

Rapid Response and Long-Term Contingency Plan

For the FCRPS Adaptive Management Implementation Plan

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Bonneville Power Administration
U.S. Bureau of Reclamation
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1. Introduction/Background

This Rapid Response and Long-Term Contingency Plan describes actions, both Rapid Response (RR) and Long-Term Contingency (LTC), which may be taken to minimize or mitigate for a significant decline¹ in abundance of an Interior Columbia ESA-listed Chinook salmon or steelhead species. These listed species include Snake River spring/summer Chinook, Snake River fall Chinook, Snake River steelhead, Upper Columbia River spring Chinook, Upper Columbia River steelhead, and Mid-Columbia River steelhead.² The plan supports contingency planning for the Federal Columbia River Power System (FCRPS) Adaptive Management Implementation Plan (AMIP). The FCRPS AMIP can be found at http://www.salmonrecovery.gov/Files/BiologicalOpinions/AMIP_09%2010%2009.pdf. The two types of actions are described briefly below:

Rapid Response Actions

These actions can be implemented relatively quickly, within 1-12 months, and will provide immediate survival benefits; to the extent feasible, actions will be implemented no later than the next juvenile/adult migration season. The goal of these action(s) is to stop the decline as soon as possible and increase returns of ESU/DPS adults above the abundance level that initiated the trigger. Thus, actions that increase survival of the next season's returning adults are a priority. They include mitigation actions that will immediately enhance survival of the target ESU or DPS—regardless of whether there are negative effects on other ESU/DPS fish—and for which the needed regulatory process is largely in place. Most, if not all, rapid response actions are expected to be temporary in nature. Since the BiOp's RPA is both aggressive and comprehensive, there are limited options for rapid response actions and their survival benefits may be modest. Within 90 days following NOAA Fisheries determination that a significant decline trigger has been tripped, actions for implementation will be selected based on the best available information at the time.

Long-Term Contingency Actions

Unlike rapid response actions, each long-term contingency action has a unique timeline for implementation depending on its complexity. Long-term contingency actions are expected to take more than 12 months to implement. In the selection of long-term contingency actions for a particular species, emphasis will be on actions that will significantly improve the survival of the species experiencing the significant decline.

This consolidated plan describes potential rapid response and long-term contingency actions in five areas: hydro operations, predator control, harvest, hatchery programs, and review of the feasibility of additional long-term contingency actions specified in the AMIP (e.g. reintroduction). The plan also describes the processes that will be used to select specific actions to stop the decline of a targeted ESU. Any actions taken under this plan will necessarily comply with any applicable statutes, regulations, court orders or other binding conventions.

¹ For a detailed description of Significant Decline Triggers, refer to Appendix 4 of the AMIP; see also pages 3 and 4 of this document.

² Snake River Sockeye are also ESA-listed, but are not subject to the Significant Decline Trigger because they are currently being propagated in a hatchery safety net program that is being significantly expanded under the 2008/10 BiOp RPA.

This plan provides a menu of potential actions that may be implemented in response to a significant decline trigger being tripped for an affected ESU/DPS; however, it is not expected that all actions would be implemented with the determination of significant decline for a particular ESU. Rather, the Action Agencies, in collaboration with NOAA Fisheries, the Regional Implementation Oversight Group (RIOG), and other regional partners and forums as appropriate (e.g. *U.S. v. Oregon*),² would review and select specific actions most suitable to the targeted ESU, while considering the implications of implementation for other ESUs and on the other authorized FCRPS project purposes. Once implemented, the actions will be reviewed periodically to determine whether they remain necessary and, if so, whether alternative actions might be more beneficial.

The plan contains seven chapters: Chapter 1 summarizes the plan's role in contingency planning for the AMIP and its relationship to the 2008 FCRPS Biological Opinion. It also describes the process leading to the initiation of a rapid response or long-term contingency plan. Chapters 2-6 describe potential rapid response and long-term contingency actions with milestones in each of five areas: Hydro (Chapter 2), Predator Control (Chapter 3), Harvest (Chapter 4), Hatchery Programs (Chapter 5), and Additional Long-Term Contingency Actions (Chapter 6). Chapter 7 summarizes the types of actions for each ESU.

1.1 Summary of Role in Adaptive Management

The 2008/2010 FCRPS Biological Opinion (BiOp), and its associated Reasonable and Prudent Alternative (RPA), describe a number of actions to improve fish survival at the federal dams operated by the Action Agencies³ through 2018 for multiple purposes. The dams are configured and operated under the RPA to meet objective performance standards for fish passage survival. Their management is subject to modification in response to new fish survival information. In addition, the RPA requires mitigation actions that will benefit all ESA-listed salmonid species adversely affected by the FCRPS. These actions aim to improve hydro operations, reduce fish and bird predation, and use hatcheries to help protect wild stocks.

As directed by the BiOp, the Action Agencies and NOAA Fisheries are managing the RPA actions adaptively to insure they incorporate the best available science and are informed by the current status of listed salmonids. These programs are informed by ongoing research, monitoring and evaluation about the status of the listed species and the efficacy of the RPA. The agencies are using adaptive management to incorporate results of new research and other scientific information on fish survival. The adaptive management approach in the BiOp increases accountability for results through specific hydro and habitat performance standards, an extensive research and monitoring program to evaluate progress toward those standards, a transparent process for annual progress reporting to the region, and involvement of the sovereigns' RIOG. The adaptive management approach also includes a contingency planning process to address the possibility of a significant decline in the abundance of listed fish that is outside the range of annual variation considered in the 2008 and 2010 BiOp analyses. The contingency plan includes biological triggers at the species level and an "All-H Diagnosis" that will be used to determine factors causing the decline and identify appropriate actions.

³ The Action Agencies are the U.S. Army Corps of Engineers (Corps), the Bureau of Reclamation (Reclamation), the federal dam operators, and the Bonneville Power Administration (BPA), which markets and transmits the power generated at these dams.

Adaptive Management Implementation Plan

The Adaptive Management Implementation Plan (AMIP) was developed in 2009 to ensure that the 2008 RPA would be implemented using the best science available at that time. As part of this more precautionary approach to implementation of the RPA, the AMIP enhances the contingency planning process, providing additional early warning indicators and significant decline triggers, which if tripped, alert the federal agencies that further action may be needed to avoid a species decline. It describes an aggressive program to develop and implement contingency actions if the biological indicators reach pre-defined warning levels. In addition, because the strategy relies on the best available science, the AMIP enhances salmonid research, monitoring and evaluation (RM&E) so that more information is available to evaluate the status of each Evolutionarily Significant Unit or Distinct Population Segment (ESU or DPS, or collectively, species), and to inform the choice of actions in the case of a significant decline. Appendix 1 provides a description of the 2010 adaptive management framework.

The expanded contingency process establishes an annual review by NOAA Fisheries and the Action Agencies to evaluate two biological indicators of species decline, the Early Warning Indicator and the Significant Decline Trigger. These two indicators are described briefly below. Appendix 4 of the AMIP discusses the development concepts for the Significant Decline Triggers and Early Warning Indicators.

Early Warning Indicator

The Early Warning Indicator alerts NOAA Fisheries and the Action Agencies to a decline in a species' natural adult abundance level that warrants further scrutiny. This indicator is a combination of five-year abundance trends and rolling four-year averages of abundance, and is based on historic data. The levels were set based on values during the most recent 20-30 years of data, depending on the species. The Early Warning Indicator would be tripped if the running four-year mean of adult abundance dropped below the 20th percentile *OR* if the trend metric dropped below the 10th percentile and the abundance metric was below the 50th percentile. Tripping this indicator results in an assessment of whether a future significant decline is likely to occur in the next two years and if so, which rapid response actions should be readied for possible implementation.

