to be implemented (*i.e.* limiting factors for tributary habitat). Information specific to geographic areas of an ESU is used with the effectiveness of different categories of habitat actions to determine the type and amount of habitat actions that need to be implemented for each area of an ESU.

Following this approach to tributary habitat mitigation requires identification of both the performance standards, monitoring of performance measures, and research on the effectiveness of actions. Currently the BiOp has only identified the population level performance needs (Tier 1) and the additional improvements in life-stage survival needed beyond the hydro and harvest improvements (Tier 2) assumed under the RPA. Physical and biological (Tier 3) habitat performance standards are planned to be identified through specific technical workgroups, TRT limiting factors, and Subbasin Planning. The measurement of physical and biological performance and the effectiveness of habitat actions is being addressed through the RM&E Program, but it will take several years for reliable information from these efforts. In the interim

the Action Agencies are planning and tracking habitat actions using programmatic level performance standards (Tier 4), available biological information, and expert opinion linking biological benefit to the categories of actions that are programmatically being measured. (See *Report 3* for information on the existing habitat mitigation planning framework).

Despite the challenges, the Action Agencies have worked with other federal agencies to develop common programmatic performance measures to track Tier 4 actions to improve habitat. Programmatic Tier 4 metrics are the best available measurements at this time to track standard habitat accomplishments for projects undertaken by multiple agencies within the range of jeopardized ESUs. Standard guidelines for physical and biological Tier 3 performance measures and monitoring approaches have been developed by the NOAA Fisheries' and Action Agencies' RM&E team, as have pilot studies seeking to measure the biological benefits of specific habitat actions. These physical and biological measures for status monitoring and action effectiveness research are provided in the RM&E Plan that is currently being reviewed by the ISAB, the Independent Scientific Review Panel (ISRP) and the state and tribal fish agencies.

In addition, through the State-Federal-Tribal Monitoring Partnership, Pacific Coast Salmon Recovery Fund coordination, and a contract with the state and tribal fish agencies, these measures are being compared with similar measures being used in other regional monitoring programs to produce common monitoring protocols and sampling designs. Later in 2003 a workgroup will be formed to begin developing performance standards for these Tier 3 physical and biological measures. In the interim, the Action Agencies remain focused on implementation and Tier 4 programmatic tracking of habitat improvements at the ESU level.

The Federal Programmatic Habitat Metrics Template (shown in Table 4-4) tracks individual on-the-ground project accomplishments for protecting, enhancing, and restoring habitat to benefit fish. Data identified in the metrics template are primarily quantitative and reported per project, and can be accumulated for each ESU and each subbasin to provide a picture of habitat accomplishment.

The Action Agencies would also like to achieve, based on streamlined habitat tracking metrics, a common system measuring habitat condition among federal and state agencies and tribes. In upcoming months, this concept will be discussed with states and tribes, as will the capability to collect habitat performance measure data from those entities for a regional database.

Table 4-4: Federal Habitat Metrics Template for Tributary and Estuary Programmatic Habitat Performance Measures

Actions	Federal Actions Supporting Habitat Improvements (**Bold** actions indicate core measurable habitat actions derived from FCRPS BiOp Tier 3 effectiveness monitoring categories)	Primary Benefit	Reporting Metrics(per action)
1. In-stream-structural	**Improve stream structure /reconfigure stream morphology**	Stream complexity restoration	Number of stream miles treated (to 0.1 miles)
2. In-stream-passage	**Upgrade or eliminate culverts**	Barrier removal	Number of miles habitat accessed/action (to 0.1 miles)
	Eliminate barriers (remove diversions, dams, mine tailings, low water crossings, install fish ladders)	Barrier removal	Number of miles access (to 0.1 miles)
3. Fish screens	**Install/retrofit fish screens to NMFS/USFWS standards**	Screen irrigation diversions	Size of each diversion screened including rate (cfs) and duty (quantity)
4. Riparian conservation	**Riparian habitat improvement /restoration treatments**	Riparian function restoration	Riparian miles (to 0.1 miles) and acres treated, thinned, fenced each side of stream

Table 4-4, Continued

Actions	Federal Actions Supporting Habitat Improvements	Primary Benefit	Reporting Metrics(per action)
	Secure long-term riparian protection/conservation easements	Riparian function restoration	Number of stream miles (to 0.1 miles) and total acres each side of stream
	Acquire productive fish habitat	Riparian function restoration	Number of miles (to 0.1 miles) and acres/action
	Streambank stabilization treatments	Riparian function restoration	Number of miles (to 0.1 miles)
5. Water quantity	**Lease or purchase instream flows** (wet water)	In-stream flow restoration	Amount of water (cfs), stream reach improvement (miles), timing (season) of effect; miles meeting ESA needs
	Water measurement	Assess flows and consumptive use	Number of gauging or demand measurement devices installed, stream reach measured (miles), amount of water (cfs)
	Water conservation projects, Special use permits (actual water conserved through modified irritation application, delivery, change in point of diversion, well, etc)	In-stream flow restoration	Amount of water returned to in-stream use (cfs), stream reach (miles) affected, timing (season) of effect; miles meeting ESA flow needs
	Water right adjudication	Identify water resource allocations, risk	Percent of rights adjudicated
6. Water Quality	Tributary and Mainstem Wetlands restored/created	Water quality improvement	Number of acres
	Apply EPA BMPs, federal standards and guidelines to agricultural areas, silvicultural activities, abandoned mine sites, construction sites, and other nonpoint source water quality effects associated with operation of dams and other hydrologic modifications	Water quality improvement	Number and size (acres) where BMPs, S&Gs applied; detected water quality improvements; Reaches removed from 303(d) list.
	TMDL implementation	Water quality improvement	Miles improved, Number and Percent of reaches removed from 303(d) list
7. Roads	Improve roads hydrologically connected to streams	Sediment reduction	Miles of road decommissioned or upgraded
	Decommission roads hydrologically connected to streams	Sediment reduction	Miles of road decommissioned or upgraded
8. Estuary	**Protection/acquisition**	Protect habitat	Number of acres wetlands and key habitats protected
	Restoration	Riparian function restoration	Number of acres wetlands and key habitats restored
	Passage	Barrier removal	Number of acres/miles habitats opened
	Predator treatments	Reduce mortality by altering predator abundance /distribution	Number of actions completed

3.4 Tiers 3 & 4 – Update on Performance Standards/Measures for Hatcheries

As noted earlier in the Progress Summary, many efforts have proceeded to establish performance measures for artificial propagation programs. Artificial propagation programs can have both positive and negative effects on naturally spawning populations of salmon and steelhead. To increase the benefits and reduce adverse effects, the region has undertaken a comprehensive effort to reform propagation programs. Reform is being accomplished primarily through the coordinated efforts of the Council's Artificial Production Review (APR) and NOAA Fisheries' ESA consultations. In December 2000, NOAA Fisheries revised the APR's 24 proposed performance standards and indicators for hatcheries in response to ISAB review and developed a prioritized subset of the APR standards most pertinent to the Action Agencies' implementation of ESA responsibilities. These hatchery performance standards are presented in section 9.2.3 of the BiOp for incorporation into Phase III HGMPs. Table 4-5 shows a comparison of hatchery performance standards prepared through the Council's APR with those presented in the BiOp.

Table 4-5. Performance Standards for Hatcheries

Performance Category	Comparable APR Standard	BiOp Hatchery Performance Standard
Genetic introgression	Patterns of genetic variation within and among natural populations do not changesignificantly as a result of naturalproduction.	Local, within-ESU, broodstock is used in all propagation programs within critical habitat, unless associated with an isolated program. Hatchery broodstocks used in supplementation programs represent the genetic and life-history characteristics of the natural population(s) they are intended to supplement. Non-isolated hatchery programs regularly infuse natural-origin fish into the broodstock, as described in an approved HGMP.
Hatchery-origin fish straying	Artificially produced origin adults in natural production areas do not exceed appropriate proportion of the total natural spawning population.	For naturally spawning populations in critical habitat, non-ESU hatchery origin fish do not exceed 5 percent; ESU hatchery-origin fish do not exceed 5 to 30 percent, unless specified in an HGMP for a conservation propagation program.
Marking	Releases are sufficiently marked to allow statistically significant evaluation of program contribution of natural production, and to evaluate the effects of the program on the local natural population.	Hatchery populations are properly marked so as not to mask the status of natural-origin populations or the capacity and proper functioning of critical habitat.
Viable and critical population thresholds	Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.	Hatchery operations do not appreciably slow a listed population from attaining its viable population abundance. Hatchery operations do not reduce listed populations that are at, or below, critical population abundance.
Harvest effects	Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	Federal hatchery mitigation fish produced for harvest do not cause subsequent over-harvest of listed stocks such that their recovery is appreciably slowed. Harvesting reforms are implemented to maintain and enhance harvest of mitigation fish in consideration of the constrained productivity of listed stocks caused by the FCRPS and other development.
Hatchery planning	Program addresses ESA responsibilities.	Hatchery goals and objectives, operational protocols, monitoring and evaluation, anticipated effects, and relationship to other critical management and planning processes are fully described in approved HGMPs.

Table 4-5. Performance Standards for Hatcheries

Performance Category	Comparable APR Standard	BiOp Hatchery Performance Standard
Research	For research hatcheries: The artificial propagation program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the experimental objective and evaluate beneficial and adverse effects on natural populations.	Scientific knowledge is increasing on the effects of hatchery supplementation and captive broodstock programs on the survival and recovery of natural-origin populations. The quality and survival of hatchery supplementation fish are increasing .

The hatchery reform effort is seriously hampered by the lack of understanding of many of the effects of propagation programs. In many cases, the programs' benefits are not regularly evaluated. Similarly, the programs' adverse effects are not regularly evaluated. And, for many potential risks, the effects of artificially propagated fish on the viability of naturally spawning populations are not sufficiently understood. These problems have been created by a combination of insufficient funding, inadequate scientific techniques to quantify effects, and lack of management attention. For a detailed discussion of these issues, refer to the ISAB's June 3, 2003, report, "*Review of Salmon and Steelhead Supplementation*."

3.4.1 Interim Hatchery Performance Measures

Based on APR and BiOp performance standards, the Action Agencies are considering the following interim performance measures for BPA-funded lower Snake River Compensation Plan (LSRCP), Reclamation, Corps, and Fish and Wildlife Program hatcheries located in the FCRPS or impacting one of the eight jeopardy ESUs:

1. Planning

By December 1, 2003, a Phase II HGMP will exist for each BPA-funded artificial propagation program in the Columbia River basin with the potential to take listed salmon and steelhead. These plans will include goals and objectives, operational protocols that address key hatchery activities and minimize risks, alternatives to improve operational protocols, and effects on listed populations. By May 1, 2004 a NOAA-approved Phase III HGMP will exist for each BPA-funded artificial propagation program in the basin that has the potential to take listed fish.

Performance measure: The number of Phase II HGMPs submitted to NOAA Fisheries compared to the number of artificial production programs for which Phase II HGMPs have not been submitted. The number of Phase III HGMPs submitted to NOAA Fisheries compared to the number of artificial production programs for which Phase III HGMPs have not been submitted.

2. Genetic Introgression

For each artificial propagation program identified as an integrated program, either:

- endemic broodstock is being used, or
- endemic broodstock is being collected to replace a non-endemic broodstock, or
- production levels is being reduced to avoid adverse genetic introgression to naturally spawning populations.

Annual performance measure:

- The number of integrated programs with endemic broodstocks compared to the number of integrated programs for which actions are being undertaken to change to endemic broodstocks,
- the number of integrated programs using non-endemic broodstocks, and
- the number of integrated programs using non-endemic broodstocks but for which production levels are being reduced to avoid potential for adverse genetic introgression and outbreeding depression.

3. Optimal Use of Natural Broodstock

For each integrated, artificial propagation program, the Phase III HGMP will identify a broodstock collection protocol that specifies the

proportion of natural-origin fish in the broodstock, including up to 100 percent natural-origin fish in the broodstock under optimal conditions.

Annual performance measure: The number of integrated programs with Phase III HGMPs that include a broodstock collection protocol optimizing the use of natural-origin fish compared to the number of integrated programs that do not have such protocols.

4. Fish Straying

4a. For each artificial propagation program identified as an isolated program, hatchery-origin adults will make up less than 5 percent of any non-target natural spawning populations.

Annual performance measure: The number of evaluated isolated programs for which hatchery-origin adults do not make up more than 5 percent of any non-target natural spawning population (five-year geometric mean) compared to the number of isolated programs for which hatchery-origin adults make up more than 5 percent of one or more non-target populations and to the number of isolated programs for which the quantitative information on adult straying to natural spawning populations is not known.

4b. For each integrated, artificial propagation program, the Phase III HGMP will identify a management protocol that specifies the proportion of hatchery-origin fish in the target, naturally spawning population.

Annual performance measure: The number of integrated programs with Phase III HGMPs that identify a protocol for management of hatchery-origin fish in the target, naturally spawning population compared to the number of integrated programs with Phase III HGMP not containing such a protocol.

6. Marking

For each artificial propagation program, the Phase III HGMP will identify a marking protocol that reflects objectives of harvest management and the need to distinguish the origin of fish in target and non-target naturally spawning populations.

Annual performance measure: The number of Phase III HGMPs with marking protocols sufficient to achieve harvest management objectives consistent with program goals and objectives and distinguish the number of adult hatchery-origin fish in naturally spawning populations compared to the number of Phase III HGMPs without such marking protocols.

6. Harvest

For each artificial propagation program, the annual harvest of hatchery-origin fish in each marine and freshwater fishery will be documented.

Annual performance measure: The number of programs for which harvest is estimated from tagging data compared to the number of programs for which harvest is not estimated.

During 2004, BPA plans to require BPA-funded hatchery operators to begin reporting on progress in meeting the Interim Performance Standards. Annual reporting requirements will be incorporated into operation and maintenance agreements for Fish and Wildlife Program hatcheries and the direct funding agreements for LSRCP, Reclamation, and Corps facilities.

3.5 Tiers 3 & 4 – Update on Performance Measures/Standards for Harvest

NOAA Fisheries wrote the harvest RPA's with the intent that if any quantitative survival benefits occurred through project implementation, the benefit would be a bonus to any anticipated benefit gained from hydro, hatchery and habitat actions. Currently, all Action Agency funded activities that address the harvest strategies in the implementation plans and are consistent with the five BiOp harvest RPA actions receive Tier 4 programmatic credit. The Action Agencies seek to pursue future activities that will yield quantitative adult life-stage survival benefits. If through project implementation, survival improvements are gained, then quantitative crediting mechanisms toward offsite mitigation would be developed.

Footnotes for Report 4

[13] Snake River sockeye are conserved under the Safety-net Hatchery Program; numbers are too limited to support tagging for assessing passage survival.

Report 5
Funding and Authorizations Obtained by Other Federal Agencies for Timely Implementation of Basinwide Recovery Strategy Actions

1. BiOp Expectations

The BiOps specifies that this 2003 Check-In Report will document the Action Agencies' findings as to "*whether the federal agencies participating in the Federal Caucus (other than the hydro Action Agencies) have obtained the funding and authorizations necessary for the timely implementation of specific action items identified in the Basinwide Recovery Strategy (All-H Paper) and whether those action items are being implemented in a manner likely to be effective, timely and consistent with the scientific basis for the Strategy. Federal Caucus members will provide this information to (NOAA Fisheries) and the Action Agencies as part of the Basinwide Recovery Strategy implementation.*"

Below are summaries of key Federal Caucus members' funding activities to date, including the Bureau of Land Management (BLM), Environmental Protection Agency (EPA), Natural Resources Conservation Service (NRCS), NOAA Fisheries, U.S. Forest Service (USFS), and U.S. Fish & Wildlife Service (USFWS).

