

Appendix 2: Adaptive Management¹

2.1.1 Introduction

Using the Collaboration Framework, the Action Agencies identified Biological Objectives, Recovery Strategies, and Actions for ESUs affected by the operation of the FCRPS – supported by specific commitments for hydro, habitat, hatcheries, predation management, and harvest. In the biological analyses of these commitments, the Action Agencies estimated benefits to fish species listed under the ESA and considered aggregated, cumulative effects on “gravel-to-gravel” lifecycle survival and recovery under the ESA. The Action Agencies evaluated multiple measures of survival and recovery, including extinction risk, productivity (recruits per spawner), abundance trend, population growth rate or lambda (λ) (the measure primarily used in the 2000 BiOp), and the Collaboration Framework gaps (allocation of long-term recovery responsibility by sector). This analysis is addressed in the referenced Comprehensive Analysis.

¹ Biological Assessment for Effects of Federal Columbia River Power System and Mainstem Effects of Other Tributary Actions on Anadromous Salmonid Species Listed Under the Endangered Species Act. August, 2007. U.S. Army Corps of Engineers, Bonneville Power Administration, Bureau of Reclamation. Pp 2-1 through 2-16.

Figure 2-1. Proposed RPA Strategy Overview



The Action Agencies' analysis is based on the best available scientific information. However, as with any analysis for a species with a complex lifecycle, there is uncertainty associated with this evaluation of survival, recovery, and biological benefits. These issues are described in more detail in the discussions of the biological analyses, climate change and ocean conditions, and latent mortality.

The Action Agencies' RPA incorporates an adaptive management structure of checks and balances similar to the 2000 BiOp, to ensure accountability for results in the face of uncertainty and risk. This section summarizes the Action Agencies' performance standards and targets, reporting and adaptive management approach, continued collaboration and oversight, and contingencies.

Accountability for Results

Action Commitments: The Action Agencies' specific commitments, including funding, presented in the form of the Proposed RPA, provide the first means to gauge results.

Performance Targets and Standards: Commitments to action are reinforced by performance targets (long-term goals) and performance standards (benchmarks for results). These will help track and gauge the effectiveness of our actions.

Planning and Reporting: A key aspect of our accountability structure is implementation plans, reporting and check-ins. The Action Agencies will report annually on progress of implementation and performance results to inform and signal appropriate adaptations or adjustments to our actions, and provide cumulative check-ins at 5 and 8 years.

Research, Monitoring, and Evaluation (RM&E) and Adaptive Management: Using a program of extensive and robust RM&E, the Action Agencies will assess compliance, effectiveness, and critical uncertainties. Adaptive management will be used to modify our actions and ensure that they continue to track performance expectations, based on the best available scientific information.

Oversight: Continued collaboration and oversight of implementation by the sovereign parties is provided, including review of how listed fish are progressing toward recovery and "All-H" (i.e., Hydropower, Hatchery, Habitat, and Harvest) diagnosis of emerging issues.

Contingencies: Consistent with the 2000 BiOp, the Action Agencies will provide specific and general contingencies in case more aggressive adaptive management changes are called for based on evaluation of our performance in years 5 and 8.

2.1.2 Performance-Based Framework

As in the 2000 and 2004 BiOps, performance targets and standards and RM&E remain central to the success of the Proposed RPA. Commitments to specific actions are reinforced by a performance-based framework that will help the Action Agencies track and gauge the effectiveness of specific actions, as well as inform adaptive management actions.

The Action Agencies have identified performance *measures* (metrics) that will be monitored and evaluated relative to performance *standards* (benchmarks) and performance *targets* (longer-term goals) to assess progress and inform adaptive management actions. Performance *standards* will be monitored frequently to ensure accountability and adherence to Proposed RPA with potential contingencies or other time-critical corrective actions. Performance *targets* will be evaluated over longer time periods as new information and learning is applied through analytical models to check for progress toward expected life stage survival improvements and trends in population performance. Performance targets will inform longer-term adaptive management decisions and prioritization of options across populations with different relative needs.

The Action Agencies will monitor two aspects of performance:

- ***Programmatic*** performance standards, tracked through project implementation and compliance monitoring, and
- ***Biological and Environmental*** performance standards or targets, tracked and evaluated through status monitoring, action effectiveness research, and critical uncertainty research in combination with existing and developing quantitative models.

Descriptions of biological/environmental performance standards and targets are outlined for adult abundance, hydropower, predation, habitat, and hatchery performance in the following sections.

Programmatic performance standards are also discussed below, but specific programmatic standards are, or will be, identified by the specific actions and associated projects committed to within the Proposed RPA and in subsequent 3-year Implementation Plans.

Reporting on achievement of performance standards and progress toward longer-term targets will take place annually and through two comprehensive evaluations in years 2012 and 2015. The proposed reporting structure includes changes made through monitoring and adaptive management, as well as clear signals if performance standards are not being met. If there is a failure to achieve performance standards, the Action Agencies commit to explore specific contingencies, in coordination with States and Tribes. These discussions will occur through the Regional Implementation Oversight Group (RIOG) described in Section 2.1.4.3.

- **Performance targets:** Performance goals for actions. These are generally the survival improvements from the lifecycle modeling, and will continue to be assessed using a modeling approach. The performance targets represent long-term goals, which are not necessarily achievable by this Proposed RPA/BiOp alone.
- **Performance standards:** Results or benchmarks for accountability for FCRPS actions. They may be biological, physical, programmatic, or a combination. This Proposed RPA establishes contingencies to address failure to meet performance standards.
- **Performance metrics or measures:** Units of measurement for assessing performance targets or performance standards.
- **All-H Reporting metrics:** Broad-level measurements that the Action Agencies may report, but which are not the exclusive performance responsibility of the FCRPS (e.g., adult trends).

2.1.2.1 Adult Abundance and Trends (All-H Reporting Metrics)

Adult abundance and trends reflect the most accessible currency in which to evaluate the progress in region-wide recovery efforts over multiple years. They give an indication of how both the naturally spawning and hatchery-based portions of a listed species are doing.