Significant Decline Trigger

The Significant Decline Trigger detects notable declines in the abundance of listed species. This trigger is also a combination of five-year abundance trends and rolling four-year averages of abundance. The levels were set based on the same set of historic values used for the Early Warning Indicator. The Significant Decline Trigger would be tripped if the abundance metric dropped below the 10th percentile *OR* the trend metric dropped below the 10th percentile and the abundance metric was below the 20th percentile. The trigger, if tripped, results in the implementation of rapid response actions to minimize or mitigate for an unforeseen downturn. The principle underlying the Significant Decline Trigger is that the conditions represented by this trigger would be significant deviations from the biological expectations in the BiOp and, if they were to persist despite the AMIP's contingency actions, could result in a re-initiation of consultation. Figure 1 provides a graphic illustration of these indicators.

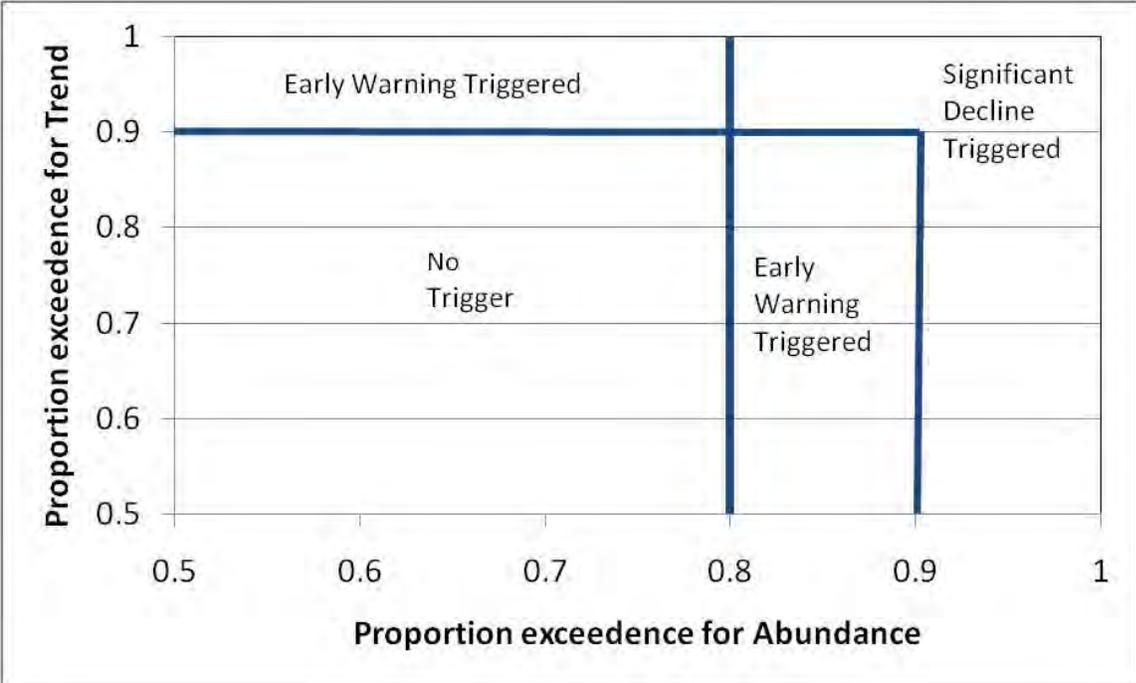


Figure 1. Example of Significant Decline and Early Warning Indicators based on combinations of 4-year running averages of abundance and a trend metric, such as 4-year geometric means of trend (From AMIP Appendix 4).

Table 1 summarizes the values used for trend and abundance triggers. As noted previously, abundance values are rolling four-year averages of adult abundance. Trend values are the slope of the regression of log-transformed spawner counts against time over a five-year period. Abundance values are rounded to the nearest 25 fish. Development of the most recent Significant Decline Trigger was completed in December 2010; development of an additional Early Warning Indicator is ongoing.

Table 1. Summary of Interim Species-Specific Significant Decline Trigger and Early Warning Indicator Metrics (Average 4-year Abundance of Naturally Produced Adults).

Species	90th Percentile Exceedence Abundance	80th Percentile Exceedence Abundance	50th Percentile Exceedence Abundance	90th Percentile Exceedence Trend
SR fall Chinook	350	400	525	-0.113
SR spring/summer Chinook	4,850	7,575	9,650	-0.366
UCR spring Chinook	450	1,125	2,400	-0.375
SR Steelhead	8,075	10,325	17,950	-0.239
UCR steelhead	975	1,100	2,175	-0.154
MCR steelhead (Yakima R.)	775	975	1,200	-0.314

Figure 2 shows the steps identified in the AMIP’s Adaptive Management and Contingency Process to determine if a significant decline in natural species abundance has occurred and if it is of sufficient magnitude to warrant a rapid response. The review includes evaluations of productivity, biological, and environmental metrics (shown in Figure 2, Box 6) that indicate triggers have been tripped. Boxes 6, 7 and 8 in Figure 2 identify potential triggering circumstances.

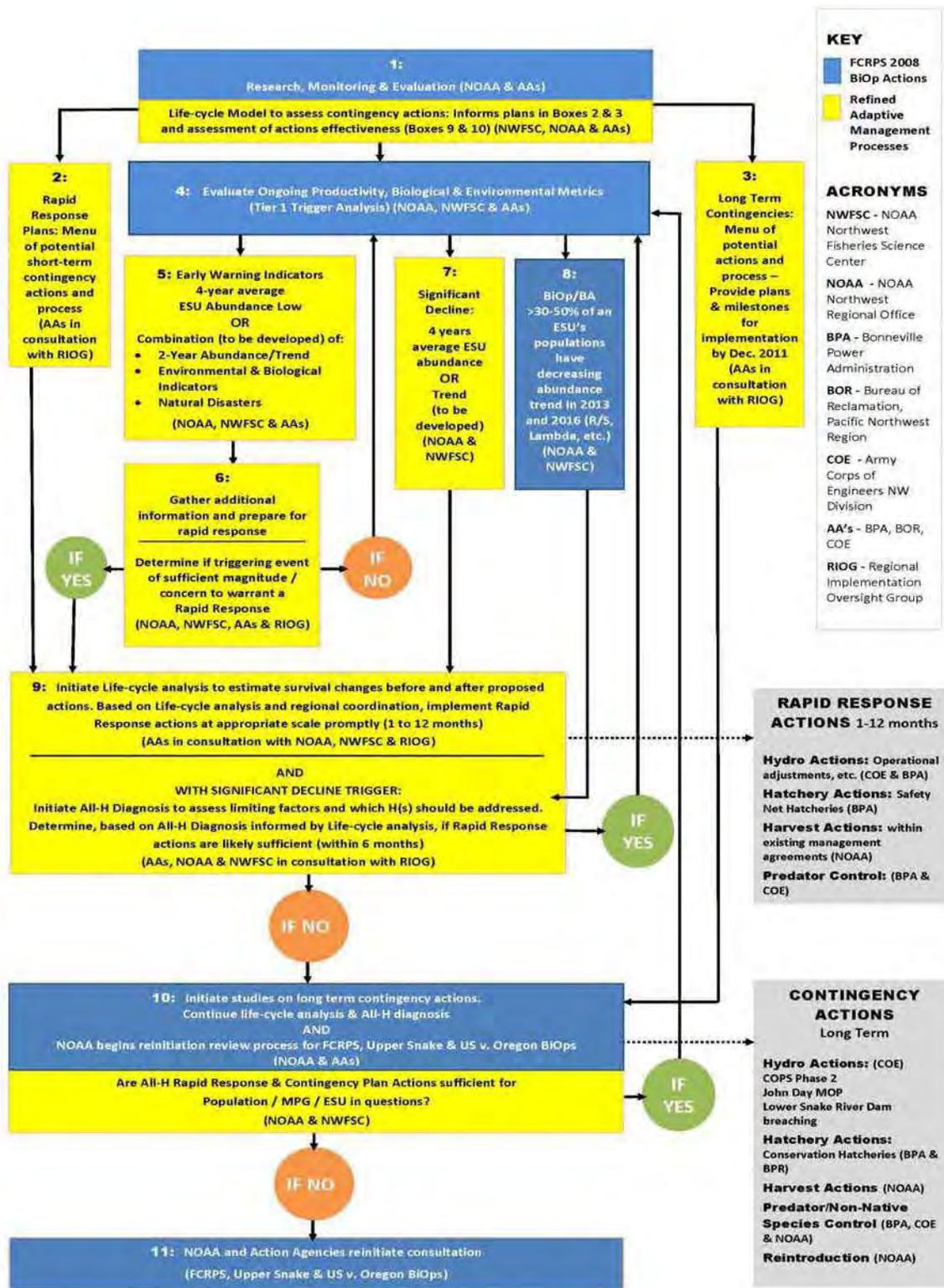


Figure 2. Adaptive Management Plan and Contingency Process. Process shows steps to evaluate a significant decline (Figure 2 of the AMIP).