2. Progress Summary and Conclusion

Conclusion: The Federal Caucus agencies have made considerable progress implementing measures identified in the Basinwide Recovery Strategy. Funding has been timely overall, although some uncontrollable factors (*e.g.,* fire suppression costs) have caused some funding resources to be redirected or reduced. Although most agencies are budgeting a steady or increasing amount of funds for fish recovery efforts each year, some agency requests have not been fully funded. For example, NOAA's RM&E requests have not been funded and this has contributed to development of the RM&E Plan at a pace slower than anticipated in the BiOp. (See Table 5-1.)

Progress highlights: Among Federal Caucus agency achievements over the past two to three years[14]:

- The BLM and USFS have fully implemented aquatic protection strategies on schedule. Moreover, good progress has been made by both agencies in identifying and addressing passage problems.
- The EPA, in partnership with NOAA Fisheries and USFWS, has successfully initiated a Regional Temperature Guidance Project. This project will guide decision-making on water temperature improvements critical to salmon recovery and survival.
- Development of 2002 harvest plans was coordinated by NOAA Fisheries, in partnership with the Pacific Fishery Management Council.
- Through voluntary, incentive-based farm programs, the NRCS has provided technical and financial assistance to local conservation districts and partners who, in turn, have helped thousands of farmers and ranchers conserve soil and water and protect fish and wildlife.
- The Caucus added two full-time staff members in April 2003 dedicated to salmon recovery efforts spelled out in the All-H paper.

Table 5-1. Fiscal Year 2001-2004 Funding for Columbia and Snake River and Coastal Salmon Recovery[15]
(Source: www.salmonrecovery.gov)

Agency/Programs	2001	2002	2003	2004
U.S. Army Corps of Engineers(Including Federal Columbia River BiOp, Columbia River Fish Mitigation, Columbia and Snake River dam fish passage improvements, and new Lower Columbia River Estuary programs.)	$102.7	$108.75	$113.5	$125.1
Department of Interior(Including Bureau of Land Management salmon conservation, Bureau of Reclamation Federal Columbia River BiOp, Leavenworth Fish Hatchery, U.S. Fish & Wildlife Service hatcheries and other BiOp implementation, Bureau of Indian Affairs, and U.S. Geological Service salmon program.)	43.9	70.7	78.3	76.9
Department of Commerce(Including National Marine Fisheries Service (NOAA Fisheries) Columbia River facilities and hatcheries and Endangered Species Act recovery planning)	25.5	24.6	26.2	39.7
Department of Agriculture(Including U.S. Forest Service and National Resources Conservation Service salmon conservation/restoration programs.)	78.2	84.4	44.8	76.8
Environmental Protection Agency(Including support for tribal salmon programs, Clean Water Act and other water quality/restoration programs.)	18.2	18.3	18.2	18.3
Pacific Coastal Salmon Recovery Fund (Dept. of Commerce) (for Washington, Oregon, California and Alaska salmon restoration programs.)	90.0	110.0	90.0	90.0
Department of Energy(Bonneville Power Administration Direct Fish Costs)	184.0	253.3	246.8	280.5
Total Funding(Discretionary and Mandatory)[16]	$542.5	$670.05	$617.8	$707.3

3. Bureau of Land Management

The BLM allocated $7.6 million in FY 2001 and $10.8 million in FY 2002 to support salmonid recovery in the basin. Future funding levels are anticipated to continue at the $10.8 million level. This funding has been focused first on the implementation of aquatic strategies intended to protect salmonids, and second on restoration in key areas identified as high priority and where restoration partnerships have presented opportunities. Overall, the BLM has done a timely and effective job of implementing protection strategies, but has been slower than anticipated in accelerating restoration in high priority watersheds identified in the All-H Paper. At the time the All-H Paper was written, the BLM expected that the Interior Columbia Basin Ecosystem Management Plan (ICBEMP) would be adopted and funded. While the ICBEMP contemplated funding additional accelerated restoration, the plan was never adopted and additional funding has not been available.

Table 5-2 provides a general summary of progress in key areas. For more details about BLM's recent progress, see the agency's 2002 Progress Report posted on the *www.salmonrecovery.gov* Web site.

Table 5-2. Progress Checklist for BLM
(from All H Paper, Table 5)

Actions	Progress
Implement aquatic protection strategies (PACFISH, Northwest Forest Plan [NWFP]).	Full implementation, on schedule.
Implement seven watershed restoration initiatives targeting core populations.	Some restoration completed; initiatives not developed.
Implement multiple-scale assessments and data management systems.	Multiple-scale assessments being developed; also working cooperatively on subbasin plans.
Accelerate land acquisition using LWCF funds prioritizing fish habitat.	Several important land acquisitions completed.
Protect existing high quality habitat and accelerate restoration in high priority subbasins.	Strong protection, accelerated restoration slower than anticipated.
Work with states to secure and protect minimum flows with federal nexus.	
Fix flow, screening and passage problems in priority subbasins.	Progress in several critical areas. Good progress on identifying and addressing passage problems; several screens installed.

4. Environmental Protection Agency

EPA has designated the Columbia River basin as a regional and national priority. Using its authorities and resources, EPA's goal is to protect public health and aid in Pacific salmon recovery by reducing sources of contamination and improving water and habitat quality in or near waters of the basin. EPA is focusing on the following areas: toxic contamination, conventional pollutants, and physical habitat/biological resources.

In FY 2001 and 2002, EPA issued grants totaling more than $9 million to support basin projects. These included:

- **Funding support to the Lower Columbia River Estuary Partnership (LCREP)** of $310,000 in 2001 and $510,000 in 2002 (plus additional support in 2003 through the Watershed Initiative, described below).
- **Additional Clean Water Act funding** to states of $3.7 million in 2001 and $3 million in 2002. These figures are in addition to statewide program grants that also support state activities within the basin.
- **EPA Watershed Initiative grants** awarded in 2003 to targeted watersheds throughout the U.S. Two grants were provided in the Columbia River basin:
  - **Clark Fork-Pend Oreille/$1 million** – Four watershed groups in Montana, tribal interests in the Flathead basin, and the Tri-State Water Quality Council operating in Idaho have partnered to address nutrient pollution through a combination of activities outlined in existing watershed plans. Projects will expand participation in voluntary nutrient reduction programs, implement stream and habitat restoration using agricultural Best Management Practices, reduce lake nutrient and sediment loading along tribal lands, and institute comprehensive monitoring systems to analyze and report trends.
  - **LCREP /$700,000** – With additional funding through the Watershed Initiative, LCREP plans to complete a stream restoration project and wetland restoration project in both Washington and Oregon, and implement habitat monitoring protocols.

4.1 Technical Assistance Provided

Besides direct funding, the EPA continues to provide technical support to states, tribes and

groups involved in recovery efforts. For example, the agency supports efforts in Oregon, Washington, and Idaho to develop total maximum daily load (TMDL) water quality improvement plans over the next decade. EPA continues to work on development of the Columbia/Snake Mainstem TMDL that will provide a foundation for future water quality implementation decisions in the mainstem

To provide targeted support for local watershed efforts, EPA Region 10 has community-based staff located in LaGrande and Eugene, Oregon; Prosser and Spokane, Washington; and Coeur d'Alene and Pocatello, Idaho. These staff members work with the community to develop local solutions for environmental problems; in particular, they are providing specialized support for TMDL efforts in the Grande Ronde basin, Umatilla basin, Willamette River, Spokane River, Yakima River, and the Walla Walla basin.

In April 2003, EPA partnered with NOAA Fisheries and USFWS to initiate a regional temperature guidance project to guide future water temperature decisions. Water temperature improvements were identified in the All-H Paper as being critical for salmon survival and recovery.

5. Natural Resources Conservation Service

Technical and financial assistance is provided by NRCS and its conservation partners using voluntary, incentive-based U.S. Department of Agriculture (USDA) farm programs, as well as other state and local programs, to address local natural resource challenges. In FY 2001 and 2002, thousands of ranchers, farmers and other private landowners/operators in the Columbia basin participated in conservation programs to make habitat improvements on nearly 2 million acres, indirectly contributing to salmon and steelhead recovery efforts. The Conservation Reserve Program, Wildlife Habitat Incentives Program, Wetlands Reserve Program, and the Environmental Quality Incentive Program are a few of the programs that enable landowners to install riparian buffers, restore habitat, stabilize and protect streams, create and restore wetlands, and conserve water. Most programs have five- to 10-year contracts.

6. NOAA Fisheries

Funding and Authorizations for Timely Implementation

In FY 2002, Congress appropriated $110 million to the Pacific Coastal Salmon Recovery Fund (PCSRF) to be used of salmon restoration, salmon stock enhancement, salmon research and implementation of the Pacific Salmon Treaty Agreement. Of this amount, $4 million went specifically to Columbia River Tribes. The States of Oregon and Washington received $17 and $34 million, respectively and a portion went to Columbia River salmon restoration activities.

In FY 2003 the total amount was $90 million, with $3 million to Columbia River Tribes and $14 and $28 to Oregon and Washington. In addition $45 million in FY 2002 was received for the Pacific Salmon Treaty.

Since FY 2001, National Marine Fisheries Service (NOAA Fisheries) has received level funding for FCRPS and All H implementation, with total enacted funds of $24.6 million in FY 2002 and $26.2 million in FY 2003.

Table 5-3. Checklist for National Marine Fisheries Service (NOAA Fisheries) Progress

Actions	Progress
General Implementation: Not All-H-specific	
Provide funding to states and tribes for recovery activities	According to the Pacific Coastal Salmon Recovery Fund (PCSRF) May 2003 report, in FY 2002 $110 million was issued to four western salmon states and two groups of Tribes. Of this amount $4 million went specifically to Colum bia River Tribes. The States of Oregon and Washington received $17 and $34 million, respectively. From this amount a portion was allocated to the Columbia River for salmon recovery activities through the Oregon Watershed Enhancement Board and the Salmon Recovery Funding Board in Washington.
Issue a Findings Report regarding the FCRPS Action Agencies' 2002 Implementation Plan	Issued its 2002 Finding Report in July 2002 in which NOAA Fisheries determined that further resolution during 2002 was required to ensure that 14 RPA Actions would be implemented as expected by the September 2003 evaluation.

Table 5-3, Continued

Actions	Progress
Assist the FCRPS Action Agencies develop the 2003/2003-2007 Implementation Plan	Prepared comments on various drafts of the document in an attempt to ensure adequacy of the implementation plan released to the public in November 2002.
Review and comment on projects submitted for funding under the Northwest Power and Conservation Council's (Council) Fish and Wildlife Program	Submitted written evaluations of proposed projects and provided determinations of consistency with RPA Actions to the Bonneville Power Administration (BPA) and the Council for the "Innovative" project solicitation and for projects submitted for the Blue Mountain, Mountain Snake, Columbia Cascade, Columbia Estuary, and Lower Columbia provinces
Chair and participate in meetings of the Federal Caucus	Provided a leadership role in the Federal Caucus to plan and manage Columbia Basin-wide salmon funding efforts by the nine Federal agencies of the Caucus. Also participated in sub-groups of the Federal Caucus, including the Federal Habitat Team, the Hydro Work Group, and a Research, Monitoring, and Evaluation (RM&E) Work Group.
Establish recovery objectives, delisting criteria and recovery measures	Developed: (1) Draft Local Recovery Plan Guidelines as part of general NOAA Fisheries guidance for subbasin/recovery planning; (2) Draft Population ID for all listed species in the Lower Columbia and Willamette Recovery Domain; (3) Draft Interim Viability Criteria for the Lower Columbia and Willamette Recovery Domain; (4) Draft and released "Interim Abundance and Productivity Targets for the Interior Columbia Basin".
Provide advice and assistance related to subbasins planning	Continued working with Federal, state, tribal, and local government forums that are or will be engaged in subbasins planning in a concerted effort to integrate subbasins planning with ESA recovery planning. Habitat and Protected Resources staff met multiple times with watershed planning groups throughout the Columbia River Basin, and, have been involved with Levels 1-3 of subbasins planning.
Habitat: Establish recovery objectives, de-listing criteria and recovery measures	See above
Habitat: Improve predator control	Completed white paper evaluating the risk to salmonid populations resulting from tern predation and what would constitute an acceptable level of tern predation in the estuary.
Habitat: Tributary Habitat Funding – Support Federal Habitat Team	Contributed staff time in leadership role, since no FY 2002 funding.
Harvest: Limit Harvest Impacts – Constrain harvest impacts on listed ESUs to no more than recently established current levels	As a participant in the *U.S. v Oregon* forum, continued to advocate harvest management reforms designed to limit the impact of fisheries on ESA-listed fish consistent with the Basinwide Recovery Strategy. Managed the 2002 spring season fisheries in the Columbia consistent with the agreement reached the previous year in *U.S. v Oregon*. Under that agreement, the parties committed to a five-year, abundance-based harvest plan that controls harvest rates on listed salmon during the spring and summer season tribal and non-tribal fisheries. Continued to manage the fall season in-river fishery consis tent with the established harvest rate constraints on listed Snake River fall chinook and steelhead as established in previous NOAA Fisheries biological opinions.Coordinated with the Pacific Fishery Management Council developing harvest plans for 2002 consistent with applicable provisions of the 1999 Agreement under the Pacific Salmon Treaty, the Sustainable Fisheries Act of 1996, and U.S. v Oregon and U.S. v Washington, as applicable, for commercial and recreational ocean and freshwater salmon fisheries.
Harvest: Limit Harvest Impacts – Manage mixed stock fisheries on natural stocks and/or stock groups affected by the fishery	Participated in the Pacific Fishery Management Council and North of Falcon preseason planning processes to develop harvest plans for 2002 consistent with applicable provisions of the 1999 Agreement under the Pacific Salmon Treaty, the Sustainable Fisheries Act of 1996, and *U.S. v Oregon* and *U.S. v Washington*, as applicable, for commercial and recreational ocean and freshwater salmon fisheries.
Harvest: Limit Harvest Impacts – Seek opportunities to further reduce fishing impacts on listed fish	Continued development of abundance based harvest management options for B-run steelhead for parties' consideration in *U.S. v Oregon*

Table 5-3, Continued

Actions	Progress
Harvest: Limit Harvest Impacts – Seek opportunities to increase harvest in ways that do not harm listed ESUs	Through participation in various harvest management forums, continued to support tribal and state fisheries designed to harvest abundant hatchery and healthy natural runs when such fisheries can be implemented consistent with applicable ESA limits. Supported the recreational and commercial spring season chinook fisheries in the lower Columbia River targeting abundant Columbia River and Willamette spring chinook provided they not exceed a 2% impact limit on listed Upper Columbia spring chinook. Supported the Select Area fisheries in the lower Columbia and various other tributary fisheries targeting abundant hatchery fish returning to many upriver hatcheries.
Hatcheries: Reform Production Facilities - Develop approved HGMPS for all hatchery facilities in the Columbia Basin	Continued work with USFWS, state, and tribal co-managers to develop and implement an inclusive, step-wise process that would lead to NOAA Fisheries-approved HGMPs for all artificial production facilities in the Columbia Basin by September, 2003 (schedule later revised to target completion in March 2004).
Hatcheries: Protect Weak Stocks	Continued working with BPA and USFWS in developing the Safety Net Artificial Production Program (SNAPP).Through the Northwest Fisheries Science Center, continued to maintain and/or support a number of pre-existing "safety-net" type projects that utilize captive brood stock technologies, e.g., the Redfish Lake sockeye project and several spring chinook captive brood programs.
Hatcheries: Reduce Uncertainties; Assess Performance	Participated in RM&E workgroups that identified needed projects to resolve critical uncertainties relating to reproductive success of wild-spawning hatchery fish.
Hydropower: Improve Nonfederal Hydro - Complete HCP for Mid Columbia Dams	Concluded lengthy negotiations, released a draft environmental impact statement, and signed a conditional agreement to implement a habitat conservation plan for three dams covering more than 100 river-miles of the mid-Columbia River. Completed a biological opinion with the Federal Energy Regulatory Commission on a license amendment for operating the Rocky Reach hydroelectric project, a mid-Columbia River dam.
Hydropower: Improve Nonfederal Hydro - Use relicensing and ESA to improve flows and passage on the Deschutes, Cowlitz, Lewis, and other rivers	Completed an interagency biological opinion with FERC on interim operations of the four Lewis River hydroelectric projects in southwest Washington State.
Hydropower: Improve Nonfederal Hydro - Apply anadromous fish priorities to re-licensing	See above.
Hydropower: Improve Nonfederal Hydro - Settlement of Snake River adjudication	Continued settlement negotiations continued in 2002. Details of those negotiations are privileged.
Hydropower: Improve Nonfederal Hydro - Improve habitat and fully evaluate passage opportunities through relicensing and ESA for Idaho Power Co. dams	No progress to report in 2002.
Hydropower: Reduce Hydropower Impacts - NOAA Fisheries comprehensive M&E program	NOAA Fisheries did not receive requested funds from Congress for the M&E program.