Adult trends are also indicators of variability in ocean survival conditions, which can significantly affect the numbers of adult anadromous fish over multiple years. Because adult trends are so critical to understanding the progress of listed fish toward recovery, the Action Agencies will regularly track and report available data on overall adult abundance and trends for the ESUs. Adult abundance and trends represent an overarching performance target, not just for the FCRPS, but also for the collective actions by all parties in the Columbia River Basin for the conservation and recovery of listed fish. Specifically, this overarching performance target is a positive trend in adult abundance.

Based on examination of adult abundance and trends, including NMFS' expected updates of ESU status in 2009 and 2014, the Action Agencies may determine that some ESUs and populations require greater or less immediate attention as implementation of the Proposed RPA is advanced, particularly related to more "local" mitigation such as habitat improvements and hatchery reforms. This approach makes best use of available resources for those ESUs in greatest need.

2.1.2.2 Hydrosystem Performance

The primary benchmark for assessing progress of FCRPS actions for conservation of ESA-listed fish is adult and juvenile survival through the hydrosystem. The Action Agencies have the greatest influence on this outcome, and it is less confounded by actions of others. Hydrosystem

performance will be tracked and evaluated through adult reach survival and juvenile dam survival performance standards, and through a juvenile system survival performance target.

Adult Survival Standards

For adult fish, the Action Agencies have largely achieved or exceeded the performance standards identified in the 2000 BiOp (Ruff 2004). Because the Action Agencies do not expect the Proposed RPA to reduce adult upstream passage survival, they will continue that operation and monitor adult passage. The intent of this standard is to demonstrate that current high levels of adult survival are being maintained.

The performance standard for Snake River Chinook salmon ESUs (including Spring/Summer and Fall), will be based on PIT-tag detections at Bonneville and Lower Granite dams. Past estimates have yielded an upstream survival estimate of 90 percent for Snake River Spring Chinook salmon, 94 percent for Snake River Summer Chinook salmon and 92 percent for Snake River Fall Chinook salmon. The Action Agencies propose to use these as estimates as the standard. For the Upper Columbia Chinook salmon ESU, the standard would be measured from Bonneville Dam to McNary Dam and would be 92 percent. Adult performance standards are summarized by ESU in Table 2-1. A more detailed discussion and the methods for calculating adult performance are located in Attachment B.2.6-2.

Table 2-1. Adult Performance Standards

ESU	Adult Standard	Reach	Rationale
Snake River Spring Chinook Salmon	90%	Bonn. to Lower Granite	Longest migratory route
Snake River Summer Chinook Salmon	94%	Bonn. to Lower Granite	Longest migratory route
Upper Columbia Spring Chinook Salmon	92%	Bonn. to McNary	Longest migratory route
Snake River Fall Chinook Salmon	92%	Bonn. to Lower Granite	Longest migratory route
Willamette River Chinook Salmon	None	None	Low Encounter Rate
Lower Columbia River Chinook Salmon	None	None	Surrogate of upriver ESU
Snake River Steelhead	N/A	Bonn. to Lower Granite	Unaccounted harvest leads to uncertainty in calculations
Upper Columbia River Steelhead	N/A	Bonn. to McNary	Unaccounted harvest leads to uncertainty in calculations
Mid-Columbia River Steelhead	N/A	Variable	Unaccounted harvest leads to uncertainty in calculations
Lower Columbia River Steelhead	None	None	Upriver Steelhead ESU surrogate
Willamette River Steelhead	None	None	Low Encounter Rate
Snake River Sockeye Salmon	None	None	Uncertainty in data

ESU	Adult Standard	Reach	Rationale
Lower Columbia River Coho Salmon	None	None	Upriver Chinook ESU surrogate
Columbia River Chum Salmon	None	None	Low Encounter Rate

Juvenile Dam Passage Survival Standards

The Action Agencies propose specific performance standards of 96 percent average relative dam survival for spring migrating fish and 93 percent average relative dam survival for summer migrating fish, with averaging/tradeoffs allowed between dams. Any survival averaging or tradeoffs between dams may occur among the Snake River dams or among the lower Columbia River dams, but not between Snake and Columbia River dams. Definitions and methods for calculating juvenile performance are located in Attachment B.2.6-2.

One mechanism for adaptive management to improve performance, when necessary, will be the Configuration and Operation Plans (COP) that the Corps prepares to evaluate and develop hydrosystem project improvements. The Corps has prepared COPs to lead to improvements including surface passage (e.g., RSWs) and other dam passage improvements at each of the lower Columbia River and Snake River projects. A COP is being/has been developed for each dam in close coordination with the Region at the technical level. Each COP will recommend the ultimate configuration and operation for that project.

The COP considers alternatives and performance standards, and several other components as described in the *Draft Snake and Columbia River Surface Passage Strategy* prepared by the Corps in July 2005. Following installation of dam passage improvements, an evaluation will be conducted to determine the success of the action in meeting the performance standard. If the standard is not met, the Corps will update the COP coordinated through the Regional Forum to determine additional potential actions.

Juvenile System Survival Targets

In the biological analyses, the Action Agencies have assessed the expected juvenile system survival to the Bonneville tailrace under current conditions (2006 hydrosystem configuration and the operation plan that were identified in the 2004 BiOp) and under the prospective conditions of our proposed hydrosystem actions through 2017. The Action Agencies propose to use the relative improvement in direct system survival from the 2004 base level conditions to the 2017 Proposed RPA conditions, as the system survival performance targets. Further explanation is provided in Appendix B.2.6-2 and tables in Appendix B of the Comprehensive Analysis.

Achievement of Performance Standards

Once the Action Agencies meet adult survival and juvenile dam survival performance standards, they will move from detailed actions to maintenance of the performance standard, subject to

regular monitoring to ensure continued performance. The choice of tools needed to maintain performance will be at the discretion of the Action Agencies. The juvenile system survival target is a longer-term goal that will be used to inform broader lifecycle improvement assessments

2.1.2.3 Predation Management Performance

Management of piscivorous and avian predation of juvenile salmonids is an effective means of increasing juvenile fish survival (Beamesderfer et al. 1996, Roby et al. 1998, NMFS 2000, Good et al. 2004). The Action Agencies will pursue focused measures that reduce predation mortality in the near and long term. These measures will be monitored annually for programmatic-level standards.