1.2 Decision Framework to Implement Rapid Response and Long-Term Contingency Actions

If the Significant Decline Trigger is tripped, the Action Agencies (in coordination with NOAA Fisheries, the RIOG and other regional parties) will implement rapid response and, if needed, long-term contingency actions to minimize and mitigate for the decline. There are four decision points in this process: 1) the Significant Decline Trigger tripping; 2) identification of appropriate rapid response actions; 3) evaluation of the sufficiency of those actions; and 4) determination of appropriate long-term contingency actions, if needed.

Annually, NOAA Fisheries and the Action Agencies will review current information to evaluate whether a Significant Decline Trigger has been tripped. Once NOAA Fisheries has determined that the Significant Decline Trigger has been tripped, the agencies have up to 90 days to determine, in consultation with RIOG, what factors or conditions may have caused the trigger to trip and assess which rapid response action or actions may be effective in minimizing or mitigating for the decline. This assessment will consider all potential actions-- hydro, predation, harvest, and hatchery that may effectively address the decline (see Figure 3). The rapid response action development process includes the following steps:

Annual Significant Decline Trigger (SDT) Review

- I. Review Significant Decline Trigger information (*NOAA*).
 - a. Determine affected ESU(s).
 - b. Determine conditions and projects that impact affected ESU(s).

SDT Determination –

- I. Convene All-H group to assess H-specific focus areas (Harvest, Hydro, Predation and Hatchery) for ESU(s) of concern (*AAs with NOAA*).
 - a. Identify H-specific areas for Rapid Response action development.
 - b. Task appropriate H-teams to make recommendations for action implementation.

SDT Determination –

- I. Propose Rapid Response Action, considering All-Hs (*AAs and NOAA*).
 - a. Internal Policy/Legal review.
 - b. Accord Partner review and *U.S v. Oregon* coordination.
 - c. Finalize draft Rapid Response Action Plan for RIOG review.
 - i. Consider RIOG comments on draft.
 - ii. Revise draft plan if necessary.
- II. Implement Rapid Response Action Plan (*AAs and NOAA*).

The agencies are to implement the responsive actions as soon as possible after a decision is made and no later than 12 months after NOAA Fisheries has made its determination of Significant Decline Trigger. Most, if not all, rapid response actions will be temporary in nature.

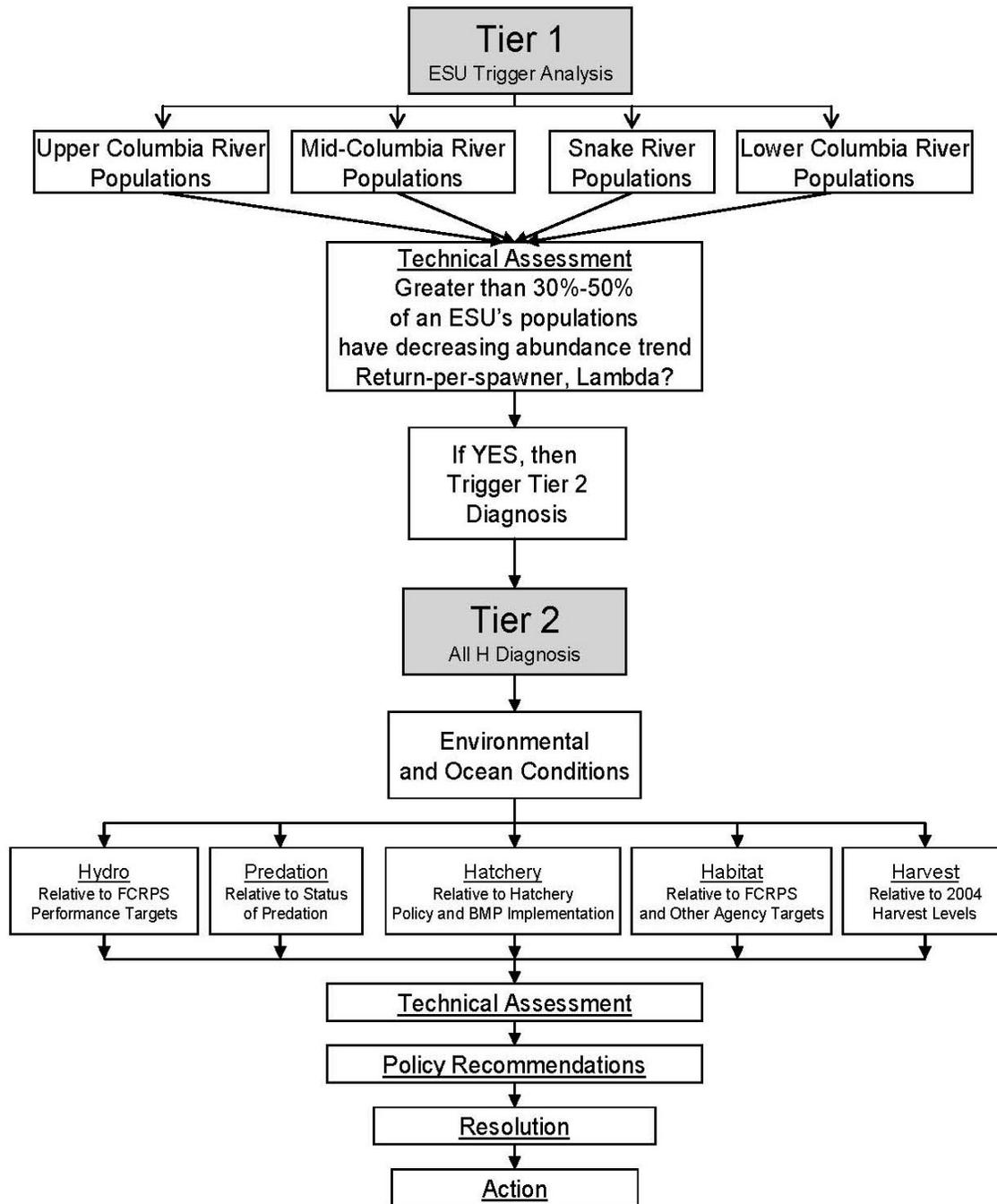


Figure 3. Performance Diagnosis Framework (Figure 2.2 of the AMIP).