7. U.S. Forest Service

In FY 2001, the Forest Service spent an estimated $54.3 million to support salmonid recovery efforts within the Columbia River basin. For FY 2002, the estimate was $56.5 million, but year-end accomplishments were lower than anticipated due to high fire suppression costs. Future funding levels are anticipated to decrease due to other agency priorities, including implementation of the National Fire Plan and Healthy Forests Initiative.

Funding to support agency salmonid recovery efforts comes from various agency budget line items that are used to implement existing Forest Plan aquatic strategies, including the Northwest Forest Plan (NWFP) Aquatic Conservation Strategy (ACS) and PACFISH. The majority of fish recovery funding is spent on planning and implementing actions needed to protect aquatic ecosystems. Approximately one-third of the total funding is focused on active restoration with the majority going to planning and ESA consultation costs. Protection and more passive forms of aquatic ecosystem restoration have been the primary focus; priority accelerated restoration actions in important areas (as described in the All H Paper) have been implemented to a much lesser degree.

For more details about the agency's recent progress, see the USFS 2002 Progress Report posted on the *www.salmonrecovery.gov* Web site.

Table 5-4. Progress Checklist for Forest Service (from All H Paper, Table 5)

Actions	Progress
Implement aquatic protection strategies (PACFISH, NWFP).	Full implementation of protection standards; accelerated restoration behind schedule (NWFP).
Implement seven watershed restoration initiatives targeting core populations.	Some restoration completed; initiatives not developed.
Implement multiple-scale assessments and data management systems.	Watershed assessments almost 90% completed under the NWFP ACS; slower rate under PACFISH. Subbasin assessments slower rate than expected. Forests included in NPCC subbasin planning efforts.
Accelerate land acquisition using LWCF funds prioritizing fish habitat.	Less than anticipated in All H Paper. Pacific NW region has been most active.
Protect existing high quality habitat and accelerate restoration in high priority subbasins.	Strong protection; accelerated restoration slower than anticipated.
Work with states to secure and protect minimum flows with federal nexus.	Variable progress across the basin.
Fix flow, screening and passage problems in priority subbasins.	Barrier inventory completed in Pacific NW region; partially competed in Intermountain and Northern Rockies regions. States set screening priorities.

8. U.S. Fish & Wildlife Service

In FY 2002, USFWS received a total of $10 million to help implement objectives set out in the Basinwide Salmon Recovery Strategy (All-H Paper) and BiOps, enabling it to make good progress in meeting its ESA and other obligations in support of salmonid recovery in the Columbia basin. Of that total, $4 million came through the Fisheries Restoration and Irrigation Mitigation Act (FRIMA), of which $1.57 million was allocated to leverage local investment in passage and fish ladder projects in the anadromous zone of the basin.

In FY 2003, USFWS is expecting to devote $9.7 million to improvements in hydropower, habitat, hatcheries and harvest. Overall, the agency's implementation of actions has been timely, effective, and consistent with the scientific basis for the All-H Paper and BiOps (see Table 5-4). For more details about the agency's recent progress, see the USFWS 2002 Progress Report posted on the *www.salmonrecovery.gov* Web site.

Table 5-5. Progress Checklist for USFWS

Actions by H	Progress
Habitat	
Establish recovery objectives, de-listing criteria and recovery measures.	Participated in NOAA Fisheries' Interior Columbia and Lower Columbia/Willamette Technical Recovery Teams; reviewed and evaluated tools for viability assessments and assisted in population identification.
Implement aquatic protection strategies (PACFISH, NWFP).	Continued to dedicate existing Section 7 consultation resources to this action.
Improve predator control.	Good progress in implementation of actions in estuary to reduce tern predation: assessed 70 alternate colony sites; published "*Status Assessment and Conservation Recommendations for the Caspian Tern in North America*."
Work with states to secure and protect minimum flows with federal nexus.	Good progress in several critical areas in developing Habitat Conservation Plans to provide in-stream flows (*e.g.* the Walla Walla River basin).
Develop subbasin and watershed assessments and plans.	Developed draft bull trout recovery plan; participated in regional, state, and subbasin planning teams and planning process and provided technical assistance in restoration activities.
Fix flow, screening and passage problems in priority subbasins.	Implemented six passage restoration projects in the Entiat, Methow, Wenatchee and Yakima River watersheds.
Establish in-stream flows for anadromous fish tributaries.	Good progress in several critical areas in developing Habitat Conservation Plans to provide in-stream flows (*e.g.* the Walla Walla River basin); studies were initiated to determine bull trout in-stream flow needs; good progress in implementing Partners for Fish and Wildlife Program projects for riparian and wetland restoration.
Screen pumps and restore passage at problematic diversions and obstructions.	In FY 2002, the FRIMA Program implemented 17 fish passage and fish ladder projects at water diversions in the anadromous portion of the Columbia basin in partnerships with Idaho, Oregon and Washington; federal cost share was $1.57 million and total cost was $3.08 million with local cost share and in-kind match.
Harvest	
Seek opportunities to further reduce fishing impacts on listed fish.	Provided technical assistance in monitoring and evaluating harvest impacts on listed fish.
Seek opportunities to increase harvest in ways that do not harm listed ESUs.	Helped develop further terminal area and selective fishery opportunities.
Hatcheries	
Develop approved HGMPs for all hatchery facilities in the Columbia basin.	Good progress in developing HGMPs; completed Phase I of HGMPs at 90% of all USFWS-funded and/or operated Columbia River basin production programs.
Implement HGMPs at federal, state, and tribal facilities by making necessary operational improvements and capital changes.	Good progress in making improvements at USFWS-funded hatcheries: constructed egg isolation unit at Warm Springs NFH; developed hatchery weir evaluation plan at Kooskia NFH; increased capability to detect fish diseases.
Implement aggressive M&E programs to reduce uncertainties.	Initiated study to evaluate interactions between wild and hatchery fish in the Warm Springs River, Oregon; good progress in assessing health of wild and hatchery fish to reduce possible transmission of diseases in the Deschutes River basin.
Hydro	
Improved flow operations to provide water conditions beneficial to migrating juvenile and adult fish.	Participated in NOAA Fisheries Regional Forum (TMT, IT, Regional Executives) and made progress in ensuring that flow needs for listed bull trout and Kootenai River white sturgeon were coordinated with the needs for listed salmon and steelhead; interim implementation of VARQ.

Footnotes for Report 5

[14] Most agencies recently released 2002 Progress Reports on their efforts under the Basinwide Recovery Strategy, which are summarized in this report. Data for 2003 is incomplete.

[15] Dollars are in the millions. FY 2001, FY 2002, and FY 2003 are enacted levels; FY 2004 is the President's request.

[16] Funding for NOAA and State Department Pacific Salmon Treaty obligations are not included in the total, since these obligations were completed in 2003.

Report 6
Update on Adult Population Trends, Population Growth Rate, and Hydrosystem Survival

1. BiOp Expectations

The BiOp primarily called for a programmatic discussion of implementation for the 2003 Check-In Report. However, the Action Agencies' support of a performance-based approach necessitates that programmatic efforts be put in context of the ultimate objective of recovery efforts – adult fish returns, and the more direct consequence of the programmatic efforts – fish survival through the hydro system. This report summarizes the current status of listed salmon and steelhead, both those for which jeopardy was found and those that were found not to be jeopardized by the federal hydro system. First, two aspects of life performance – juvenile and adult survival through the hydro system – are presented and compared to BiOp performance standards. Second, three population level metrics–adult abundance levels, adult population trends, and population growth rate – are presented for listed salmon and steelhead.

2. Progress Summary

In 2001 through 2003, returns of adult salmon and steelhead to the Columbia River basin were at or near historically high levels. Most of the listed ESUs demonstrated substantial gains in both adult abundance and abundance trends since the 2000 BiOp. In addition, population growth rates (lambda) for Snake River steelhead and Chinook also show significant improvement over what was estimated in 2000. Pre-season estimates of adult returns suggest the recent trend of good spring and summer runs is likely to continue in 2004. The Action Agencies remain optimistic about the improving status of listed ESUs, in terms of the effectiveness of salmon recovery actions taken by the Federal agencies, States, Tribes, and private entities, the continuation of favorable ocean conditions, and at least a temporary reprieve from concerns of population levels that fell to critically low levels in the mid-1990s. This is by no means to be interpreted that the Action Agencies believe salmon recovery has been achieved, but rather as an opportunity for enhanced regional coordination and implementation of actions to achieve the desired biological results.

Many factors contributed to these impressive fish returns, including the benefits of recovery actions implemented under the 1995, 1998 and 2000 BiOps and the Council's Fish and Wildlife Program. Favorable conditions in both the freshwater and marine environment also contributed to the higher adult runs, and are discussed more below.

Most salmon and steelhead populations listed under ESA and affected by the federal hydrosystem have demonstrated dramatic improvements in productivity since the BiOp, as indicated above and discussed below. All of these ESUs, except Snake River sockeye, are clearly in less jeopardy of extinction today than when they were listed in the 1990s and at the time the 2000 BiOp was implemented. Improvements to fish passage at mainstem dams, to habitat in the tributary subbasins, and to hatchery and harvest practices are resulting in population gains when combined with a favorable ocean environment. Clearly, conditions in the freshwater environment are not preventing relatively productive returns when the ocean environment where salmon and steelhead spend most of their life is more favorable. *Success* in productivity of salmon populations is a reflection of *preparation* in the Hs when combined with the *opportunity* of a productive ocean environment (success = preparation * opportunity). This formula for success is validated by current productivity of salmonid stocks observed throughout the Columbia basin.

And the future should show additional improvements. Many of the improvements implemented since the inception of the Fish and Wildlife Program, particularly habitat improvements, are only now beginning to contribute to increased production of natural origin fish. This would be even more the case for actions implemented under the 2000 BiOp. As spawning and rearing habitats continue to heal throughout the Columbia basin and more watershed-wide initiatives are undertaken, further gains in natural origin populations should be expected. Additionally, the strength of rebuilding is enhanced as the numbers of fish rebuild from relatively low levels, just like investments made in ones' retirement account as a result of the effects of compounding interest. For the immediate future, strong runs continued in 2003, with indications of strong runs again in 2004.

3. Adult Returns and ESU Performance

Population level performance of salmon and steelhead in the Columbia basin reflects the combination of freshwater survival, including survival through the hydrosystem, as well as survival in the ocean. There has been improved survival of listed and non-listed fish compared to that of the past couple of decades, leading to the largest or near largest returns of salmon and steelhead since record keeping began in 1938. Much of the improved survival is attributed to improvements in the ocean environment. This appears to have resulted from a multi-decadal marine regime shift as indexed by the Pacific Decadal Oscillation (PDO—Figure 6-1), which results in improved conditions and contributes to increased productivity for Columbia basin salmon and steelhead. Consequently, the status of the marine environment must be considered when assessing the performance of listed ESUs, and this and future progress reports will include discussion of indicators of ocean productivity.

Adult Returns and Aggregate Run Strength

Returns of spring and summer Chinook in 2003 continued the trend since 2000 of record or near-record numbers of fish counted at Bonneville Dam since 1938 when the dam was first constructed. Returns of both fall Chinook

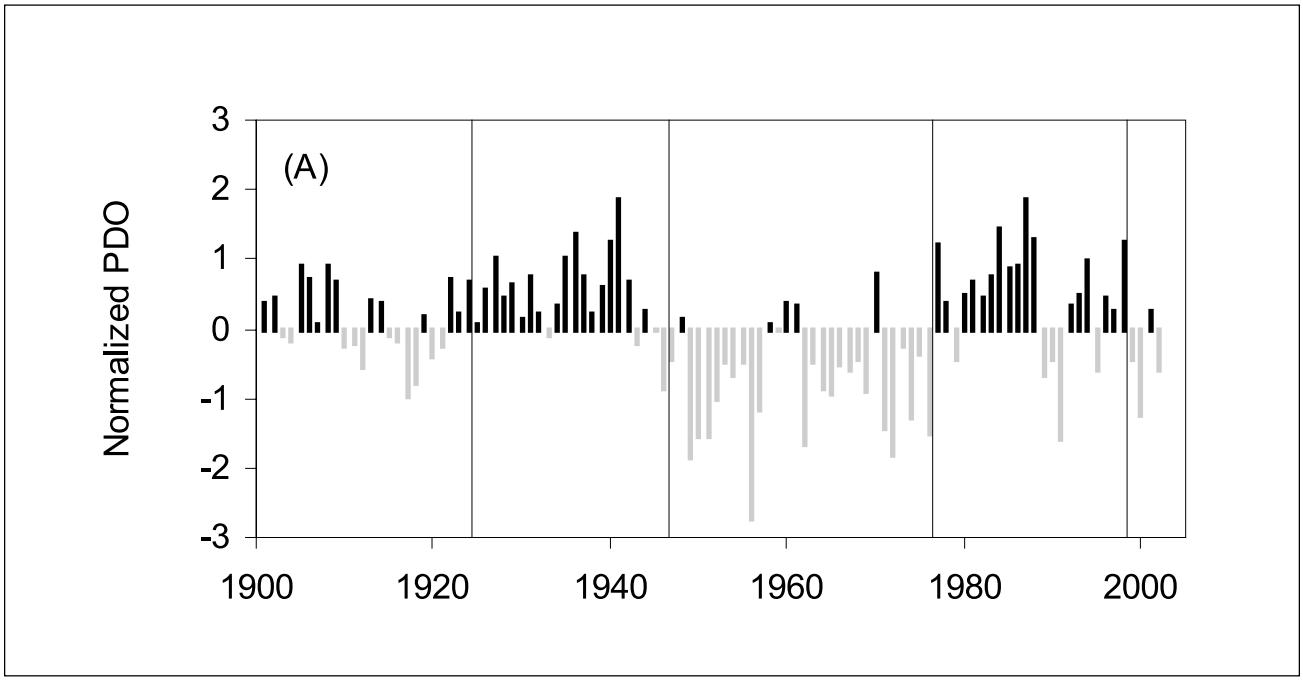


Figure 6-1. Winter values of the Pacific Decadal Oscillation (1900-2002), an index of sea surface temperature which characterizes the state of the surface waters of North Pacific Ocean. The PDO index shows that the ocean cycles between a warm regime, identified by a positive PDO, and a cool regime, in which the PDO is negative. Dashed vertical lines denote shifts in temperature regime.

and steelhead are also relatively strong; total numbers will not be known until later this year following completion of the migration.