For both piscivorous and avian predation, estimates of juvenile fish survival improvements associated with the 2007 to 2017 Actions (3.1 percent for Chinook salmon, 4.4 percent for steelhead, and 1.7 percent for fall Chinook salmon) will serve as long-term performance targets. Additional performance metrics that will be reported and included into modeling assessments will include monitoring results on predator exploitation rates and changes in estimated annual predation rates. As described above for juvenile system survival measures, comprehensive evaluations using modeling will take into account any improvements in predation management over the 2004 BiOp baseline condition (i.e., current survival benefits associated with ongoing predation control).

Research and monitoring results on predation will continue to be incorporated into these juvenile survival analyses and used to evaluate progress and achievement of expected survival improvements from predation actions.

2.1.2.4 Tributary and Estuary Habitat Performance

For the Tributary and Estuary Habitat Actions, the Action Agencies estimated survival and productivity benefits using methods developed and discussed in the Habitat and Estuary Workgroups. This approach, although not as precise as preferred, applies the best available scientific information to estimate benefits from habitat actions. The performance targets and standards derive from this approach.

Tributary Habitat

Benefits for Tributary Habitat Actions were estimated for individual populations and also were used in the biological analyses for the FCRPS BA. These estimated benefits, in the form of changes in habitat quality linked to limiting factors, provide the performance targets to be achieved by 2017 for individual populations. Performance standards will be initially based on annual progress reports of specific habitat projects that were identified for 2007 to 2009 implementation. Subsequent performance standards will be based on specific projects and actions identified in 3-year cycles from 2010 to 2017. Those projects will be selected from the

menu of actions compiled in the Remand Collaboration Process in coordination with Council and recovery planning processes. Performance metrics such as cubic feet per second of streamflow improvement, miles of access restored to spawning and rearing habitat, diversions screened, acres of riparian habitat protected or enhanced, and miles of channel complexity improvement will be compiled and reported on an annual basis.

RM&E will be used to confirm and improve the understanding of the relationships among different habitat actions, environmental improvements, and survival and productivity improvements. As this information is developed, it will be considered in the selection and the priorities of projects for 2010 to 2017 to meet the habitat quality improvement targets.

Estuary Habitat

Biological benefits for Estuary Habitat Actions that will be implemented by the Action Agencies from 2007 to 2017 have been estimated for ESUs depending on life history and use of the estuary, and applied within the biological analysis in the FCRPS BA. Estimates are 5.7 percent for stream-type fish and 1.9 percent and 5 percent for ocean-type fish. These estimates have been based on a review of the menu of potential recovery actions developed in the Remand Collaboration Process, consideration of which projects might be feasible and estimated improvement of habitat functions linked to key limiting factors, developed in coordination with local biological input. The estimated improvements in habitat function based on Estuary Habitat Actions provide the long-term biological performance targets for estuary habitat.

Programmatic performance will be assessed by monitoring implementation of the specific projects identified to meet the habitat function targets on a 3-year cycle. Standard habitat performance measures such as acres of habitat restored will also be compiled on a rolling basis.

RM&E will be used to confirm and improve the understanding of the relationships between different estuary habitat actions, the environment, and the survival and productivity performance measures. As this information is developed, it will be considered in the selection and the priorities of projects for 2010 to 2017 to meet the habitat quality targets.

2.1.2.5 Hatchery Performance Standards

The Action Agencies have developed Hatchery Actions that are expected to reduce extinction risk and increase abundance and productivity of several ESUs. The Hatchery Actions identify targeted populations and factors to be improved. Programmatic performance standards will be used, based on Action Agency commitments and implementation plans, to track implementation.

Although ongoing hatchery RM&E has targeted many of the research needs described in the Hatchery Action, existing information remains insufficient to quantitatively estimate the effects of many of the actions proposed in the Hatchery Action, a view confirmed by the Hatchery/Harvest Workgroup. The expected benefits of the Action were qualitatively assigned

as high, medium, or low value. These benefits represent the performance targets for adaptive management. Hatchery Action effectiveness research will be used to help confirm and update the qualitative expectations of these benefits as new information becomes available.

These benefits (performance targets) are relative to the following objectives of the Hatchery Actions:

- Safety-net programs reduce extinction risk for target populations in Snake River Sockeye Salmon, Snake River Spring/Summer Chinook Salmon, Mid-Columbia River Steelhead, Lower Columbia River Steelhead, and Columbia River Chum Salmon ESUs.
- Conservation hatchery programs increase abundance of target populations in Snake River Spring/Summer Chinook Salmon, Snake River Fall Chinook Salmon, and Upper Columbia River Steelhead ESUs, thereby reducing the time to recovery.
- High-priority hatchery reform actions (i.e., those needed to address hatchery programs that are considered major limiting factors by NMFS), result in improved abundance, productivity, diversity, and/or spatial structure of target populations.
- Future implementation of additional hatchery reforms identified through Columbia River Hatchery Scientific Review Group's hatchery review process, combined with use of best management practices (BMPs) at FCRPS hatchery facilities, improve abundance, productivity, diversity, and/or spatial structure of target populations, depending on the nature of the reform.
- Hatchery effectiveness monitoring and research will be used in the 2012 and 2015 comprehensive evaluations to test and update the expectations of these benefits and gauge the progress. As BMPs are adopted for specific hatchery programs, these will provide additional performance measures that Action Agencies will track and report.

2.1.2.6 Summary of Performance Targets and Standards

Table 2-2 provides a summary of performance targets, standards, monitoring, and reporting under the performance-based framework.

2.1.2.7 The Role of Cost Effectiveness

Comprehensive performance management is critical to success in achieving ESA goals, but cost-effectiveness is also a consideration. Consistent with the approach described in the Northwest Power Act, clearly defined performance standards and biological objectives should be met through cost-effective alternatives, so that fish receive the greatest benefits possible for the region's financial investment.

The Action Agencies will use the adaptive management framework to achieve performance standards in a cost-effective manner and may seek changes or propose alternative implementation options if they will achieve equal or better survival improvements at lower cost. The Action Agencies will continue to engage in regional discussions of any potential or proposed cost effectiveness initiatives.