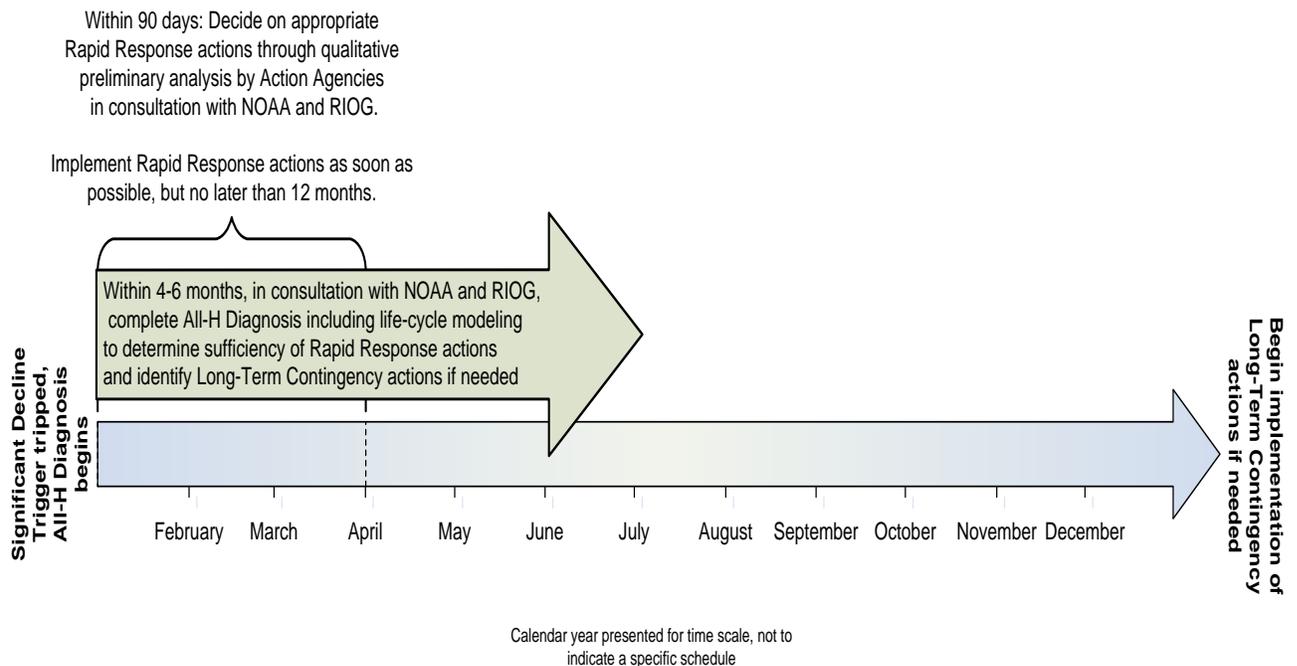


Figure 4. Timeline for Decision Framework to Implement Rapid Response and Long-Term Contingency Actions.

All-H Diagnosis

The Action Agencies will conduct an initial qualitative All-H analysis informed by data provided by NOAA Fisheries and any other available scientific information on the likely factors that caused the Significant Decline trigger to trip. This initial analysis will be used to inform a proposed list of rapid response actions. Concurrent with the initiation of efforts to determine what rapid response actions will be taken, the Action Agencies (in coordination with NOAA Fisheries, the RIOG and other regional parties) must also initiate an All-H diagnosis. In the All-H diagnosis (Figure 3, Tier 2), the Action Agencies will: 1) evaluate whether the actions of the FCRPS are on track to meet All-H specific performance targets by 2018; 2) determine the causes of a species decline (including whether ocean and climate conditions are contributing factors); and 3) review life-cycle model results of potential long-term contingency actions and identify which H (hydro, predation, hatchery, habitat, and harvest) limiting factors should be addressed in the contingency actions.

The diagnosis must be completed within four to six months of a Significant Decline Trigger being tripped (see Figure 4, decision timeline). The Action Agencies, in consultation with RIOG, will then use the results of the analysis to determine if the rapid response actions are likely to be sufficient, or if long-term contingency actions will need to be implemented, and if so, which long-term contingency actions will be implemented.

Life Cycle Analysis and Life Cycle Model

The BiOp uses a combination of life cycle modeling and passage modeling (COMPASS) to estimate how changes in life-stage specific survival affect BiOp metrics (productivity, population growth rates, abundance trends and probability of quasi-extinction). A key component of the life cycle analysis is the life cycle model. Information from this model will be used to determine which rapid response and, if necessary, which long-term contingency actions to take and whether or not the actions are proving effective for the ESU/DPS in decline.

The Action Agencies and NOAA Fisheries are jointly funding enhanced, data-driven life cycle modeling for contingencies, augmenting the current BiOp modeling. Based on newly available and emerging data, the existing models will be expanded further to explicitly evaluate a variety of other factors. This augmentation will allow the federal agencies to better evaluate which rapid response and long-term contingency actions should be taken if a trigger is tripped.

The NOAA Science Center is currently enhancing the existing models to address:

1. Climate—Sensitivity of Species
2. Climate—Adaptive Management
3. Hatchery Effects
4. Habitat Actions & Monitoring
5. Spatially Explicit Modeling
6. Inter-species Interactions
7. John Day MOP
8. Dam Breach Module.

The life cycle analysis can be accomplished with existing models, or with newer models as these products are completed. The Action Agencies and NOAA Fisheries will bring draft lifecycle analyses to RIOG for review before choosing rapid response and/or long-term contingency action(s) to implement. In deciding which contingency action(s) to implement, the Action Agencies and NOAA Fisheries will consider regional input, relevant existing information including status and trend data, relevant research and monitoring data, the All-H diagnosis results, and the life cycle analysis results.

Potential Rapid Response and Long-Term Contingency Actions

The following chapters describe the suite of potential rapid response and long-term contingency actions that could be taken if a Significant Decline Trigger is tripped. These actions, developed by the Action Agencies and NOAA Fisheries, in collaboration with RIOG, serve as a menu of potential actions that may address the needs of a specific ESU. The Action Agencies in collaboration with NOAA Fisheries, the RIOG, and other regional partners would review and select specific actions with regard to the targeted ESU, while considering the implications of implementation for other ESUs and on the other authorized FCRPS project purposes.

In addition, once implemented the rapid response and long-term contingency actions will be periodically reviewed in light of new scientific information to determine whether the actions continue to be necessary and if so, whether alternative actions might be more beneficial.

2. Hydro Operations

2.1 Introduction

The Action Agencies are on track to achieve performance standards of 96% per dam passage survival for spring juvenile migrants and 93% per dam passage survival for summer juvenile migrants by 2018, averaged across the Columbia or Snake River dams, as specified in the 2010 Supplemental BiOp. The Supplemental BiOp and its associated RPA are intended to increase juvenile salmonid survival past the FCRPS dams and through the hydro system to meet these performance standards.

Tripping of the Significant Decline Trigger, however, may require the Action Agencies to take steps beyond those needed to achieve the performance standards. Rapid response and long-term contingency actions differ explicitly from BiOp hydrosystem operations and RPA actions in that rapid response action(s) represent a deliberate attempt to increase immediate adult and juvenile hydrosystem survival of the ESU hitting the trigger, even if performance standards are already being met.

The Action Agencies have identified the hydro rapid response action development process described below, that may be implemented if a Significant Decline Trigger is tripped for an ESA-listed Columbia Basin ESU. Rapid response hydro actions must have the potential to improve adult survival and juvenile survival without degrading adult in-river passage conditions.

2.2 Rapid Response Actions for Hydro Operations

If a Significant Decline Trigger is tripped and it is agreed that hydro rapid response actions should be developed, the Action Agencies and NOAA Fisheries, in collaboration with the RIOG and Accord Partners, will review the current information on adult and juvenile dam survival and juvenile fish transportation and assess where additional project survival benefits may be gained with regard to the targeted ESU. Any hydro rapid response actions under consideration will incorporate the latest information on fish survival and will focus first on maximizing survival of returning adults as those actions will provide the most immediate benefits to the target ESU.

Typically, rapid response actions for hydro operations will focus on 1) spill, 2) operation of fish passage facilities, 3) fish sampling strategies, and 4) fish transportation strategies. These are actions that may be implemented in less than 12 months, and which are expected to provide immediate survival benefits for a specific ESU. The environmental compliance requirements for their implementation are already in place. Rapid response hydro actions must have the potential to improve adult system survival or juvenile survival without degrading in-river passage conditions for returning adults.

It should be noted that while a particular rapid response action would provide some level of benefit to the target ESU(s), the action may also cause a corresponding reduction in either survival or smolt-to-adult return rates (SARs) of other ESUs of concern. These potential impacts will be identified and considered during the action development process.