In each year since 2000, adult returns to Bonneville, Lower Granite, and Priest Rapids dams have substantially exceeded the 10-year average for the period of 1991-2000 (Figures 6-2, 6-3, and 6-4). For adult fish counted at Bonneville Dam since 2000, returns for spring, summer, and fall Chinook, and steelhead have exceeded the 10-year average by as much as several hundred percent. Returns in 2003 also exceed the 10-year average for 1993-2002, even with the inclusion of the record level returns of 2001 and 2002 in an updated 10-year average.

Bonneville Adult Returns

Adult returns of spring Chinook in 2003 were nearly 200,000 fish, or approximately 308 percent of the 10-year average for 1991-2000 (see Figure 6-2). For comparison, they were 157 percent of the 10-year average for 1993-2002. Returns for summer Chinook, were approximately 113,000, over 300 percent of the 1993-2002 average and over 500 percent of the 10-year average through 2000. The relatively large abundance of summer Chinook enabled the first commercial fishery on this stock since 1965. Adult returns in 2002 to Bonneville Dam continued the high rate observed in 2001, were the second largest numbers in recent history and among the largest since fish counts began in 1938. That year, about 272,000 passed Bonneville Dam, with the total upriver Chinook run — including fish harvested below Bonneville Dam — estimated to be about 756,000 fish (Columbia River Fish Runs, Status Report, 2000). This total includes smaller male "jacks." In comparison, the 2002 total for all runs above Bonneville Dam is estimated to be about 870,800 Chinook adults (Corps, Adult Fish Counts, 2002 Data Reports, as reported by Walla Walla District, electronic files and the UW DART Data Files).

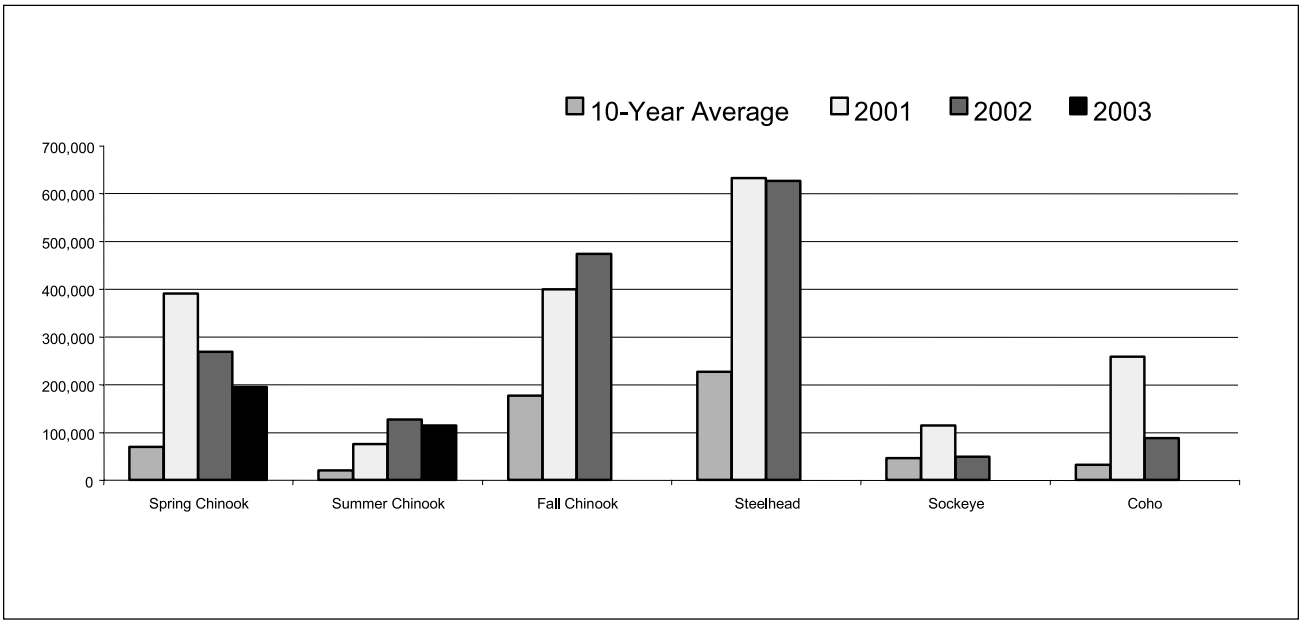


Figure 6-2. Adult Fish Counts at Bonneville Dam in 2001, 2002, and 2003, and 1991-2000 Average Returns (2003 returns of fall Chinook, steelhead, and coho ongoing at the time of this report).

Lower Granite Adult Returns

Adult returns of spring Chinook in 2003 were nearly 71,000 fish, or approximately 500 percent of the 10-year average for 1991-2000 (Figure 6-3). Returns in 2003 for summer Chinook were approximately 16,000, nearly 400 percent of the 1993-2002 average

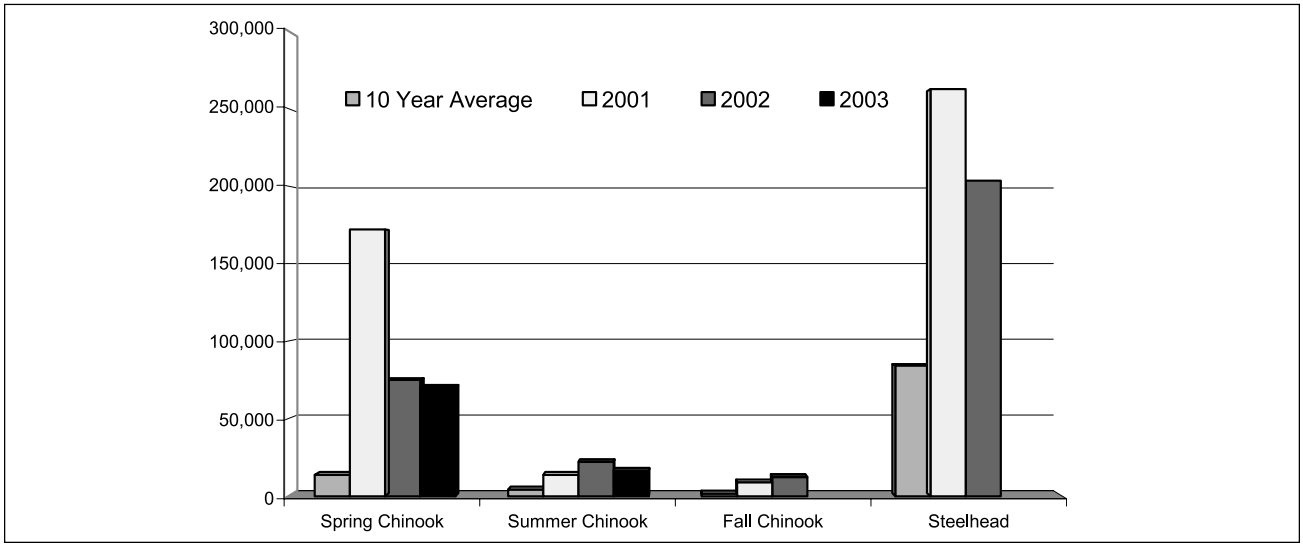


Figure 6-3. Adult Fish Counts at Lower Granite Dam in 2001, 2002, and 2003, and 1991-2000 Average Returns (2003 returns of fall Chinook, steelhead, and coho ongoing at the time of this report).

Priest Rapids Adult Returns

Adult returns for 2003 of spring Chinook were approximately 17,400 fish, or approximately 45 percent of the 1991-2000 average (Figure 6-4). Returns in 2003 for summer Chinook were approximately 82,000, approximately 80 percent greater than the 1991-2000 average.

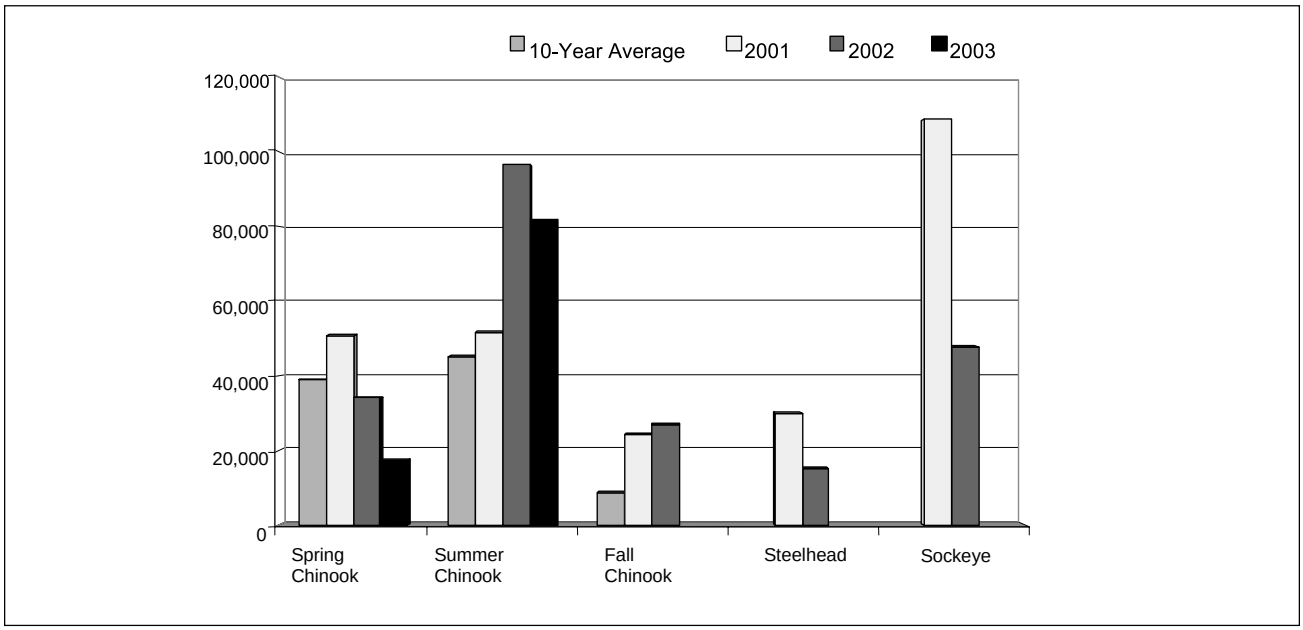


Figure 6-4. Adult Fish Counts at Priest Rapids Dam in 2001, 2002, and 2003, and 1991-2000 Average Returns (2003 returns of fall Chinook, steelhead, and coho ongoing at the time of this report).

Population Abundance and Trends

Population-level performance indicators for various ESUs (e.g., adult abundance, adult abundance trends) provide a measure of productivity, population trajectory, and overall population status. But they also reflect factors, both natural and human, that contribute to survival across all life stages, all Hs. That is, Federal, State, Tribal, and local actions affecting habitat, hatcheries, hydro, and harvest, as well as natural environmental and climatic conditions (including the ocean) are all reflected in the population-level performance metrics. Thus, the population metrics represent the ultimate measure of performance under the ESA.

Figures 6-5 to 6-12 (Hinrichsen et al. 2003) display the most recent adult abundance and population trend information for the eight listed ESUs addressed by the 2000 FCRPS BiOp (the ESU interim standard is also shown for reference). Additional information on the performance of these ESUs is displayed in Table 6-1.

The abundance of the listed, natural-origin adult Snake River spring/summer Chinook ESU has increased dramatically since the 2000 BiOp, there is a continuing increase in the five-year geometric mean, and the trend is increasing (Figure 6-5). The mean abundance is expected to increase further once the data from the strong run of 2003 are available. Also, a strong jack count at Lower Granite Dam in 2003 foretells the possibility of another strong run in 2004 which should continue the upward trend of this ESU. In addition to the more obvious upswing in the number of returning adults, this also reflects the reduced risk of extinction in this ESU in the immediate term.

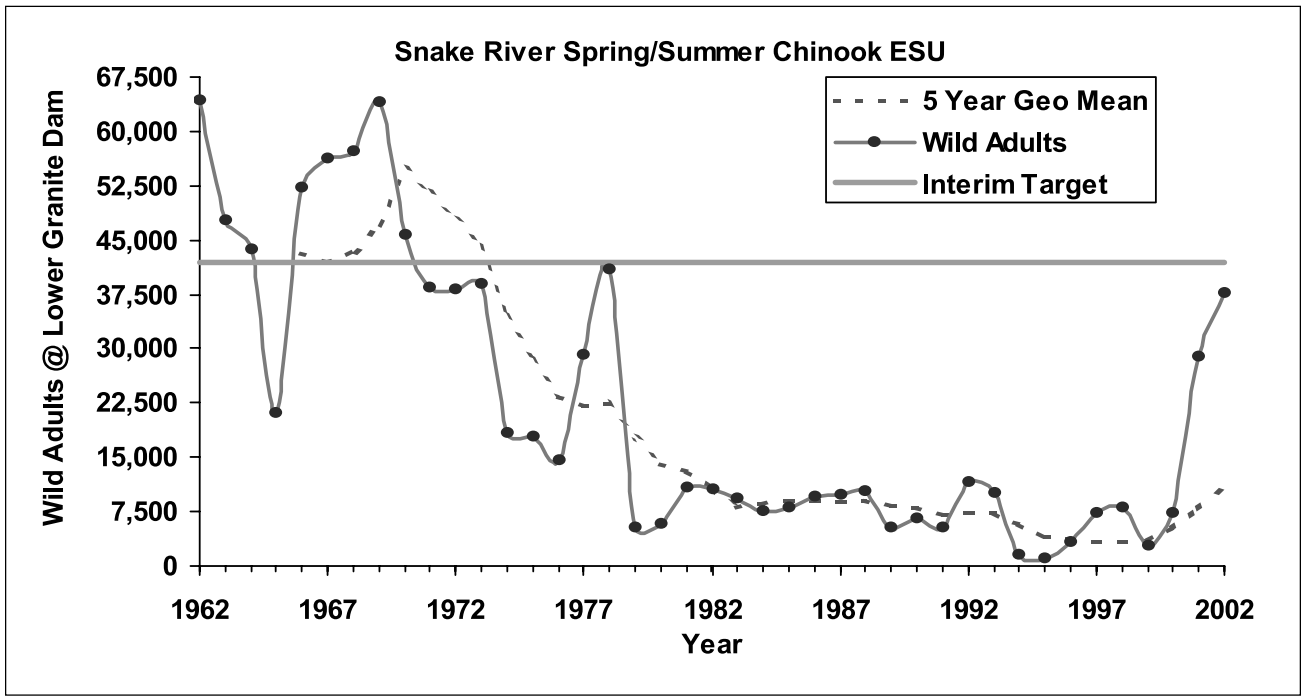


Figure 6-5. Run sizes and geometric mean of run sizes of Snake River spring/summer Chinook over time.