Table 2-2. Outline of Performance Tracking and Reporting

Performance Targets	Performance Standards	Monitoring	Reporting
Fish Population Metrics			
Positive trends in abundance		Context for prioritization of actions and adaptive management needs	Comprehensive Evaluations [using NMFS Biological Review Team (BRT) Status Report]
Hydrosystem			
Percent system survival – by ESU or DPS		Juvenile Passage RM&E and System Survival Modeling	Comprehensive Evaluations
	Hydrosystem Action Programmatic Standards	Project Implementation and Compliance Monitoring	Annual Progress Reports and Comprehensive Evaluations
	Juvenile Dam Survival Standards (96 percent average for spring migrants and 93 percent average for summer migrants)	Juvenile Passage Monitoring and Dam Survival Modeling	Comprehensive Evaluations
Flow, gas, and temperature levels (adjusted to reflect annual and seasonal water conditions)	Juvenile and Adult Hydrosystem Environmental and Physical Configuration Standards	Environmental Monitoring at Mainstem Dams	TMT Annual Water Management Plan Reports
	Adult Hydrosystem Survival (no significant change from current average survival levels)	Adult System Survival Monitoring	Annual Progress Reports and Comprehensive Evaluations
Tributary Habitat			
Percent habitat quality improvement – by population for actions implemented from 2007 through 2017		Intensively Monitored Watersheds, Status Monitoring, and Project-Level Monitoring informs and updates modeling	Comprehensive Evaluations
	Tributary Habitat Action Programmatic Standards (3-year cycle)	Project Implementation and Compliance Monitoring	Annual Progress Reports and Comprehensive Evaluations

Performance Targets	Performance Standards	Monitoring	Reporting
Estuary Habitat			
Percent function improvements for Stream Type and Ocean Type ESUs for actions through 2007 and through 2017		Status Monitoring and Project-Level Monitoring informs and updates modeling	Comprehensive Evaluations
	Estuary Habitat Action Programmatic Standards	Project Implementation and Compliance Modeling	Annual Progress Reports and Comprehensive Evaluations
Hatchery			
Low, Medium or High benefits relative to objectives – by target populating		Status Monitoring and Project-Level Monitoring and updates Lifecycle Modeling	Comprehensive Evaluations
	Hatchery Action Programmatic Standards; site-specific BMPs	Project Implementation and Compliance Monitoring	Annual Progress Reports and Comprehensive Evaluations
Predation			
Percent survival increase for spring and for summer migrants		Predation Action Effectiveness Research and Status Monitoring	Comprehensive Evaluations
		Predation Exploitation rates	Comprehensive Evaluations
	Predation Action Programmatic Standards	Project Implementation and Compliance Monitoring	Annual Progress Reports and Comprehensive Evaluations

2.1.3 Planning and Reporting

The Action Agencies will provide a transparent and regular examination of their performance under the new FCRPS BiOp through implementation and progress reporting, using the milestones identified in Table 2-3.

Table 2-3. Overview of Planning and Reporting Milestones

Year	Implementation Plans	Comprehensive Evaluations	Annual Reports
2009	Dec. 2009 Plan for 2010-2012		Sept. 2009 Report on Jan. 2008-Dec. 2008
2010	-	-	Sept. 2010 Report on Jan. 2009- Dec. 2009
2011	-	-	Sept. 2011 Report on Jan. 2010-Dec. 2010
2012	Dec. 2012 Plan for 2013-2015	June 2012 Report on info. Thru Dec. 2011	-
2013	-	-	Sept. 2013 Report on Jan. 2012-Dec. 2012
2014	-	-	Sept. 2014 Report on Jan. 2013-Dec. 2013
2015	Dec. 2015 Plan for 2016-2018	June 2015 Report on info. Thru Dec. 2014	-
2016	-	-	Sept. 2016 Report on Jan. 2015-Dec. 2015
2017	-	-	Sept. 2017 Report on Jan. 2016-Dec. 2016

2.1.3.1 Implementation Plans

Adaptive Management Action 1- Implementation Plans

The Corps, BPA, and Reclamation will submit to NMFS Action Implementation Plans by the end of December 2009, December 2012, and December 2015 that detail commitments to implement RPA actions during the subsequent 2-3 years. Specifically, the Action Implementation Plans will describe the tributary and estuary habitat actions that will be funded during the 2010 to 2012, 2013 to 2015, and 2016 to 2017 periods. The Action Implementation Plans will also detail any changes in Proposed RPA Actions for hydro, predation management, hatchery, or RM&E from the actions described in the BA for each time period. This information will assist NMFS in determining if the Proposed RPA is being implemented as identified in this BA or, conversely, if re-initiation triggers defined in 50 CFR 402.16 have been exceeded.

For the Proposed RPA, the Action Agencies have identified specific details for the first 3 years of the BiOp term (2007 to 2009). This specific information represents the initial 3-year implementation plan for the new BiOp. BPA will maintain a BiOp database to provide project- and action-level detail for planning and reporting purposes. This information will be updated and summarized in subsequent 3-year implementation plans to be submitted to NMFS in December 2009 for Fiscal Year (FY) 2010 to 2012 (i.e. October 2010 to September 2012), December 2012 for FY 2013 to 2015, and December 2015 for FY 2016 to 2017 during the life of the BiOp. The December submittal will allow for regional discussion of the results of the comprehensive evaluations provided in June of that year.

The Action Agencies will coordinate implementation plan with other appropriate regional processes. This includes coordination related to statutory provisions for the Federal government [BPA/Northwest Power and Conservation Council (Council)], voluntary coordination among Federal agencies (Federal Caucus), and coordination with regional processes for Federal/non-Federal engagement [Technical Management Team (TMT), System Configuration Team (SCT), Pacific Northwest Aquatic Monitoring Partnership (PNAMP), Northwest Environmental Data (NED) network, and others]. The collaboration described in the Oversight section (see Section 2.1.4.3) is intended to support continued interaction among the sovereigns regarding the effectiveness of the Proposed RPA and the need to alter or adjust actions in response to documented successes or failures.