Hydro and Predation Rapid Response Action Development Process

The Action Agencies have identified the following hydro 90-day rapid response actions development process. This process will be initiated when a Significant Decline Trigger is tripped for an ESA-listed Interior Columbia Basin ESU/DPS. Once NOAA Fisheries has made a determination that a Significant Decline Trigger has been tripped, and the Action Agencies and NOAA Fisheries have made an initial assessment about what actions may be effective in minimizing or mitigating for the decline (hydro, predation, hatchery, and harvest), they will task appropriate teams to identify potential rapid response actions for implementation consideration. If hydro rapid response actions are considered potentially effective, the following development process will be initiated. This process also identifies predation rapid response actions following the same development process timeline; specific predation actions are described further in Chapter 3.

Annual Significant Decline Trigger (SDT) Review

SDT Determination – 11-45 days following (Hydro/Predation)

- I. Convene special Studies Review Work Group (SRWG) meetings in coordination with the Hydro Coordination Team (HCT) to review spill/operation information (*Corps*).
 - a. Evaluate relevant project (dam) specific survival information to determine if spill or operational changes are warranted at each candidate project.
 - i. Assess existing survival information that applies to the current project configuration.
 - b. Develop alternative spill/operations Rapid Response action(s) for each candidate project if warranted and supported by existing survival data.
 - i. Action must not block/delay passage or substantially increase the fallback of returning adults.
 - ii. Identify benefit (quantitative or qualitative) for target ESU(s).
 - iii. Identify benefit/detriment for other ESU(s) / species of concern.
 - iv. Consider compatibility of alternative spill/operations Rapid Response action(s) with existing or potential alternative fish transportation strategy rapid response actions (see item II).
 - v. Determine duration of Rapid Response action(s)
 1. Develop schedule for implementation.
 - c. Formulate technical recommendation on alternative spill/operations Rapid Response action(s).
- II. Convene special SRWG meetings in coordination with the HCT to review fish transportation strategy information (*Corps*).
 - a. Evaluate relevant fish transportation information to determine if a fish transportation strategy change may be warranted to benefit the affected ESU(s).
 - i. Assess existing fish transportation information that applies to the current system configuration.
 - b. Develop alternative fish transportation strategy Rapid Response action(s) for each candidate project, if warranted and supported by existing data.
 - i. Identify benefit (quantitative or qualitative) for target ESU(s).
 - ii. Identify benefit/detriment for other ESU(s) / species of concern.

- iii. Consider compatibility of alternative fish transportation strategy Rapid Response action(s) with existing or potential alternative spill/operations (see item I).
 - iv. Determine duration of Rapid Response action(s)
 - 1. Develop schedule for implementation.
 - c. Formulate technical recommendation on alternative fish transportation strategy Rapid Response action(s).
- III. Convene special SRWG meetings to review dam predation information (*Corps*).
 - a. Evaluate relevant project specific avian and piscivorous predation information to determine if changes to current programs are warranted at each candidate project.
 - i. Consider current configuration and whether survival information applies to the current project configuration.
 - b. Develop alternative avian hazing and dam angling Rapid Response action(s) for each candidate project if warranted.
 - i. Identify benefit (quantitative or qualitative) for target ESU(s).
 - ii. Identify benefit/detriment for other ESU(s) / species of concern.
 - iii. Determine duration of Rapid Response action(s).
 - 1. Develop schedule for implementation.
 - 2. Identify any currently existing monitoring efforts of Rapid Response actions.
 - c. Formulate technical recommendation on alternative avian hazing and dam angling Rapid Response actions.

SDT Determination – 46-70 days following (Hydro/Predation)

- I. Prepare draft alternative spill/operations/fish transportation/predation strategy Rapid Response action(s) (*AAs and NOAA*).
 - a. Finalize draft Hydro/Predation Rapid Response action(s) for RIOG review.
 - i. Consider RIOG comments on draft actions.
 - ii. Revise draft actions if necessary.
 - b. Finalize and submit Hydro/Predation Rapid Response action(s) to NOAA Fisheries, Action Agencies and RIOG for final determination.

2.3 Long-Term Contingency Actions (Phase II) for Hydro Operations

As specified in the AMIP, long-term contingency actions include Phase II hydro actions identified in the Configuration and Operation Plans (COPs) that were (or are currently being) developed by the Corps in collaboration with regional sovereigns. Similar to the process used to determine appropriate Rapid Response actions to implement, relevant Phase II hydro actions will be reviewed and reassessed by regional Fish Facility Design Review Workgroup (FFDRWG) members using the latest available juvenile fish survival information for a given project. Phase II hydro actions previously identified in each COP may change as more juvenile fish survival information for each project is acquired; some existing actions may be removed from the list, while new actions may be added for consideration. The FFDRWG will evaluate each action under consideration to confirm that a survival benefit to the ESU of concern will be gained from the action(s). Once an action(s) is identified, the action(s) will be ranked, prioritized, and recommended for funding under the Corps' Andromous Fish Evaluation Program (AFEP) by the System Configuration Team (SCT). Upon recommendation of an action for implementation/construction by the SCT, the Corps will develop a scope, schedule, and cost estimate to complete the action.

3. Predation Control

3.1 Introduction

In the FCRPS BiOp, the Action Agencies committed to specific RPA actions to reduce predation on listed smolts by redistributing Caspian terns from the nesting colony on East Sand Island and implementing a northern pikeminnow reward/removal program. Expected survival benefits were estimated based on the successful implementation of these actions. RPA actions dealing with double-crested cormorant predation in the estuary and avian predation at dams and inland nesting areas did not specify actions or expected benefits, but called for the development of management plans intended to establish such actions and estimate benefits. The Inland Avian Predation Management Plan and the Double-crested Cormorant Management Plan are rapidly approaching the point where such RPA actions and expected benefits can be delineated

Should a Significant Decline Trigger be tripped, the Action Agencies may be required to take rapid response and long-term contingency predation actions beyond those described through existing RPA processes. Some of the options developed through the predation management planning processes described above are not considered acceptable RPA actions because, although they may be beneficial to one ESU, they may be detrimental to others. Other actions may only be acceptable or beneficial if done short term under specific conditions rather than over the remaining term of the BiOp. Such short-term actions could constitute potential rapid response or long-term contingency actions, only to be implemented when a specific ESU initiates responses to hitting a trigger. One action that may fall into this category is short-term lethal take of targeted avian predators at a specific location during peak passage of an ESU that has hit an Early Warning or Significant Decline Trigger level.

Other management actions not anticipated by the current BiOp could become long-term contingency actions. For example, actions may be taken to address growing concerns over smolt predation by bass, walleye, and other piscivorous predators, especially near the dams. A potential long-term contingency action arising from such concerns could be a dam angling or reward program for these species.

Once a trigger is tripped, the Action Agencies and NOAA Fisheries have 90 days to develop a list of rapid response actions to move ahead. The process for determining specific predation actions within the specified 90 days is outlined in Chapter 2, Section 2.2, Hydro and Predation Rapid Response Action Development Process (pages 11-12). Potential rapid response and long-term contingency actions to control predation are described in more detail below.

3.2 Rapid Response Actions for Predation Control

The 90-day process for determining predation control actions is identified in Section 2.2. This 90-day process includes several steps to identify specific actions that can quickly reduce predation on a targeted ESU. These steps include: 1) evaluating project-specific avian and piscivorous predation information and determining if changes are warranted; 2) identifying alternative project-specific rapid response actions and assessing their impacts on the targeted ESU(s) and other ESUs; and 3) developing technical recommendations on alternative avian

hazing and dam angling rapid response actions for inclusion in an All-H Rapid Response Action Plan.

Predation control actions that can be accelerated and implemented within 12 months are considered rapid response actions. Concurrent with the date of this report, there are two existing actions that could qualify as rapid responses: avian predator hazing and pikeminnow dam angling at the dams. Potential rapid response actions for predator control are described below. Tables 2 and 3 show the effects of these actions on the listed species.