The abundance of the listed, natural-origin adult upper Columbia River spring Chinook ESU has increased dramatically since the 2000 BiOp and the immediate trend in the five-year geometric mean has become positive, although the 1990-2001 trend for this endangered ESU is still decreasing (Figure 6-6). The trend for this ESU should continue to show improvement when the data for 2002 and 2003

become available. Also a strong jack count at Rock Island Dam in 2003 indicates the possibility of another good run in 2004.

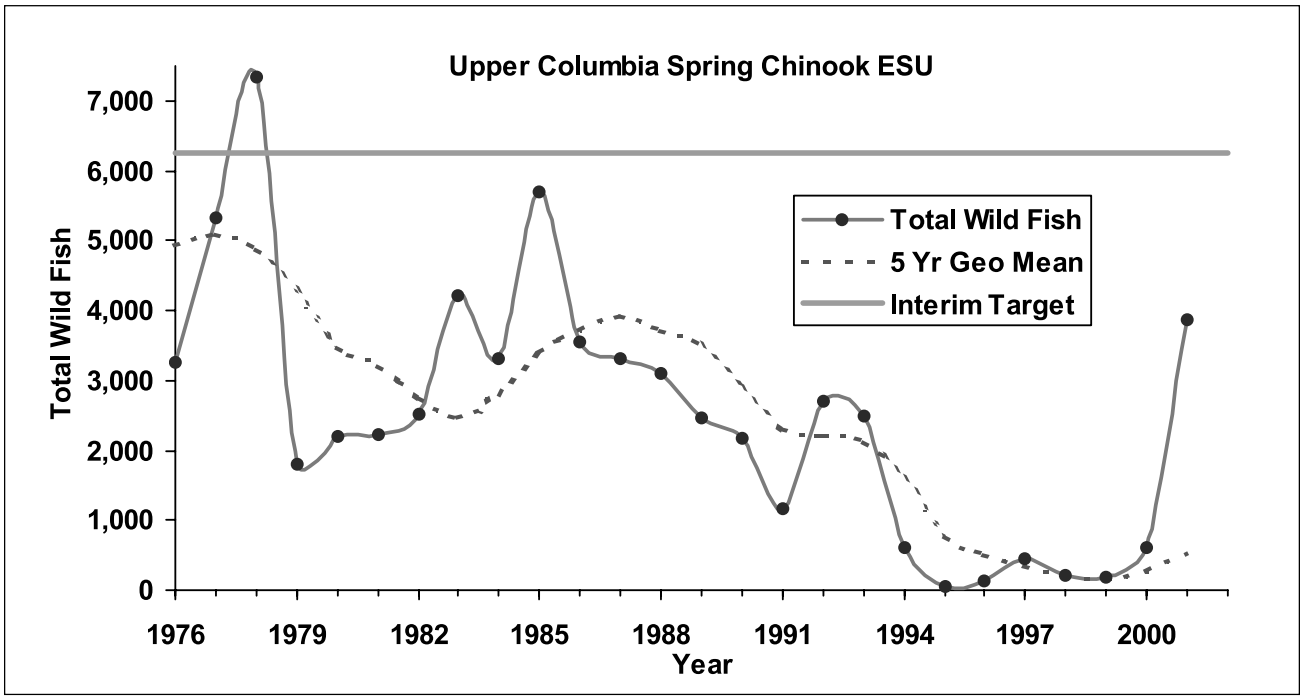


Figure 6-6. Run sizes and geometric mean of run sizes of upper Columbia spring Chinook over time.

Snake River fall Chinook show continued strong runs of listed, natural-origin adults through 2001. The five-year geometric mean continues to increase and the 1990-2001 trend is increasing. Abundance in 2001 reached a level greater than the interim delisting target (Figure 6-7).

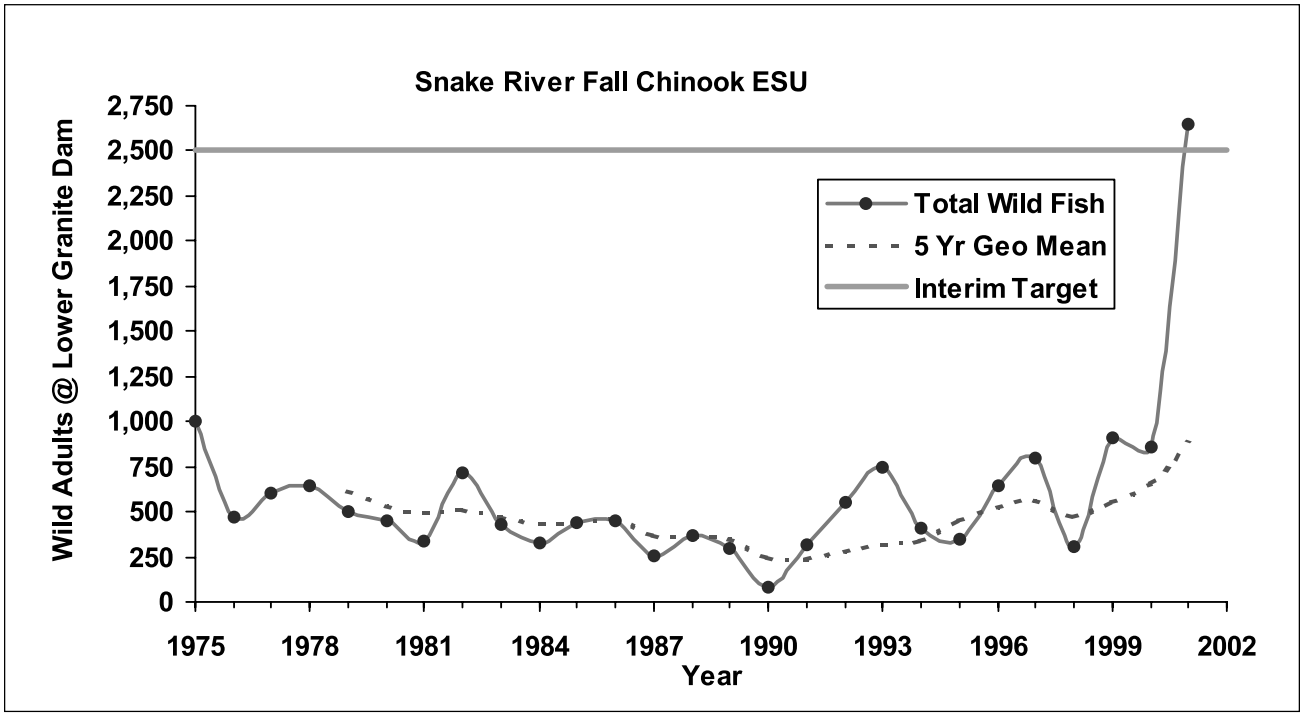


Figure 6-7. Run sizes and geometric mean of run sizes of Snake River fall Chinook over time.

Substantial increases in abundance of listed, natural-origin adults of the Snake River steelhead ESU, through the 2002 run, are shown in Figure 6-8. The recent trend in the five-year geometric mean continues to improve and the 1990-2002 trend is increasing. The 2003 steelhead return is ongoing at this time and appears to be progressing well, but it is too early to predict its strength.

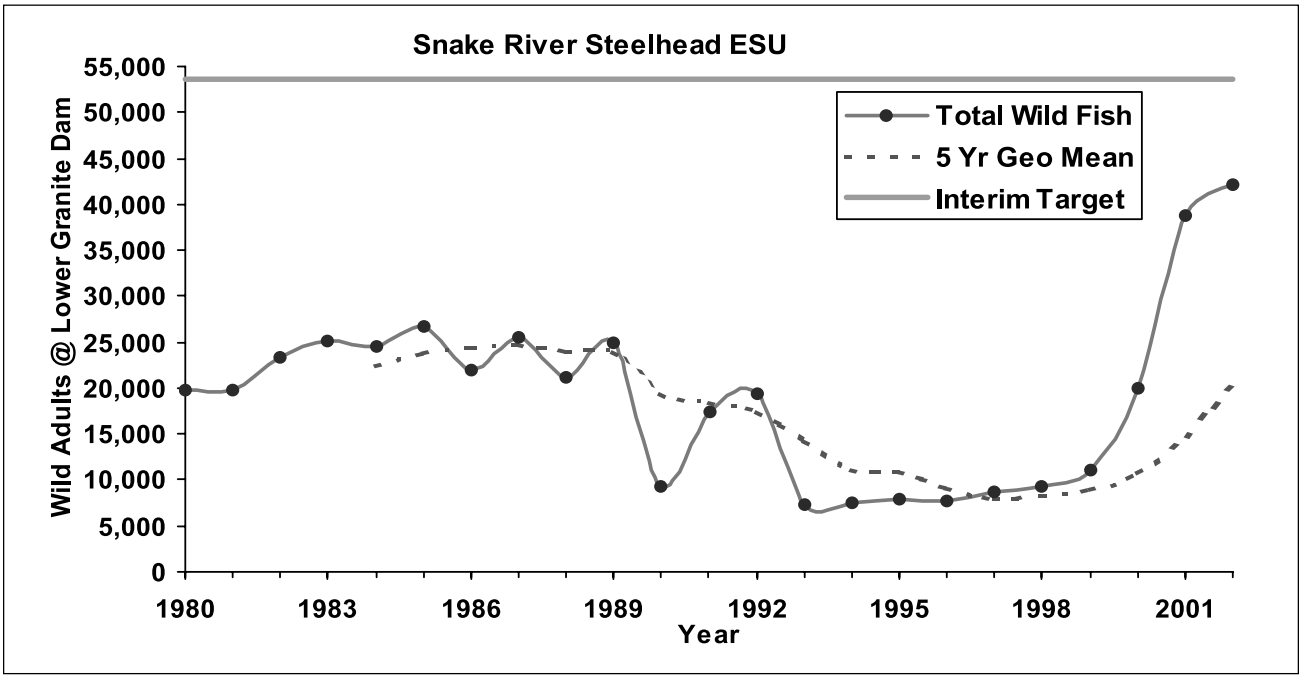


Figure 6-8. Run sizes and geometric mean of run sizes of Snake River steelhead over time.

A dramatic increase in listed, natural-origin upper Columbia steelhead adults through 2001 is shown in Figure 6-9. The recent five-year geometric mean has become positive and the 1990-2001 abundance trend is now increasing.

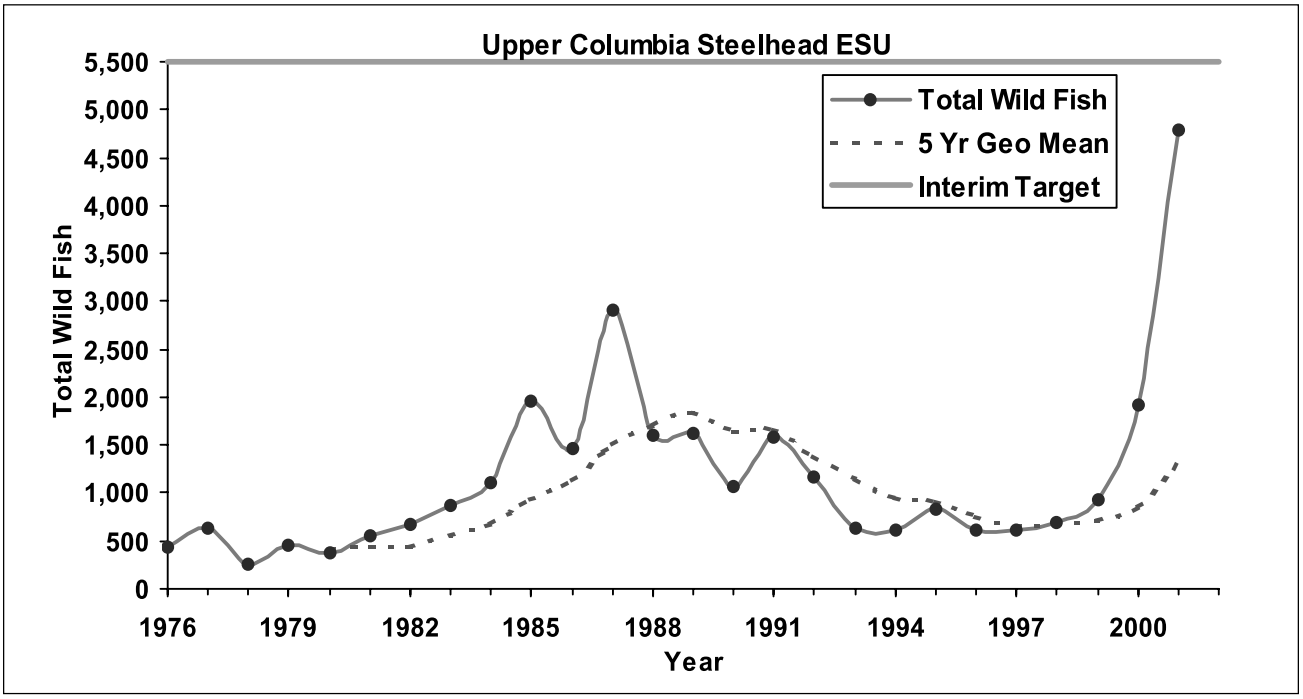


Figure 6-9. Run sizes and geometric mean of run sizes of upper Columbia steelhead over time.

As shown in Figure 6-10, the mid-Columbia steelhead ESU run totals have been generally increasing since the mid 1990s, though a small drop occurred between 2001 and 2002. The trend for geometric means has been positive.

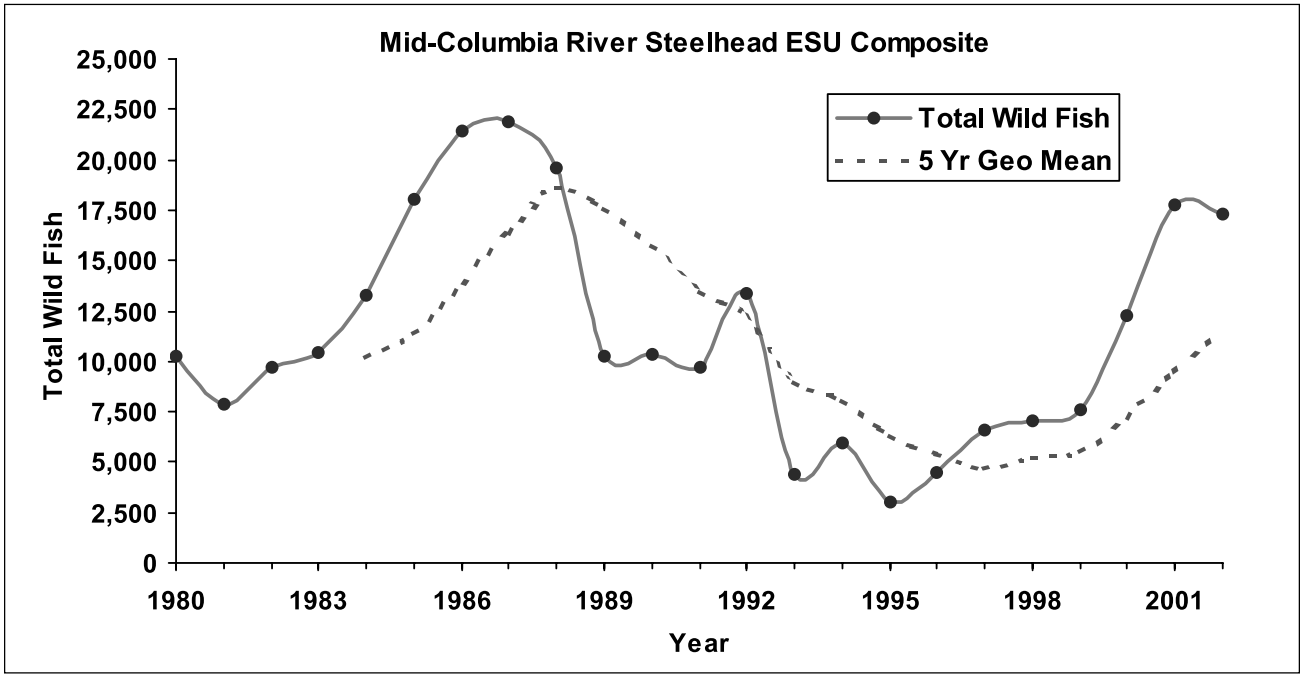


Figure 6-10. Run sizes and geometric mean of run sizes of mid-Columbia River steelhead over time.