2.1.3.2 Annual Progress Reporting

Adaptive Management Action 2- Annual Progress Reports

The Corps, BPA, and Reclamation will submit to NMFS Annual Progress Reports in September of all years except 2012, and 2015. The reports will cover operations for the previous calendar year. These Annual RPA Progress reports will describe the status of implementing all actions as of the end of the previous calendar year. For example, the 2009 RPA Progress report will describe the status of RPA Actions through December 2008. In addition to RPA Action implementation status, the Annual RPA Progress Reports will describe the status of physical or biological metrics monitoring (as described in the RM&E). This information will assist NMFS in determining if the RPA is being implemented as anticipated in this BA or, conversely, if re-initiation triggers defined in 50 CFR 402.16 have been exceeded.

As noted previously, the Action Agencies will monitor implementation and compliance, or programmatic performance, for all of the identified action commitments in the Proposed RPA and as further defined by Implementation Plans in 2009, 2012, and 2015. In addition, the Action Agencies will track biological and environmental performance metrics such as juvenile and adult hydrosystem passage through monitoring and annual reports of hydrosystem survival conditions, and performance metrics for non-hydrosystem actions. Finally, to provide context for the performance in aggregate with others' actions, the Action Agencies will report on adult

abundance for listed ESUs using available information. The results of the progress reports will inform adjustments in future year actions through adaptive management.

The Action Agencies will prepare annual progress reports and provide them to the RIOG. The annual reports will document progress on specific performance standards. For example, some types of actions specify anticipated dates for implementation (e.g., for installation of RSWs). The Action Agencies consider project milestones as benchmarks for implementation. Annual reports will identify the status of achievement of these benchmarks.

The Annual Progress Reports will describe the progress on implementation of all of the Actions in the Proposed RPA, the status and results of the RM&E on juvenile and adult survival improvements, and adjustments made on specific actions through the Regional Forum within the reporting year. The Annual Progress Reports are not intended to assess the overall re-assessment of the Proposed RPA to compare with the estimated survival improvements included in the Comprehensive Analysis. This overall analysis is addressed in the following Comprehensive Evaluations.

2.1.3.3 Comprehensive Evaluations

Adaptive Management Action 3- Comprehensive RPA Evaluations

The Corps, BPA, and Reclamation will submit to NMFS Comprehensive Evaluations of multi-year implementation activities by the end of June 2012, and June 2015. The Comprehensive Evaluations will review all implementation activities through the end of the previous calendar year (as would be covered in the Annual Progress Report) and compares them to scheduled completion dates as identified in the BA or modified in the Implementation Plans in 2009, 2012, and 2015. The Comprehensive Evaluations will also describe the status of the physical and biological factors identified in this BA, and compare these with the expectations in the survival improvements identified in the Comprehensive Analysis. The Comprehensive Evaluation will include a discussion of Action Agencies plan to address any shortcomings of current estimated survival improvements as compared to the original survival estimates identified in the Comprehensive Analysis referenced in this BA. This information will assist NMFS in determining if the RPA is being implemented as anticipated in this BA or, conversely, if re-initiation triggers defined in 50 CFR 402.16 have been exceeded.

Comprehensive Evaluations are a tool to ensure that the Action Agencies and regional parties step back and take a comprehensive and cumulative check on implementation of FCRPS actions. This allows the opportunity to both build on successes and make mid-course corrections where necessary. Comprehensive Evaluations are also a juncture to examine the broader context of recovery, looking at the status of listed fish, actions by others across the salmon lifecycle, and environmental or other changes.

The Action Agencies will prepare Comprehensive Evaluations in 2012 and 2015. The evaluations will include a cumulative review of both progress in implementation and updated information on ESU status and trends by the NMFS BRT (now scheduled for 2009 and 2012).

The evaluations will describe progress on programmatic (compliance) standards to determine whether the cumulative implemented actions remain consistent with the objectives identified for the new BiOp and an assessment of progress toward biological/environmental performance standards and targets.

Regarding programmatic standards, the evaluations will summarize the cumulative accomplishments; and propose corrective actions where the Proposed RPA may be off track programmaticaly.

Regarding biological performance standards and targets, progress toward the performance standards and targets for hydro, habitat, hatcheries and predation management will be reported on in the Comprehensive Evaluations, and used to inform adaptive management decisions. This report will also address any significant new information from RM&E results.

The results of the evaluations will be used to guide adaptive management of the Proposed RPA and to ensure that Action Agencies are making adequate progress on achieving the strategies and performance standards, as well as to inform the 2012 to 2015 implementation plan. If it is determined that course changes are necessary in order to achieve expected performance, the Action Agencies will discuss those changes with NMFS and the Collaboration parties prior to implementation.

Coordination with the RIOG in connection with the Comprehensive Evaluations will include consideration of adaptive management and contingencies (described in more detail below). The RIOG may utilize a diagnostic performance framework described in Figure 2-2 to assess FCRPS and broader regional progress for listed fish.

2.1.3.4 Reporting Clear Signals for Adaptive Management

As part of the 2012 and 2015 Comprehensive Evaluations, the Action Agencies will use the following Green-Yellow-Red signals to gauge their success, challenges, and failures:

Green—Standard Met or Exceeded: If performance tracking shows that compliance or performance standards for a particular strategy have been met, the strategy will be maintained. If performance tracking shows that compliance or anticipated performance standards for a particular strategy has been exceeded, the strategies may also be adjusted.

Yellow—Obstacles or Delays in Meeting Standards: If performance tracking shows that issues are hindering or delaying achievement of performance standards, modifications of approach or schedule may be necessary to get back on track.

Red—Compliance/Standard Not Met: If performance tracking shows a failure to achieve compliance or performance standards for a particular strategy, a response will be necessary. This response may involve modification of the specific strategy not meeting expectations, or implementation of other cost-effective strategies. Depending on degree, more aggressive contingencies might be pursued. In the alternative, re-consultation might be necessary.

Red and yellow signals will be discussed with the RIOG.

2.1.4 Contingencies

Contingencies are alternative actions, plans, or approaches for addressing failure to meet performance standards, in other words a “Red” signal as described above.