1) Expand Avian predator hazing at FCRPS dams from dawn until dusk in all zones where hunting is observed during the outmigration of the targeted ESU.

Present Hazing Schedule:

- Bonneville Dam: April 1 - July 30 (8 hours per day between 0600 & 2000)
- The Dalles Dam: May 1 - July 30 (All daylight hours up to 16 hour, boat-based hazing is the preferred method)
- John Day Dam: April 12 - July 30 (All daylight hours up to 16 hours), boat-based hazing is the preferred method)
- McNary Dam: April 1 - July 16 (8 hours per day)
- Ice Harbor Dam: April 1 - June 30 (16 hours per day + boat hazing)
- Lower Monumental Dam: April 1 - June 17 (8 hours per day)
- Little Goose Dam: April 1 - June 18 (8 hours per day)
- Lower Granite Dam: April 1 - June 30 ((16 hours per day April 24-June4)

The potential benefits from increasing hazing to include all daylight hours in all zones of the dams where and when active hunting is observed are based on the range of recent estimates of the rate of avian predation on smolts at FCRPS dams with current structures and operations. This estimate is a percentage of smolts surviving to the tailrace that are then lost to avian predators. These numbers are included in Table 2. Rates vary considerably between years and are likely to change with future modifications, such as installation of new outfalls at McNary and Lower Monumental dams. Survival benefits related to maximizing avian hazing efforts can range from zero, where these efforts are not effective, to the average rate of predation at a dam, if avian predation is completely eliminated. More precise estimates of benefits are being developed as a part of the Inland Avian Management Plan.

Avian predators are known to move readily up and down the river among multiple dams to exploit localized feeding opportunities. The systemwide benefit estimate from increased hazing at dams would need to be based on combining all the dam specific potential survival benefits to an ESU with any adjustments needed to account for avian predator movements among dams.

Changes to the current program crafted for the specific ESU that hit the Early Warning or Significant Decline Trigger should be able to be implemented before the next passage season by modifying existing contracts and permitting to increase hazing efforts at dams.

- 2) **Expand Northern Pikeminnow Management Program (NPMP). Increase the Dam Angling component of the Northern Pikeminnow Management Program by adding an additional crew and increasing the number of fishers in the existing crew for the duration of the field season. Additionally, increase the Sport Reward program’s monetary incentive for angling in reservoirs and migration corridors where specific salmonid populations have declined below viable salmonid population (VSP) thresholds.**

Present Dam Angling schedule:

- The Dalles Dam: May 30 – August 15 (5:00 am to 1 pm M-F)
- John Day Dam: May 30 – August 15 (5:00 am to 1 pm M-F)

The potential benefits from increasing the dam angling scope and sport reward incentive would involve an increase in project and reservoir survival for outmigrating juvenile salmonids. This strategy allows the Action Agencies to target specific river reaches where salmonid populations have dropped below VSP thresholds. Additional monetary incentives to boost harvest have occurred at various times during the 20-year implementation of the Sport Reward program. Additional catch correlates to increases in pikeminnow exploitation rates for the field season. The increase in catch would be incorporated into the NPMP spreadsheet model used to estimate the long-term reduction in juvenile salmonid mortality due to predation. This model is updated annually by the biological evaluation program component of the NPMP.

Table 2. Rapid Response Actions for Predators and Non-native Species — Avian Predator Hazing.

Description of Action	SR Sch	SR FCh	SR Sthd	UCR SpCh	UCR Sthd	MCR Sthd	Effect on Other Species of Interest (Lower River and unlisted salmon and steelhead, lamprey, green sturgeon, etc)	Advanced Work Required
	Targeted ESU/DPS and Potential Range of Positive Effects to Dam Survival							
Expand Avian predator hazing at FCRPS Dams								
Lower Granite Dam⁴								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is observed during outmigration of the targeted ESU.	X 0-1%	X 0-0.5%	X 0-2%				Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting
Little Goose Dam⁵								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is observed during outmigration of the targeted ESU.	X 0-1%	X 0-0.5%	X 0-1%				Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting
Lower Monumental Dam⁶								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is observed during outmigration of the targeted ESU.	X 0-0.5%	X 0-0.5%	X 0-0.5%				Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting
Ice Harbor Dam⁷								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is observed during outmigration of the targeted ESU.	X 0-2%	X 0-1.5%	X 0-2%				Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting
McNary Dam⁸								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is observed during outmigration of the targeted ESU.	X 0-1%	X 0-1%	X 0-1%	X 0-0.5%	X 0-0.5%	X 0-1%	Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting
John Day Dam⁹								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is	X 0-0.1%	X 0-0.1%	X 0-0.5%	X 0-0.1%	X 0-0.5%	X 0-0.5%	Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting

⁴ Average bird count <10 gulls/day based on historical in-house numbers; 2011 hazing data ~10-15 gulls/day in May; Sth: PS 2006 95.8%; Yearling: PS 2006 - 96.7%; Subyearling: PS 2006 - 91.7%

⁵ Average Bird count at LGO under 20/birds per day averaged over season (primarily gulls), May average = 22gulls/day; June/July = 1-2 gulls/day; Sth: Estimate based on passage survival testing of 97.8-99.8% during 2007 & 2009 performance standard testing; Yearlings: 2007- 99.1% 2009-99.4%; Subs: 2006-95% 2009-95.2%

⁶ Average LMN bird count is <10 birds/day every month based on based on internal historical data, 2011 hazing data indicates average bird counts are ~15-20/birds/day; Sth: PS 2009-96.7-97.6; Yearlings: 2009 - 97.3; Subs: 2009 - 92.3

⁷ Average ICE bird count ~25/birds/day; max average bird count is in May ~150 gulls/day; Sth: PS 2008 -97.0; Yearlings: 2008 -96.6; Subs: 2008 - 93.3

⁸ Average bird count April-Sept is 33/gulls/day, max average month is May @ 95gulls/day; IF 80% reduction based on JDA info: Season Reduction n=6, 0.14% (from 0.7%)

⁹ Current Mean count in May ~60-80/gulls/day based on FFU study. Take by Blalock Is terns + Miller Rock Gulls on Chinook including UCR Spring, SR Spring, MCR Spring, and UCR Summer is under 1% per ESU (Table 3.3; page 102 of Avian Synthesis Report (final)). Take by Blalock Is terns + Miller Rock Gulls on steelhead including UCR summer, SR Summer and MCR Summer is 1-2% per ESU (Table 3.3; page 102 of Avian Synthesis Report (final)). Reduction in predation at dams by initiating hazing season earlier will only slightly reduce this predation and would be split between JDA and TDA; significant portion of predation occurs in reservoir. Significant portion of take is from within reservoir and not at projects.

Description of Action	SR SCh	SR FCh	SR Sthd	UCR SpCh	UCR Sthd	MCR Sthd	Effect on Other Species of Interest (Lower River and unlisted salmon and steelhead, lamprey, green sturgeon, etc)	Advanced Work Required
observed during outmigration of the targeted ESU.								
The Dalles Dam¹⁰								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is observed during outmigration of the targeted ESU.	X 0-0.1%	X 0-0.1%	X 0-0.5%	X 0-0.1%	X 0-0.5%	X 0-0.5%	Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting
Bonneville Dam¹¹								
Expand Avian predator hazing at FCRPS dams from dusk to dawn in all zone where hunting is observed during outmigration of the targeted ESU and during release of truck transported fish.	X 0-0.1%	X 0-1%	X 0-0.1%	X 0-0.1%	X 0-0.1%	X 0-0.1%	Pacific lamprey (unknown positive effect since unknown dam survival)	Supplement USDA-APHIS permitting

¹⁰ Current early season mean counts are under 20/gulls/day prior to April 15 (based on trend data from FFU study). Current mean counts at peak bird season ~60-80/gulls/day (mid-late May). Take by Blalock Is terns + Miller Rock Gulls on Chinook including UCR Spring, SR Spring, MCR Spring, UCR Summer is under 1% per ESU (Table 3.3; page 102 of Avian Synthesis Report (final)). Take by Blalock Is terns + Miller Rock Gulls on steelhead including UCR summer, SR Summer, and MCR Summer is 1-2% per ESU (Table 3.3; page 102 of Avian Synthesis Report (final)). Reduction in predation at dams by initiating hazing season earlier will only slightly reduce this predation and would be split between JDA and TDA. Significant portion of take is from within reservoir and not at projects.