The continued precarious status of the endangered Snake River sockeye ESU is shown in Figure 6-11. The viability of this ESU continues to rest on the success of the captive broodstock program. Although there were small increases in recent sockeye runs, the substantial improvements in survival of all other salmon ESUs has not manifested itself in this limited population.

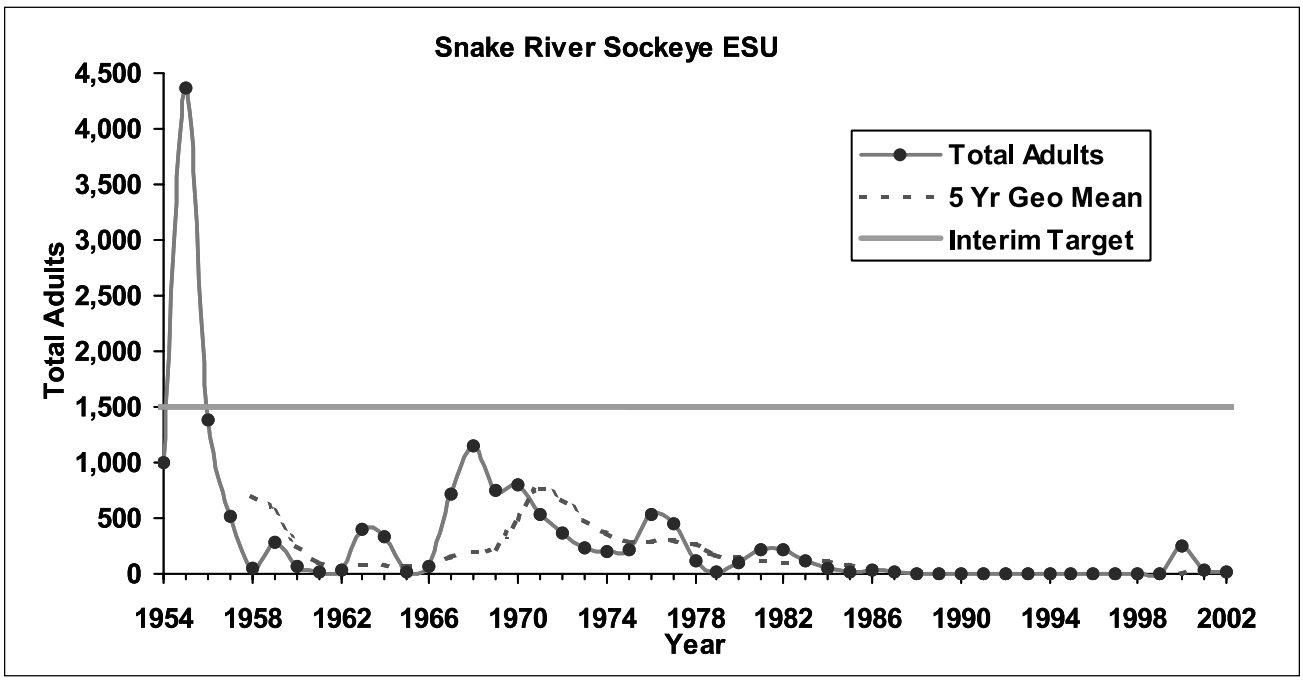


Figure 6-11. Run sizes and geometric mean of run sizes of Snake River sockeye over time.

New data are not available on the status of the lower Columbia River chum ESU. Through 2000, the ESU is showing a stabilized abundance between 1,000 and 1,500 adults (Figure 6-12). Preliminary figures indicate dramatic increases in the abundance of this ESU since 2000; more complete reporting will be provided in the 2004 progress report.

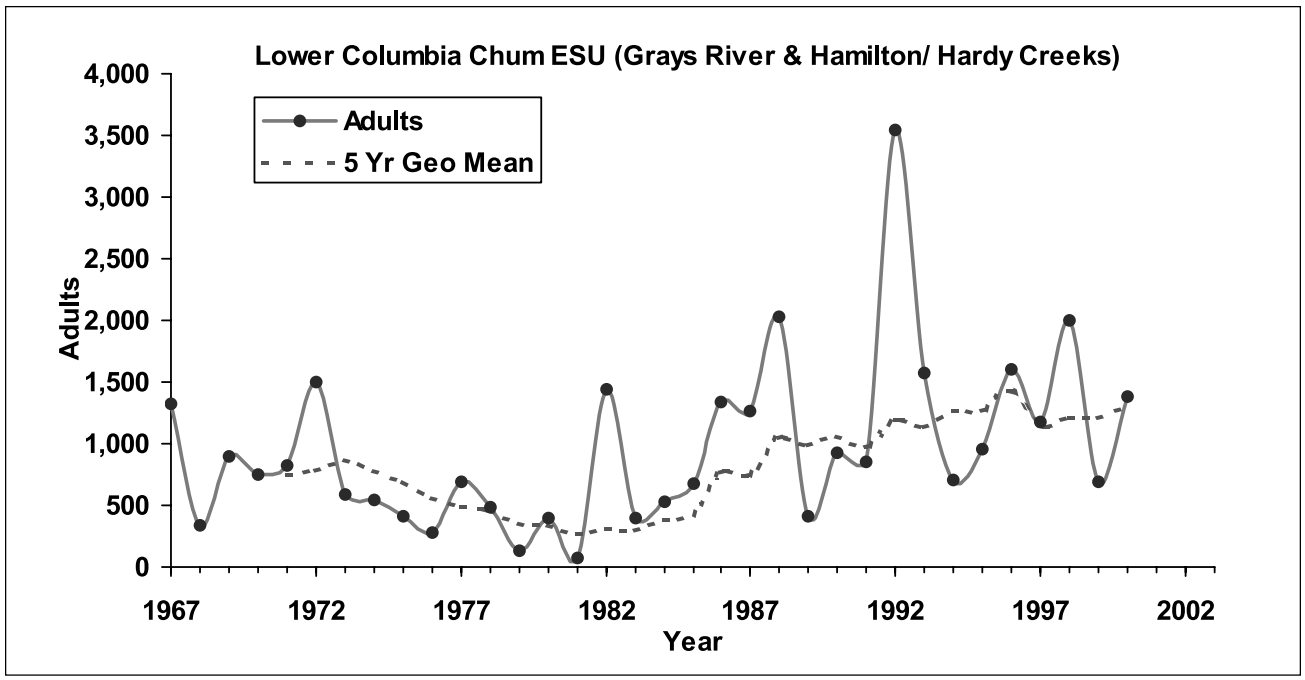


Figure 6-12. Run sizes and geometric mean of run sizes of lower Columbia chum over time.

Figures 6-13 to 6-17 display the most recent abundance information for the four listed ESUs that NOAA determined were not jeopardized by operations of the FCRPS in the 2000 BiOp. Additional information on the performance of these ESUs is also displayed in Table 6-1.

The upper Willamette River steelhead ESU is showing a recent increase in the five-year geometric mean of listed, natural-origin adults and an increasing 1990-2003 trend (Figure 6-13).

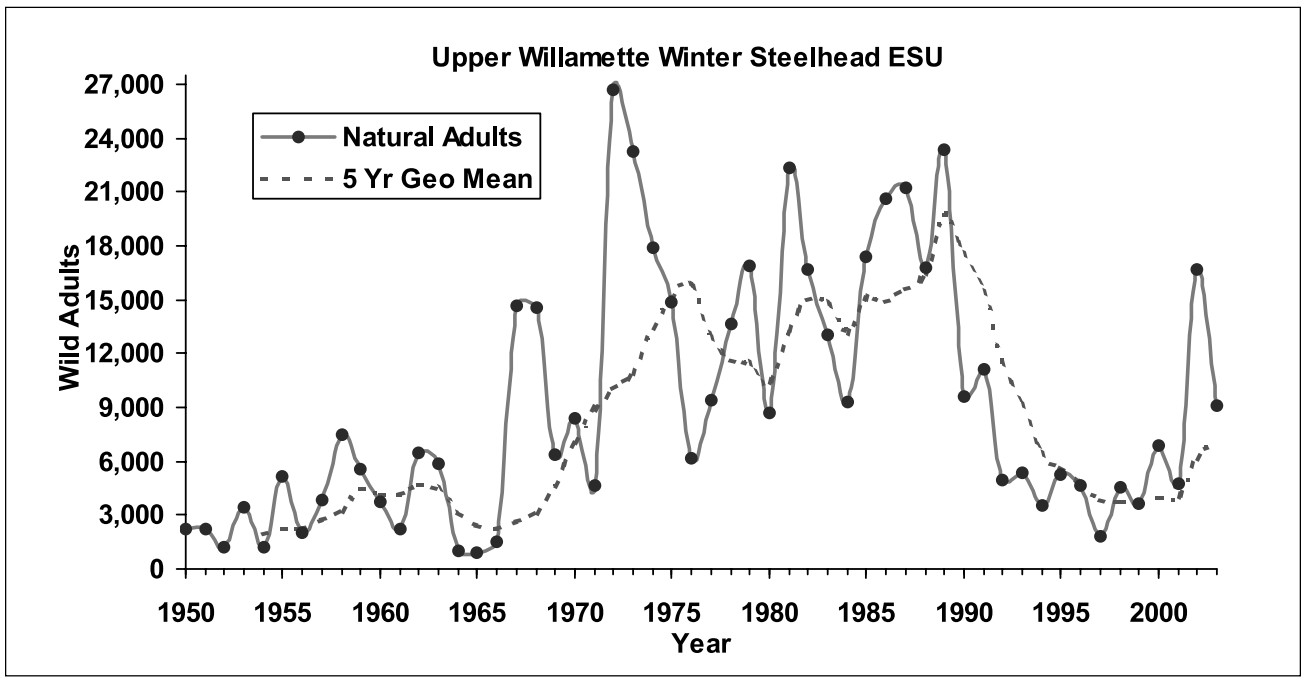


Figure 6-13. Run sizes and geometric mean of run sizes of upper Willamette winter steelhead over time.

The upper Willamette River Chinook ESU is demonstrating a recent increase in abundance and an increasing five-year geometric mean (Figure 6-14). When data are available on the strong runs since 2001, the trend in this ESU should improve further.

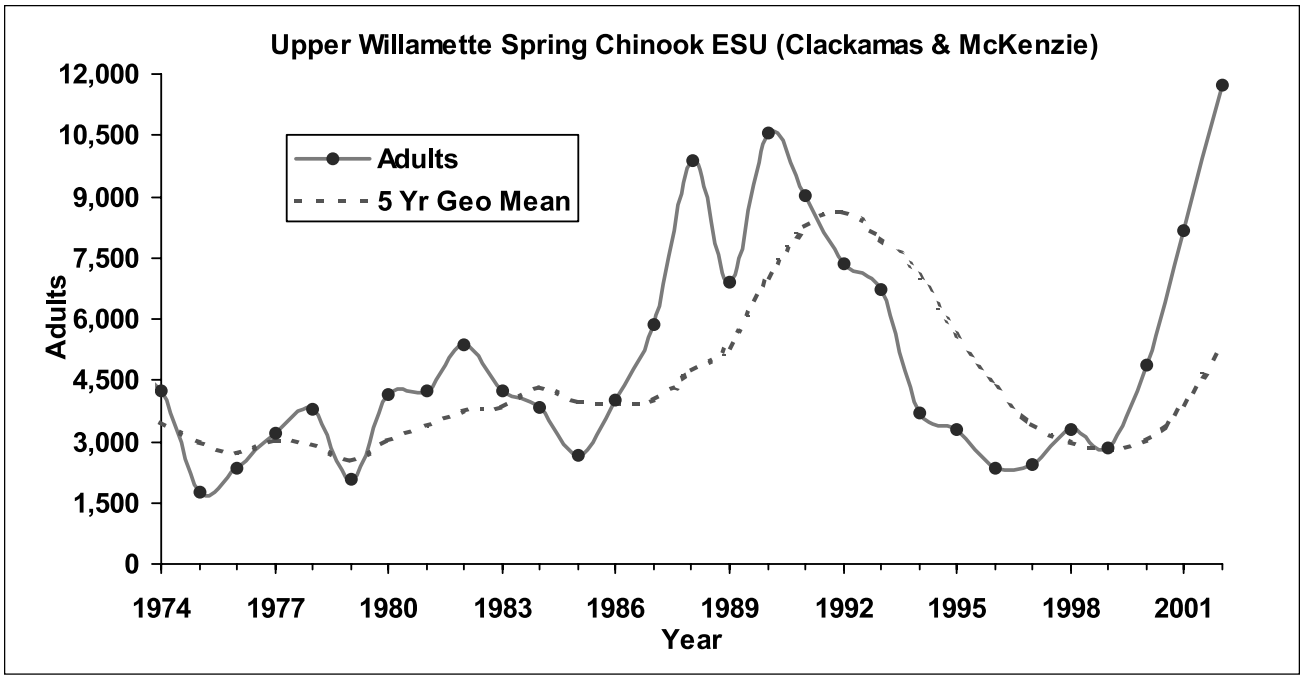


Figure 6-14. Run sizes and geometric mean of run sizes of upper Willamette spring Chinook over time.

The lower Columbia River steelhead ESU is showing a recent decline in abundance and the 1990-2001 trend is negative (Figure 6-15).

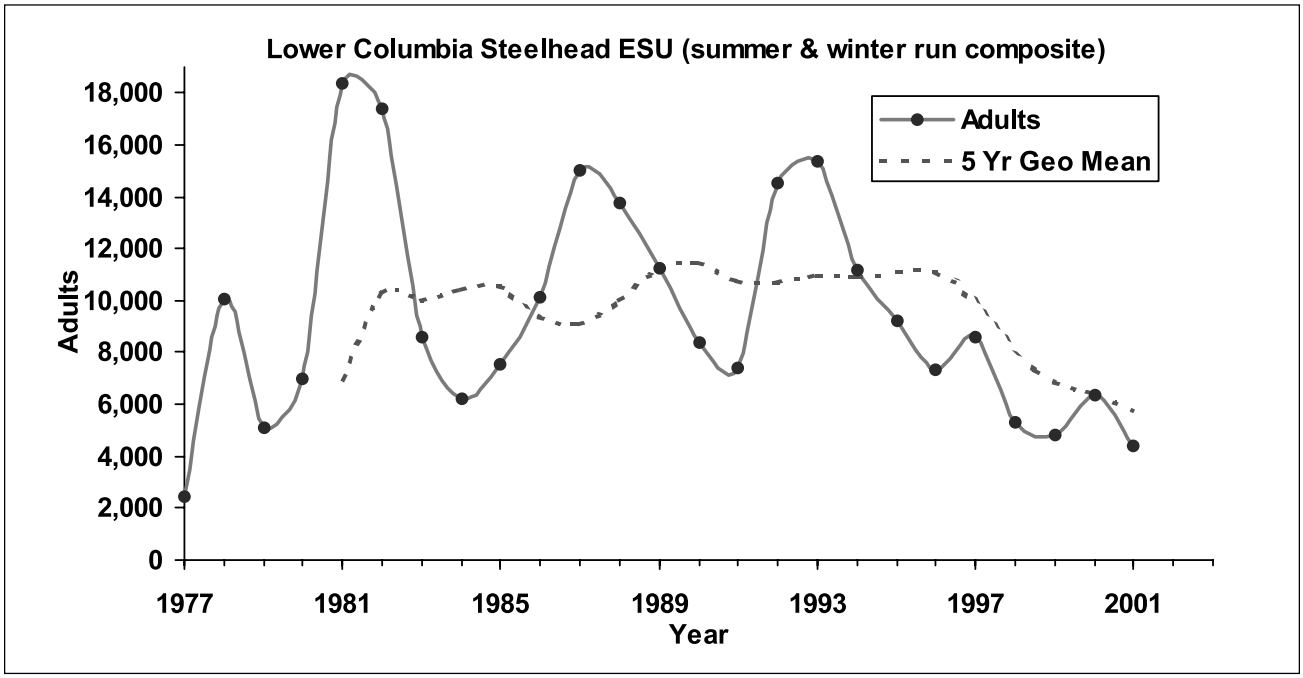


Figure 6-15. Run sizes and geometric mean of run sizes of lower Columbia steelhead (summer and winter) over time.