2.1.4.1 Specific Contingencies

The Action Agencies have committed to explore specific contingencies they have been able to identify through coordination with States and Tribes, in advance of knowing whether they will actually need to be deployed:

- For dam modifications, COPs include specific Phase 2 actions to be pursued in the event initial actions do not achieve performance standards for juvenile dam passage (see Appendix B.2.1).
- For Snake River Sockeye Salmon safety-net production, the Action Agencies are investigating alternatives to the current expansion program, including lower river production and Wallowa Lake production, in the event that the expansion effort is not successful.
- For tributary and estuary habitat, the failure of an individual project to be implemented would lead to a replacement project of equal or greater biological value being implemented.

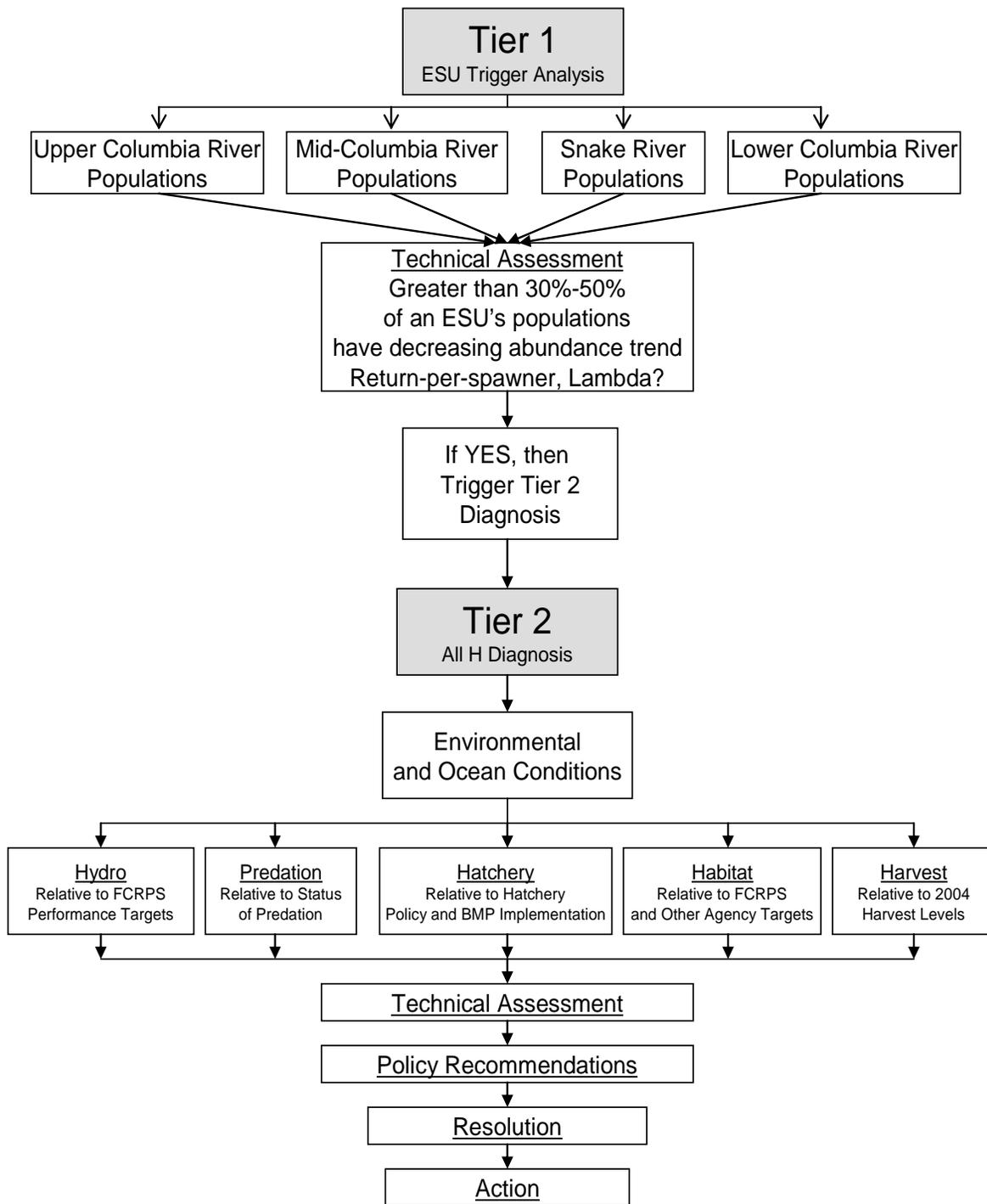


Figure 2-2. Performance Diagnosis Framework

Other Contingencies

The Action Agencies acknowledge the need to consider other contingencies in the event that actions under this new BiOp do not prove successful, even after adaptive management. As a result, the Action Agencies commit to the following approach in coordination with States and Tribes:

- In the course of the 2012 and the 2015 Comprehensive Evaluations, the Action Agencies will include the All-H diagnosis described in Figure 2-2.
- Tier 1 of this approach includes consideration of the status of abundance, trends, and productivity of the ESUs. Tier 2 includes consideration of whether the actions of the FCRPS are on track to meet All-H specific performance targets by 2017, as well as progress through broader regional actions.

Contingencies under this section may be advisable if ESA-listed fish are not making expected progress toward recovery goals and the All-H diagnosis confirms that the FCRPS is a significant factor.

Based on this review, the Action Agencies will coordinate with States and Tribes using the RIOG process to identify, evaluate, and develop proposed schedules for contingent actions to be implemented after 2017. Contingent actions will:

- Address the appropriate limiting factors identified in the All-H diagnostic analysis with a high likelihood of enhancing fish survival;
- Consider both biological effectiveness and cost effectiveness; and
- Ensure the RIOG consideration is guided by the All-H diagnosis process presented in Figure 2-2.

Once contingencies are identified, the Action Agencies will evaluate them for biological, economic, technical, and institutional feasibility. If feasible, the Action Agencies will proceed with pre-planning, design, and funding/authorization as appropriate, so that the actions can be implemented on schedule.