¹¹ TBD

Table 3. Rapid Response Actions for Predators and Non-native Species — Dam Angling.

Description of Action	SR SCh	SR FCh	SR Sthd	UCR SpCh	UCR Sthd	MCR Sthd	Effect on Other Species of Interest (<i>Lower River and unlisted salmon and steelhead, lamprey, green sturgeon, etc</i>)	Advanced Work Required
	Targeted ESU/DPS (and expected positive effects to dam survival)							
Increase Dam Angling for Targeted Pikeminnow removal								
Lower Granite Dam								
Increase piscivorous Dam Angling crew number to include pikeminnow removal efforts at LGR.	TBD	X 0-0.5%	TBD					Existing environmental permitting sufficient for additional effort.
McNary Dam								
Increase piscivorous Dam Angling crew number to include pikeminnow removal efforts at McNary.	TBD	X 0-0.5%	TBD	TBD	TBD	TBD		Existing environmental permitting sufficient for additional effort.
John Day Dam								
Increase piscivorous Dam Angling crew number to include pikeminnow removal efforts at John Day.	TBD	X 0-0.5%	TBD	TBD	TBD	TBD		Existing environmental permitting sufficient for additional effort.
The Dalles Dam								
Increase piscivorous Dam Angling crew number to include pikeminnow removal efforts at The Dalles Dam.	TBD	X 0-0.5%	TBD	TBD	TBD	TBD		Existing environmental permitting sufficient for additional effort.
Bonneville Dam								
Increase piscivorous Dam Angling crew number to include pikeminnow removal efforts at Bonneville.	TBD	X 0-0.5%	TBD	TBD	TBD	TBD		Existing environmental permitting sufficient for additional effort.

3.3 Long-Term Contingency Actions for Predation Control

Actions to control predatory fish and birds and invasive species, in addition to those taken under the RPAs and other efforts, could be implemented if determined that long-term contingency actions are needed to help a declining species. These actions are considered long term because they are expected to need considerable regional coordination before they could be implemented. If such coordination can be accomplished before any trigger is hit, then the action could potentially become a rapid response. One action that may fall into this category is targeted, short-term lethal take of avian predators at a specific location during the period of peak passage of a targeted ESU. Other management actions not anticipated by the current BiOp could also become long-term contingency actions. One example may be the growing concerns over smolt predation by bass, walleye, and other piscivorous predators, especially near the dams. A potential long-term contingency action arising from such concerns could be a dam angling or reward program for these species.

Potential Long-Term Contingency Actions

1) **Targeted Lethal Take of avian predators at dams or other hot spots during peak passage period of the ESU initiating triggers.**

Lethal take of avian predators, especially Caspian terns and double-crested cormorants, has often proved to be unacceptable to regional managers responsible for their protection. It may be possible, however to negotiate conditional limited and local lethal take related to tripping a trigger for a specific ESU. The uncertainty of being able to obtain this capability means that it would require significant planning and is, therefore, considered a long-term contingency action.

2) **Provide alternative prey for Foundation, Crescent, or East Sand Island bird colonies during peak passage period of the ESU initiating triggers.**

Bird colonies at East Sand Island in the estuary and Foundation and Crescent Islands on the Columbia River, are emerging as the two inland locations responsible for the largest take of ESU smolts in the Columbia River Basin, along with Goose Island in Potholes Reservoir. Providing alternative fish prey in net pens to bird colonies on these islands in the Columbia River is challenging in terms of implementation because of their locations. At East Sand Island, prey may need to be provided over a protracted period, raising concerns for the potential to alter productivity and nesting success. Because of these challenges, this action would require significant planning and is considered a long-term contingency action.

3) **Establish a bass and/or walleye dam angling and/or reward program similar to that established for pikeminnow.**

Although a general system-wide removal program likely would not work the same for bass or walleye as it does for pikeminnow, some variety of reward programs could be considered. A focused dam angling program for bass and walleye at suspected hot spots where juvenile smolts are likely to be most susceptible could reduce predation of a targeted ESU. Because of the economic and social value of the existing recreational bass fishery, this action would require significant planning and is considered a long-term contingency action.

4. Harvest

4.1 Introduction

Columbia River salmon and steelhead species encounter fisheries in the ocean, Columbia River estuary, mainstem Columbia, Snake River, and tributaries as they complete their migration from the ocean back to natal streams. These different fisheries adhere to the guidelines and constraints of the Pacific Salmon Treaty, the Columbia River Fish Management Plan, the Endangered Species Act, the Pacific Fishery Management Council, the states of Oregon, Washington, and Idaho, the Columbia River Compact, and management agreements negotiated between the parties to *U.S. v. Oregon*.

4.2 Rapid Response Harvest Actions

ESA-listed species in the Columbia basin are either subject to very low harvest rates (e.g., A-run steelhead) or subject to abundance-based management frameworks. If abundance is low, harvest is reduced automatically, providing a self-adjusting rapid response. (More details related to the harvest rapid response for terminal, *U.S. v. Oregon*, and ocean fisheries are described in AMIP Appendix 5.) Additionally, under the *U.S. v. Oregon* agreement, if the performance measure of any indicator stock declines for three consecutive years when compared to the base period (1988-2007), any party may request that the Technical Advisory Committee (TAC) conduct an analysis of the decline. The analysis must be completed within one year. After review of the analysis, the parties may make recommendations to modify the agreement. If NOAA Fisheries determines that additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements. Thus, the abundance-based management provisions of the *U.S. v. Oregon* agreement comprise the rapid response plan for fisheries in the mainstem Columbia River. Rapid responses for terminal and ocean fisheries are described in AMIP Appendix 5.

4.3 Long-Term Contingency Harvest Actions

If a Significant Decline Trigger is tripped, NOAA Fisheries will review all fisheries that affect the species of concern, including ocean, mainstem, and terminal, to assess whether existing harvest management agreements provide adequate protection. (More details are provided in the description of harvest related rapid responses in AMIP Appendix 5. The same considerations would be used to address long-term contingency requirements.) Under the *U.S. v. Oregon* agreement, if the performance measure of any indicator stock declines for three consecutive years when compared to the base period (1988-2007), any party may request that an analysis of the decline is conducted (by the Technical Advisory Committee). The analysis must be completed within one year. After review of the analysis, the parties may make recommendations to modify the agreement. If NOAA Fisheries determines that additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements, and its ESA authority to implement changes where required.

5. Hatchery Programs

5.1 Introduction

The Adaptive Management Implementation Plan, Appendix 5 calls for the Action Agencies and the NOAA Fisheries, in consultation with the RIOG, to develop hatchery rapid response safety-net and long-term contingency plans for each listed salmon and steelhead species in the interior Columbia Basin. Rapid response actions include actions that will immediately enhance fish survival and for which the needed regulatory process is largely in place. Long-term contingency actions include actions that can take longer than one year to implement; the lengthy ESA regulatory process needed for safety-net hatchery programs, e.g. new hatchery supplementation programs or captive breeding programs, precludes employing these types of artificial production strategies as rapid response safety-net actions. Consequently, supplementation, safety-net hatchery programs and hatchery reform activities are included as potential hatchery long-term contingency actions.