The lower Columbia River Chinook ESU is showing an upswing in spring run populations with a big return in 2001 (Figure 6-16). However, the 1993-1998 trend in abundance of this population was decreasing. The fall run populations of the ESU are showing a declining abundance trend through 2000 (Figure 6-17).

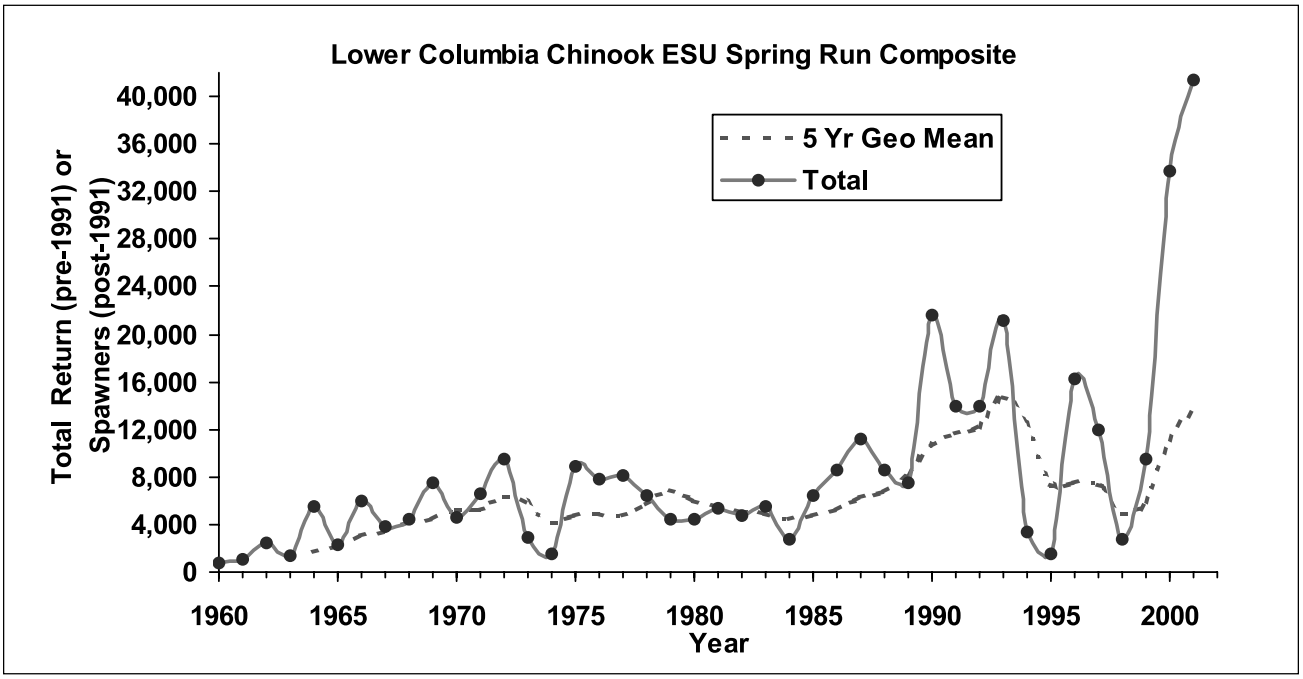


Figure 6-16. Run sizes and geometric mean of run sizes of lower Columbia spring Chinook over time.

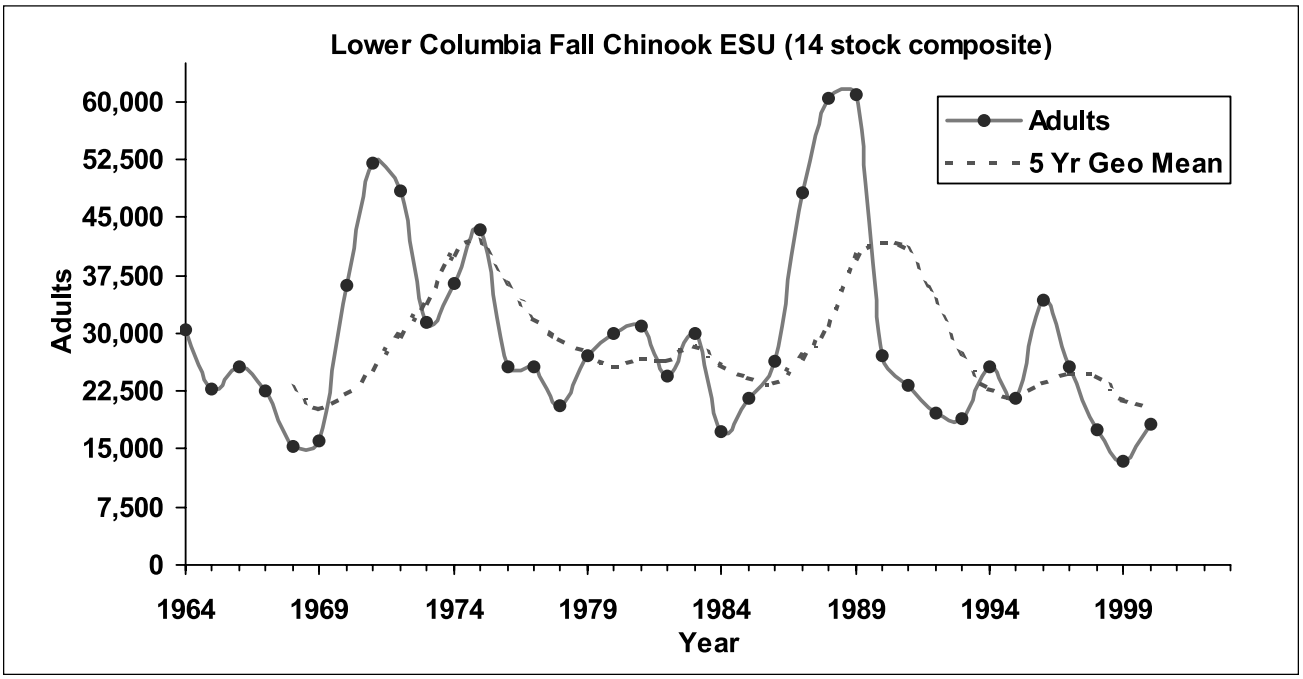


Figure 6-17. Run sizes and geometric mean run sizes of lower Columbia fall Chinook over time.

Table 6-1 provides a summary of adult abundance and abundance trends of both listed and non-listed ESUs in the Columbia River basin. The dramatic, short-term improvement in the status of the listed ESUs affected by the FCRPS is demonstrated by the percent change in the 1996-2000 geometric mean (pre-BiOp) compared to the geometric mean for 2001-2002 (post-BiOp). Also important are the 1990-2002 abundance trends for each of the ESUs (with trends > 1 indicating ESUs increasing in the short-term and trends <1 indicating decreasing ESUs).

Table 6-1. Abundance and abundance trends for listed and unlisted ESUs in the Columbia basin.

Trend No.	ESU	Spawning Aggregation	Data Type	Most Recent Year	Geomean (1996-2000)	Geomean (2001-2002)	BRT Trend (1990-2000)	BRT Trend (1990-2002)	% Change in Geomean	% Change in Trend
1	Lower Columbia Chinook	Lower Columbia	Total	2001	11135	41450	0.97	1.03	272.2	6.6
2	Mid-Columbia Chinook	Mid-Columbia	Best estimate total spawners	2001	12728	45143	1.00	1.06	254.7	5.5
3	Snake River spring /summer Chinook	Best est. wild @ LGR	Wild adults	2002	5186	33035	0.97	1.11	537.0	13.8
4	Snake River fall Chinook	Fall Chinook above LGD	Total wild fish	2001	655	2652	1.15	1.19	304.7	3.7
5	Snake River Sockeye	Snake River	Total adults	2002	4	24	1.23	1.26	434.2	2.1
6	Snake River summer steelhead	Snake River	Total wild fish	2002	10663	40465	1.00	1.09	279.5	8.4
7	Upper Columbia spring Chinook	Upper Columbia	Total wild fish	2001	274	3868	0.79	0.90	1312.5	14.0
8	Upper Columbia River steelhead	Upper Columbia River	Total wild fish	2001	852	4794	0.99	1.06	462.4	6.9
9	Deschutes River summer fall Chinook	Deschutes	Wild adults	2002	9137	12347	1.10	1.10	35.1	0.2
10	Mid-Columbia River steelhead	Mid-Columbia River steelhead ESU composite	Total wild fish	2001	4061	8561	0.98	1.01	110.8	3.3

Table 6-1., continued

Trend No.	ESU	Spawning Aggregation	Data Type	Most Recent Year	Geomean (1996-2000)	Geomean (2001-2002)	BRT Trend (1990-2000)	BRT Trend (1990-2002)	% Change in Geomean	% Change in Trend
11	Lower Columbia spring Chinook	Clackamas & McKenzie Rivers	Adults	2000	3041		0.89	0.89		
12	Lower Columbia fall Chinook	Fourteen early- mid- & late fall run	Adults	2000	20698		0.97	0.97		
13	Lower Columbia chum	Grays River & Hamilton /Hardy Creeks	Adults	2000	1295		1.00	1.00		
14	Lower Columbia River steelhead	Lower Columbia River	Adults	2001	6333	4429	0.93	0.92	-30.1	-0.8
15	Lower Columbia River coho	Lower Columbia River	Adults	2002	822	2901	0.92	0.99	253.1	7.8
16	Lake Wenatchee sockeye	Lake Wenatchee	Total spawners	2001	7449	38625	0.83	0.91	418.5	9.0
17	Okanogan Lake sockeye	Okanogan Lake	Total spawners	2001	15605	74481	1.00	1.07	377.3	6.9

Table 6-1., continued

Trend No.	ESU	Spawning Aggregation	Data Type	Most Recent Year	Geomean (1996-2000)	Geomean (2001-2002)	BRT Trend (1990-2000)	BRT Trend (1990-2002)	% Change in Geomean	% Change in Trend
18	Upper Columbia summer /fall Chinook	Upper Columbia	Escape-ment	2001	67052	104946	1.04	1.05	56.5	1.2
19	Upper Willamette steelhead	Winter steelhead (Willamette Falls Dam)	Adults	2003	3961	8948	0.93	1.01	125.9	8.7

Column Name & Description

ESU: The ESU in which the spawning aggregation resides
Trend type: *e.g.,* redds/mile, total spawners, wild spawners
Most recent year: Most recent year of data available for the spawning aggregation
Geomean (1996-2000): Geometric mean based on years 1996-2000
Geomean (2001-2002): Geometric mean based on years 2001-2002
BRT Trend (1990-2000): Trend used in recent BRT document based on 1990-2000
BRT Trend (1990-2002): Trend used in recent BRT document based on 1990-2002
NA: Means that the indicated quantity is not available, due to lack of data
% Change in geomean: The % change in the geometric mean between periods 1996-2000 and 2001-2002
% Change in trend: The % change in trend between periods 1990-2000 and 1990-2002

The geometric mean of adult abundance for nearly all ESUs is substantially greater as a result of recent record level adult returns when compared to returns immediately preceding the 2000 BiOP (Figure 6-18). Similarly, the adult abundance trends for nearly all ESUs is also substantially greater than those immediately preceding the BiOp (Figure 6-19).

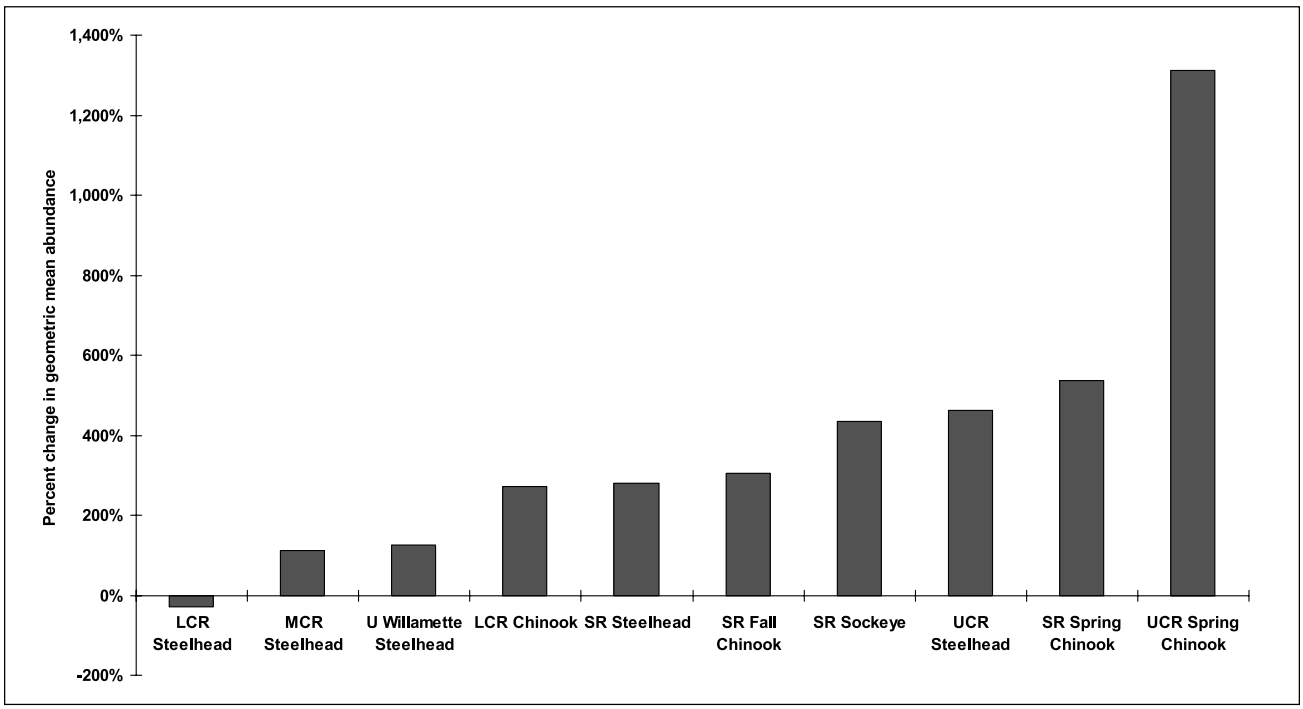


Figure 6-18. Percent change in the geometric mean of abundance for listed ESUs from the pre- to the post-BiOp period (data not available for lower Columbia River chum and upper Willamette River spring Chinook).