2.1.4.3 Collaboration & Oversight of Implementation

The Federal agencies, States, and Tribes would like to continue to collaborate and oversee implementation of recovery actions across the salmon and steelhead lifecycle. Acknowledging the value gained from the Remand Collaboration Policy Work Group, the Action Agencies will support a RIOG to oversee the implementation of the FCRPS BiOp, in aggregate with the conservation and recovery actions of others.

Like the Policy Work Group, the Action Agencies recommend that the RIOG consist of senior policy representatives, representing Federal, State, and Tribal sovereigns, appointed by:

- Federal executives to represent the following Federal agencies: NMFS, BPA, Reclamation, the Corps, and the U.S. Fish and Wildlife Service (USFWS);
- The Governors representing the States of Montana, Idaho, Washington, and Oregon; and
- Tribal governments appointed by Tribal councils.

A memorandum of agreement (MOA) to memorialize the RIOG would be desirable to provide operating principles and protocols. The RIOG may form subcommittees to oversee the hydrosystem and predation management, estuary and tributary habitat, hatchery, harvest, and RM&E.

Responsibilities of the RIOG would include:

- Review implementation of FCRPS ESA actions and results;
- Review implementation of lifecycle recovery actions by others, including States and Tribes;
- Discuss and attempt to resolve salmon and steelhead issues in ways that minimize or result in no adverse impact on other Columbia River Basin fish and wildlife;
- Clarify, address, and narrow policy issues and differences relating to implementation;
- Promote coordinated funding and partnerships;
- Emphasize “on-the ground” actions that meet or exceed legal requirements and provide accountability for results in a biologically effective and cost-efficient manner;
- Coordinate regarding the annual and comprehensive progress reports prepared by the Action Agencies, including adaptive management decisions and consideration of contingencies;
- Hold an annual meeting to review how well actions by the FCRPS and others have been implemented and the success in meeting the appropriate performance standards; and
- Coordinate implementation and oversight of the Proposed RPA with other regional processes [e.g., Council; Regional Forum; *U.S. v. Oregon*; NMFS recovery process] to minimize duplication and promote efficiencies).

In year 10 (2017), the RIOG will consider the effectiveness of the BiOp. It will also consider whether a new RPA is desirable, or whether an extension of the current Proposed RPA/BiOp

would be appropriate, taking into account that biological benefits of FCRPS actions from 2007 to 2017 will continue to be expressed in adult returns and other measures in the next decade.

Appendix 3: Estuary MOA with the State of Washington

Through funds provided by BPA, Washington Department of Fish and Wildlife (WDFW) will be a cost-sharing partner with the Corps under its Section 536 authority to implement ecosystem restoration projects that support salmonids. This new partnership will produce major projects to be implemented in the out-years between 2013 and 2017; however, some of these projects will likely be implemented in the 2010 – 2012 timeframe.

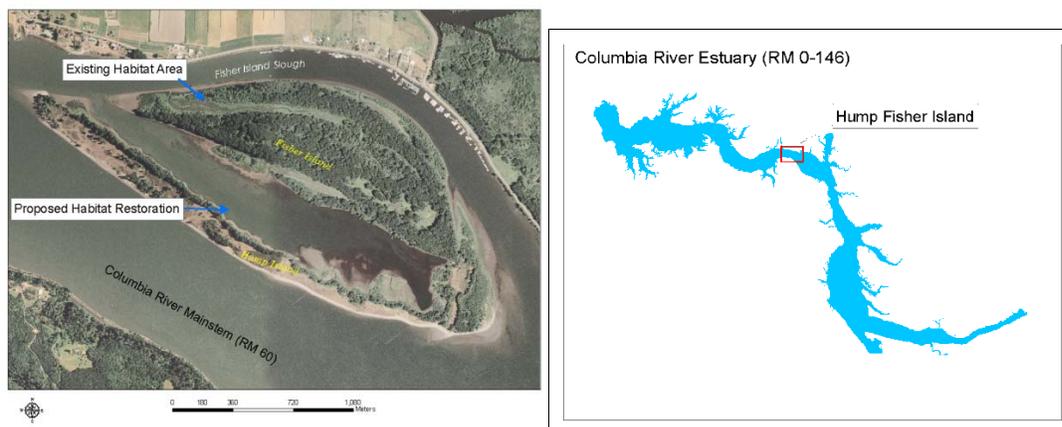
Project Selection & Benefits

In identifying the projects for inclusion in the Estuary MOA, the WDFW identified a suite of potential projects, which were later refined to the 21 listed in Attachment 1: Estuary MOA Projects. Projects were then evaluated based upon a scoring process that was consistent with the method used in the 2008 FCRPS BiOp.

A potential benefit score was assigned by WDFW for each of the 21 projects. The scores ranged from a high of 5 and a low of 2. The average potential benefit score for the projects was between 3 and 4 points.

The Hump - Fisher Island Restoration is an example of project that was evaluated before inclusion in the Estuary MOA. The 337 acre site is located in the mainstem downstream of Longview. Hump – Fisher Island is co-owned by the WDFW and the Department of Natural Resources. The site contains important juvenile salmonid rearing habitat in a complex of channels and mosaic of tidal and upland wetlands adjacent to Fisher Slough (see Figure 1 existing habitat arrow). The proposed project at Hump – Fisher Island is to enhance the existing embayment wetlands to improve hydrology and tidal and upland wetland habitat complexity within and around the existing embayment.

Figure 1: Hump – Fisher Island Restoration, Columbia River Estuary



The Hump – Fisher Restoration project concept was developed by the WDFW and the Army Corps of Engineers – Portland District. Hump – Fisher received a high score (4) for certainty of success and a very high score (5) for potential benefit.