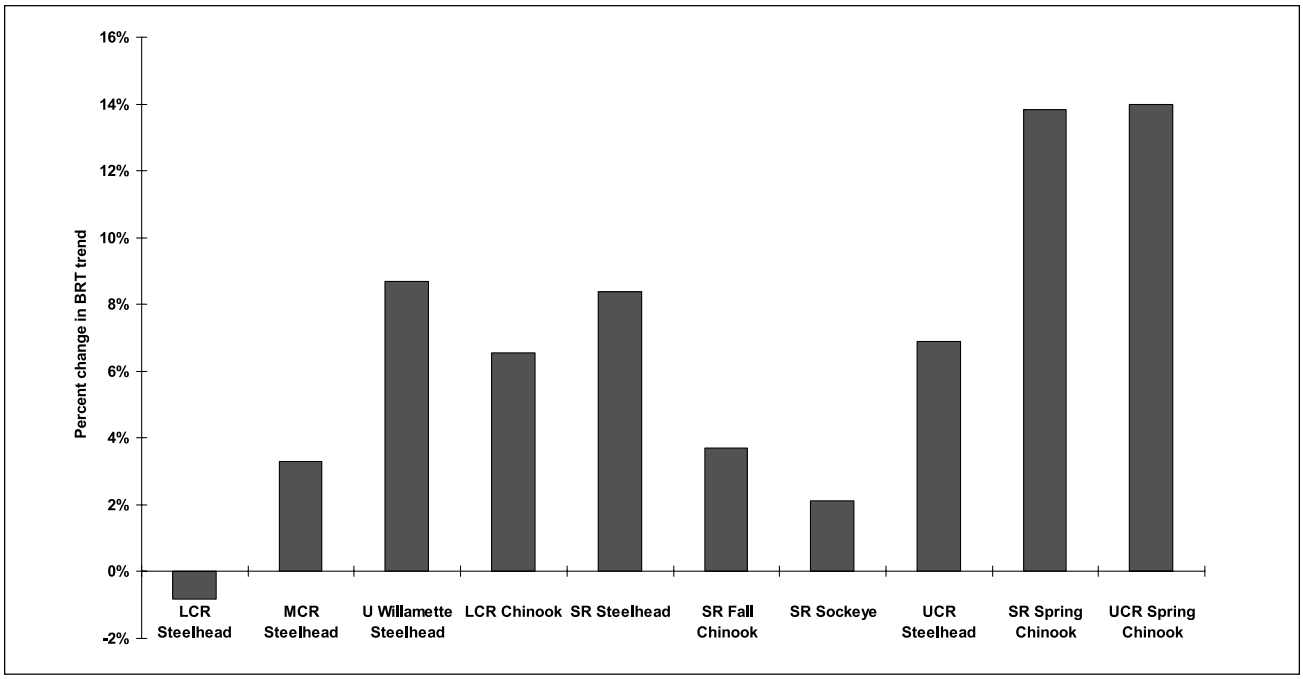


Figure 6-19. Percent change in the BRT trend slope for listed ESUs from the pre- to the post-BiOp period (data not available for lower Columbia River chum and upper Willamette River spring Chinook).

Population Growth Rate – Lambda

The population growth rate, lambda, is used to represent ESU performance, including predicting future population growth and determining risk of extinction. It is a composite of survival rates across all life stages and Hs, encompassing both natural and human effects on life stage survival. In simple terms, it is a regression of the growth trend represented by the first and last four years of the time series of the analysis.

The 2000 BiOp included ESU-specific estimates of lambda based on adult returns through 1999. NMFS has recently revised its analysis to include adult returns through 2001 for Snake River steelhead and Snake River fall Chinook. We understand that further revisions to this analysis to include adult returns through 2003 will be completed by spring 2004. Table 6-2 summarizes what information we have at this time. Both Snake River steelhead and Snake River fall Chinook show increased population growth rates since the BiOp.

Table 6-2. Lambda values for ESUs[17]

ESU	Est. Lambda (BiOp)	Est. Lambda(July 2003)[18]
Upper Columbia River steelhead	0.83-0.69	Not available
Snake River steelhead	0.83-0.72	0.89-0.76
Mid-Columbia River steelhead	0.84-0.72	Not available
Upper Columbia River spring Chinook	0.85-0.84	Not available
Snake River spring/summer Chinook	0.91-0.82	Not available
Snake River fall Chinook	0.92-0.87	1.02-0.94
Columbia River chum salmon	1.04	Not available
Snake River sockeye	Not available	Not available

In addition to the information in this report, the TRT and NOAA Fisheries' Biological Review Team (BRT) recently reviewed existing status information for listed ESUs (available at *http://161.55.120.162/trt/brtrpt.htm*). This draft report confirms the positive trends we have been seeing for the ESUs.

Related to ESU performance management, the Action Agencies also intend to establish and report on performance standards and measures for tracking other goals of the *All-H Recovery Strategy*. Such annual measures could include abundance of the aggregate runs of salmon and steelhead arising from the Columbia basin, tribal trust and non-tribal harvests, as well as resident fish and wildlife objectives.

4. Salmon and Steelhead Survival through the Federal Hydrosystem

Population performance indicators at the ESU level are the most critical for monitoring overall progress of recovery efforts for ESA-listed species. However, population level performance is the combined result of both natural and human impacts on survival at all life stages of salmon and steelhead, including factors that are not within the control of the Action Agencies. Consequently, the most directly applicable performance indicators for the federal hydrosystem are the survival values for adult and juvenile fish at and between the dams. Even then, we must recognize potential non-hydro factors that influence survival of fish during their migration within the hydrosystem corridor. The Action Agencies and NOAA Fisheries established the Hydro RME Workgroup to develop a comprehensive plan to address hydrosystem performance standards and specific research-related RPA actions. In the case of adult and juvenile fish survival through the hydrosystem discussed below, the Action Agencies are working closely with NOAA Fisheries analysts to determine estimated survival through the hydrosystem and for comparison against hydrosystem performance standards. For a variety of reasons, data necessary to generate these estimates may be limited. The Action Agencies are continuing to work with NOAA

Fisheries and other salmon managers to enhance reporting in a timely manner.

Adult Fish Survival

Estimating adult fish survival through the hydrosystem is dependent on detection of known-origin PIT-tagged adult fish, with adjustments to account for straying, harvest, navigation-lock passage, and fish that fall back but do not reascend.

In the first year of BiOp implementation, 2001, survival rates of adult fish migrating between Bonneville and Lower Granite dams were among the highest on record, exceeding the BiOp goals for spring/summer Chinook, steelhead, and likely, fall Chinook (Table 6-3). Preliminary estimates of survival to Lower Granite in 2002 indicate another year of good survival, exceeding BiOp goals for spring/summer Chinook, and likely for steelhead as well. Reductions in fallback rates at Bonneville Dam and better assessment of unaccounted losses have contributed to these results. Estimates are not yet available for 2003 or the late running adult migrants in 2002.

Table 6-3. Adult Spring/Summer Chinook, Fall Chinook, and Steelhead survival, Bonneville to Lower Granite Dam, 2001.

	BiOp Goal	Estimated Survival to Lower Granite based on PIT tag detection*	
		2001	2002
Spring/Summer Chinook	85.5%	92.8%	86.8
Fall Chinook	74%	>85.5%	N/A
Steelhead	80.3%	92.7%	N/A

*Using Hydro RM&E methodology that adjusts for fallback, tributary turn-off, straying, and known harvest.

Juvenile Fish Survival

As of this writing, available information on juvenile fish survival for the first three years of BiOp implementation is limited. Estimates of juvenile fish survival through the hydrosystem that were available were presented in the 2001 and 2002 Progress Reports. Survival estimates for 2003 are not yet available. We anticipate including results from the 2003 migration in our 2003 Progress Report.

Estimating juvenile fish survival through the hydrosystem is dependent on a combination of empirical data, extrapolation, and modeling. The origins of estimates vary by ESU and between in-river and total hydrosystem (i.e., combined in-river plus transportation survival). Reasons for these multiple approaches include varying opportunity to tag fish by ESU, varying tag detection capability by river reach, and the fact that critical uncertainties relative to certain parameters (e.g., delayed transportation mortality, or "D", discussed below) may require modeling because empirical estimates for "D" may lag those of in-river survival by 2 to 4 years. Also, the precision of estimates varies by ESU depending on numbers of fish available for tagging, tag detection rates, and other factors. In some cases, precise estimates of survival may be possible for hatchery fish, but not for wild fish.

Reporting on juvenile fish survival through the hydrosystem will be based on:

- In-river survival from the head of the entrance reservoir to the tailrace of Bonneville Dam;
- Total hydrosystem survival (combined in-river plus transportation survival), which is based on in-river survival, above, plus:
  - — Direct survival of transported fish (from collection to release);
  - — Delayed transportation mortality ("D");
  - — The proportion of the ESU arriving at the uppermost Federal dam that is transported to below Bonneville Dam.

Total System Survival

Under the BiOp, a spread-the-risk transportation strategy is employed during the spring in the Snake River when flows are greater than 85 thousand cubic feet per second (kcfs). Conversely, the BiOp calls for maximizing collection and transportation of spring migrants when

flows are less than 85 kcfs. The BiOp calls for transportation to be maximized at all four transport projects (Lower Granite, Little Goose, Lower Monumental, and McNary dams) during the summer under all runoff and flow conditions.

Information on total juvenile hydrosystem survival—the combined survival of both in-river and transported migrants – is our primary measure for evaluating performance of Snake River ESUs because of the relative proportion of juvenile outmigrants that are transported at Snake River dams. It was also an important performance measure for Upper Columbia River ESUs in the severe drought of 2001 when spring transportation at McNary was used as a risk management strategy.

Environmental and hydrologic conditions that greatly effect hydrosystem operations, and consequently fish survival, varied substantially across the three years (2001-2003) covered in this report. The extreme drought conditions of 2001 represented the second lowest Columbia basin runoff volume on record, at approximately 54 percent of average. Both 2002 and 2003 were also low runoff years, at approximately 97 and 83 percent of average, respectively (data for January-July 2003 at The Dalles from Scott Boyd, Corps, pers. comm., Aug 2003). As a result, flow conditions during the juvenile out-migration varied, and in turn, resulted in differing transportation operations (and proportion of fish migrating in-river) across each year.

Tables 6-4 to 6-6 show juvenile fish survival for listed salmon and steelhead ESUs in the Columbia River basin for 2001 and 2002. Data are not available for 2003.

Table 6-4. Estimated 2001 Juvenile Fish Survival (%) for Listed Salmon/Steelhead ESUs.
(Source: 2001 Progress Report)

Population	In-river Survival	% Transported	Total System Survival		BiOp Total System Performance Standard
			Low D	High D	
SR spring/summer Chinook	27.6	90-95	58.2	67.4	54.8-60.4
SR steelhead	4.2	90-95	45.4	50.6	49.0-52.5
SR fall Chinook	Not Available	95	Not Available	Not Available	12.7
UCR spring Chinook	50	40	45.8	49.1	66.4
UCR steelhead	25	40	18.2	19.5	67.7
Hanford Reach fall Chinook	57.9	50	Not Available	Not Available	Not Applicable

Table 6-5. Estimated 2002 Juvenile Fish Survival (%) for Listed Salmon/Steelhead ESUs.
(Source: NOAA Fisheries)

Population	In-river Survival	% Transported	Total System Survival		BiOp Total System Performance Standard
			Low D	High D	
SR spring/summer Chinook	57.8	73	56.8	64	54.8-60.4
SR steelhead	24.5	78	41.6	46.2	49.0-52.5
SR fall Chinook	Not Available	90-95	Not Available	Not Available	12.7
UCR spring Chinook	Not Available	Negligible	Not Available	Not Available	66.4
UCR steelhead	Not Available	Negligible	Not Available	Not Available	67.7
Hanford Reach fall Chinook	Not Available	50	Not Available	Not Available	Not applicable

Table 6-6. Estimated 2003 Juvenile Fish Survival (%) for Listed Salmon/Steelhead ESUs

Population	In-river Survival	% Transported	Total System Survival		BiOp Total System Performance Standard
			Low D	High D	
SR spring/summer Chinook	53.2[4]	56[4]	Not Available		54.8-60.4
SR steelhead	30.9[4]	74[4]	Not available To be reported in 2003 Progress Report		49.0-52.5
SR fall Chinook	Not available To be reported in 2003 Progress Rpt.	90-95			12.7
UCR spring Chinook		Negligible			66.4
UCR steelhead		Negligible			67.7
Hanford Reach fall Chinook		50			Not applicable

Total system survival is most affected by the proportion of fish that are transported, and the associated survival (direct and indirect) of transported fish. On average, over 60-70 percent of Snake River spring migrants are transported under the "spread-the-risk" transportation strategy during average or better water conditions, and approximately 80-90 percent are transported under the maximum transportation strategy in below-average water conditions during the spring and under all water conditions in the summer. As a result, survival of transported fish is the most influential factor on total system survival. Further, when the differential between survival of transported fish and survival of fish that migrate in-river is higher (such as was the case in 2001 when river flow was low, or in the case of steelhead), then the survival of transported fish becomes even more influential. Total system survival for Snake River stocks tends to exceed the performance standard of the BiOp in the case of Chinook, or may be near the standard in the case of steelhead. In contrast, as the proportion of fish transported decreases, as in the case of upper Columbia River Chinook and steelhead, the lower in-river survival becomes more influential, and total system survival falls short of the performance standard. This demonstrates the value of juvenile fish transportation as a mitigation strategy, particularly when runoff conditions are below average (as has been the case since the current BiOp was adopted).

In-River Juvenile Fish Survival

In-river survival is an important performance measure for upper and middle Columbia River ESUs that are not generally subject to juvenile fish transportation; it is of relatively less consequence to Snake River ESUs that are mostly transported, and therefore, not subjected to in-river conditions.

In-river survival values during 2001, 2002, and 2003 represent some of the highest and lowest estimates in recent years. In-river survival values during 2002 and 2003 for yearling Chinook migrants from the Lower Granite Dam tailrace to the Bonneville Dam tailrace were among the highest ever observed (approximately 58 percent and 53 percent respectively, for 2002 and 2003). In contrast, in-river survival for Snake River steelhead migrants was lower than observed in recent years since 1995 (except in the case of 2001 when it was estimated at approximately 4 percent). In-river survival was approximately 26 percent and 31 percent for 2002 and 2003, respectively. Of particular importance is the reduced steelhead survival in the reach from Lower Monumental Dam to McNary Dam. Explanations for why this is the case are not fully understood, though it is likely that predation by Caspian terns is a major factor. Minimum estimates of tern-related mortality based on PIT tag recovery suggest approximately 21 percent and 10 percent loss in 2001 and 2002, respectively; data from 2003 are not yet available. Efforts are underway to reduce these losses.

Footnotes for Report 6

[17] Estimated lambda ranges based upon 20 to 80 percent efficiency in spawning of hatchery origin fish.
[18] July 2003 lambda values from C. Toole (NOAA Fisheries, pers. comm..)
[4] Preliminary data from memorandum from John Ferguson to Brian Brown, NOAA Fisheries, September 12, 2003