Attachment 1: Estuary Habitat WA MOA projects

Project	Description
Abernathy Tidal Restoration	IMW Treatment Plan identifies two projects in the tidal reaches of Abernathy Cr (1A and 2A). The projects would enhance 500' of off channel habitat and 2200' of mainstem through ELJ, LWD riparian enhancement and floodplain reconnection. Conceptual designs have been completed for these projects.
Fisher - Hump Island Restoration	Modify dredged materials to improve flushing flows within the Hump - Fisher Island embayment; plant additional riparian vegetation (Hump Island); revegetate meadow on Fish Island (5-10 acres); remove piling/add LWD.
Cottonwood/Howard Island Tidal Channel Connection	Reconnect and construct backwater channels.
Lower Kalama Tidal Restoration	LCFEG recently completed a Lower Kalama Offchannel Habitat Assessment that identified five projects in the tidal reaches of the Kalama. Three of these scored in the fundable range when subjected to the LCFRB criteria (KRL 0.1, KRR 0.7, and KRL 1.4). These projects would create or enhance existing off-channel habitat. Conceptual designs and cost estimates have been completed for KRR 0.7.
Acquisition of Chaney Parcel at Wood's Landing and Restoration of Chum Salmon Spawning Tributary	Acquire 2.29 acre property located within the Wood's Landing Columbia River chum salmon spawning site. It has old growth cedar forest and has a segment of an essential habitat, Erskine's Creek, that supports the chum spawning springs to the east - in front of a parcel currently owned by Columbia Land Trust. The parcel is crucial both for its microclimate/hydrological support for the habitat as a whole, but also for its stream segment and riparian values. This parcel contains the last unprotected habitat for the genetically distinct "I-205 population" of chum salmon. If protected, restoration efforts could bring salmon back up Erskine's Creek, where they historically spawned. Site also has Native American cultural values and functioning riverine wildlife community.
Post Office Lake	This project will restore hydrologic connection from the Post Office Lake floodplain wetland with the estuary while protecting privately owned farmland. The objective is to re-establish access and improve wetland function to approximately 80 acres of shallow water habitat for juvenile salmonids.
Germany Tidal Restoration	IMW Treatment Plan identifies two projects in the tidal reaches of Germany Cr (2A, 2B, 2C). The projects would enhance 600' of mainstem habitat, stabilize 350' of eroding bank, and enhance 7 acres of riparian area. Conceptual designs have been completed for these projects.

Project	Description
Paradise Point Wetland Enhancement	Restore and enhance approximately 1000 lineal feet of side channel habitats within a tidally influenced forested/emergent/scrub-shrub wetland complex; construct mainstem LWD structures juvenile rearing and adult holding habitat during low tributary flows, low Columbia River flows, and periods of low tide.
Austin Point LWD Complexing	Restore riparian habitat and construct ELJs on the right bank of the North Fork Lewis River at the confluence with the Columbia River, to provide instream cover and complexity, and cold-water refuge for outmigrating salmonids.
Elochoman Tidal Restoration	CLT was funded to purchase 200 acres of high quality intertidal forested riparian and wetland habitat along the Elochoman River and Elochoman Slough. The property is adjacent to the JBH Refuge and 210 acres already owned by CLT on Nelson Creek. The property includes over 7000' of off channel habitat. Potential restoration activities on the property include culvert removal, tidegate removal, road abandonment, invasive treatment, and riparian enhancement.
Willow Grove Tidal Restoration	CLT has recently purchased over 200 acres of intertidal wetland and off-channel habitat along the Columbia River and Coal Creek. Potential restoration activities include restoration of native wetland communities, invasive control, and enhancing the hydrologic connection of the site to the mainstem, possibly via Fisher slough.
Shillapoo Wildlife Area Floodplain Reconnection	Investigate the potential for providing fish passage to re-connect historical floodplain wetland habitats at Shillapoo Wildlife Area. Restoration actions will focus on restoring hydrology to existing water bodies, providing physical access for juvenile salmonids, reducing elevated water temperatures, and managing piscivorous fish species. Project requires further scoping prior to assessing survival units.
Duncan Creek Fish Passage Restoration	Modify existing dam and outlet structure and construct backwater elevation control berm/roughened channel to improve steelhead, coho and chum passage during Columbia River low flow periods.
Lower Washougal Delta Habitat Complexing	Construct ELJs on the Lower Washougal river delta at the Columbia River confluence to provide instream cover and complexity, and cold-water refuge for outmigrating juvenile salmonids and migrating adults.
Lower Kalama Delta Habitat Complexing	Construct ELJs on the Lower Kalama river delta at the Columbia River confluence to provide instream cover, complexity and holding; coldwater refuge for outmigrating juvenile salmonids and migrating adults; and to reduce predation by pinnipeds during low flow conditions.
Chinook River Estuary Restoration	Project would include additional acquisition of estuarine wetland contiguous with previous acquisitions. The project would re-establish the hydrologic link between the river channel and the floodplain over the entire acquisition area, including the removal of tidegates at the mouth of the Chinook, and setback levee construction.

Project	Description
Lower Cowlitz Tidal Restoration	<p>The Lower Cowlitz River and Floodplain Habitat Restoration Project Siting and Design report identifies 6 potential projects in the tidal reaches of the Lower Cowlitz and Coweeman Rivers (1 0L 0 5R C3 5R C4 0B 3 0L 4 5R). These projects include removal of dredge material, riparian enhancement, side channel creation and/or enhancement, riprap removal, and LWD placement. (Note: when scored by LCFRB, these projects did not all fall within the fundable range, but out-of-basin/estuary benefits were not included at that time).</p>
Coweeman River Tidal Restoration	<p>The Lower Cowlitz River and Floodplain Habitat Restoration Project Siting and Design report identifies 6 potential projects in the tidal reaches of the Lower Cowlitz and Coweeman Rivers (1.0L, 0.5R, C3.5R, C4.0B, 3.0L, 4.5R). These projects include removal of dredged material, riparian enhancement, side channel creation and/or enhancement, riprap removal, and LWD placement.</p>
Lewis River Restoration	<p>A large parcel of land on the lower Lewis River will be purchased by Clark County in 2010. This property has potential for future side channel and floodplain reconnection.</p>
Port of Kalama Offchannel Wetland Enhancement	<p>Restore and enhance tidal slough channel habitats at the Port of Kalama's Northport mitigation site; remove or modify pile structures.</p>
Barlowe Point Beach Nourishment	<p>Contour beach profile through beach nourishment to reduce fish stranding (Note: should be associated with subsequent effectiveness monitoring).</p>