A considerable amount of advance work needs to be conducted to implement both the hatchery rapid response and the hatchery long-term contingency actions. First steps include identification and confirmation of participants for the Regional Hatchery Planning Groups; relevant agencies for each region have been identified in Table 4. In addition to forming the Regional Hatchery Planning Groups, NOAA Fisheries and BPA need to work with the regional co-managers to identify those populations most important to recovery that will be priorities for rapid response and long-term contingency actions if a Significant Decline Trigger is tripped at the ESU/DPS level. Choosing which populations to focus on could be influenced by the severity of decline. A precipitous drop in a single population in an MPG would suggest efforts aimed at that one population. A precipitous drop in the entire MPG may require “triage” in which efforts are focused on the most representative population(s) in the MPG. Advance work is described in Section 5.4 and Table 8.

5.2 Rapid Response Hatchery Actions

Rapid response actions include mitigation actions that can be implemented relatively quickly (i.e., within 12 months) to enhance fish survival and for which the needed regulatory process is largely in place. In general, the types of actions proposed as rapid-response actions will involve modifying existing Hatchery and Genetic Management Plans (HGMPs) to consider additional recommendations of the Hatchery Scientific Review Group (HSRG), USFWS Hatchery Review Team (HRT) for high-priority at-risk populations, or other sources. Both review entities have developed numerous recommendations that are available at the HSRG website:

http://www.hatcheryreform.us/hrp/welcome_show.action

and the HRT website: <http://www.fws.gov/pacific/Fisheries/Hatcheryreview/>.

Future advances in hatchery science may also identify new hatchery reform actions that can improve survival of wild populations and be implemented within the 12-month timeframe. When an ESU/DPS trigger is tripped, NOAA Fisheries and the Action Agencies will work with hatchery operators to determine if there are additional reform actions, e.g., HSRG or HRT

recommendations not currently planned in an HGMP that might be useful in improving survival of a wild population.

Rapid response actions include deviations from actions specified in HGMPs such as reprogramming production to modify release numbers or release locations, the mix of natural-origin and hatchery-origin fish in the broodstock or on the spawning grounds, marking plans, and disease management protocols. NOAA Fisheries would work closely with operators to revise HGMPs and ESA permits, and expedite their approval. Rapid response actions could also include acceleration of measures already in an HGMP. Examples include employing a low-cost temporary weir while a permanent weir is being funded, designed and built, or reprioritizing an action to make funds available earlier. The hatchery rapid response action planning process is outlined in Table 5.

Table 4. Regional Hatchery Planning Group Members.

Region	Agency/Tribe	Representative
Upper Columbia	NOAA BPA USFWS BOR WDFW Yakama Nation Colville Tribes	For BPA = Jeff Gislason For BOR = Sue Camp Other members TBD by early 2012
Mid-Columbia	NOAA BPA Corps USFWS WDFW ODFW Yakama Nation Umatilla Tribes Warm Springs Tribes	TBD by early 2012
Snake River	NOAA BPA Corps USFWS (LSRCP) Umatilla Tribes Nez Perce Tribe Shoshone-Bannock Tribes	TBD by early 2012

Table 5. Hatchery Rapid Response (RR) Action Planning Process.

Timeframe (Days after trigger is tripped)	Action	Lead	Other Participants
Day 0	ESU/DPS Significant Decline Trigger tripped	NOAA	
Day 1 -30	<p>NOAA/BPA convene the applicable Regional Hatchery Planning Group (comprised of federal, state, and tribal representatives), which will:</p> <ul style="list-style-type: none"> ▪ Review available information on current status of priority populations in the affected ESU or DPS. This may involve a lengthy technical process. Choosing which populations to focus on could be influenced by the severity of decline. A precipitous drop in a single population in an MPG would suggest efforts aimed at that one population. A precipitous drop in the entire MPG may require "triage" in which efforts are focused on the most representative population(s) in the MPG. ▪ Review options for rapid response actions. Generally, rapid response actions will involve modifications of HGMPs to include actions already identified through HSRG and HRT processes but not included in the current HGMP acceleration of the approval/permitting of the modifications, or acceleration of actions already in HGMPs. Some examples: <ul style="list-style-type: none"> ○ Reprogram production of an existing program to modify release numbers or release locations ○ Modify the mix of natural-origin and hatchery-origin fish in the broodstock or on the spawning grounds. ○ Alter disease management protocols to further reduce the potential for disease transmission from hatchery to wild fish ○ Employ a low-cost temporary weir while a permanent weir is being funded, designed and built ○ Reprioritize funding so actions already in an HGMP can be implemented sooner. ▪ Review indicators of future abundance to assist in prioritizing actions ▪ Develop a "menu" of priority actions for RIOG review and coordination 	NOAA/BPA	<p>The Regional Hatchery Planning Group for the affected ESU/DPS:</p> <ul style="list-style-type: none"> ▪ Upper Columbia Group <ul style="list-style-type: none"> ✓ <i>UCR spring Chinook ESU</i> ✓ <i>UCR steelhead DPS</i> ▪ Mid-Columbia Group <ul style="list-style-type: none"> ✓ <i>MCR steelhead DPS</i> ▪ Snake River Group <ul style="list-style-type: none"> ✓ <i>SR spring/summer Chinook ESU</i> ✓ <i>SR fall Chinook ESU</i> ✓ <i>SR steelhead DPS</i>
Day 30 -60	Coordinate menu of RR actions with RIOG. Consider RIOG recommendations	NOAA/BPA	Regional Hatchery Planning Group
Day 30 - 60	Complete any necessary U.S. v. OR coordination	NOAA	US v. OR agencies/tribes participating in the Regional Hatchery Planning Group process
Day 60 – 90	Modify existing HGMP to include priority RR action or actions for a particular hatchery program	Hatchery Operator & BPA	Action Agencies NOAA
Day 90 - 120	Initiate and complete ESA Consultation for RR actions as described in a consultation-ready HGMP. If an action involves only minor modification of an existing HGMP and accelerated approval/permitting of the modifications, then additional ESA	Hatchery Operator & BPA	Action Agencies NOAA

Timeframe (Days after trigger is tripped)	Action	Lead	Other Participants
	compliance may not be necessary.		
Day 90-120	Complete NEPA for RR actions described in HGMP	Action Agency /Hatchery Operator	
Day 120 - 360	Begin implementing RR actions	Hatchery Operator & BPA	Action Agencies

5.3 Long-Term Contingency Hatchery Actions

Within four to six months of a Significant Decline Trigger being tripped, an All-H diagnosis and life cycle model analysis will be conducted to determine if the rapid response action(s) are likely to be sufficient or if long-term contingency actions will need to be implemented, and if so, what actions are appropriate for implementation. Potential long-term contingency actions include working with hatchery operators to reprogram safety-net programs to longer-term conservation hatchery programs, where appropriate; and reforming existing hatchery programs to meet conservation goals while also meeting legal harvest obligations. These actions are discussed below and in Table 7.

Safety-Net Hatcheries

Currently, safety-net hatcheries are in place for two of the listed species, Snake River sockeye and spring/summer Chinook (Table 6).

Table 6. Existing Safety-Net Hatchery Programs for Interior Columbia ESUs.

ESU	Safety-Net Hatchery	Operator
Snake River Sockeye	Eagle Fish Hatchery	IDF&G
	Sawtooth Fish Hatchery	IDF&G
	NWFSC Manchester Research Station	NOAA
	NWFSC Burley Creek Hatchery	NOAA
	Oxbow Fish Hatchery	ODF&W
Snake River Spring/Summer Chinook	Bonneville Captive Brood Facility	ODF&W
	Eagle Fish Hatchery	IDF&G
	NWFSC Manchester Research Station	NOAA

Safety-net hatchery programs are intended to function as “gene conservation” programs to reduce extinction risk of salmon and steelhead populations. Before proceeding with implementation, technical staff and policy decision makers should weigh carefully the risks and benefits of safety-net hatchery programs. Appendix 2 describes the current conservation hatchery programs for Interior Columbia salmon and steelhead populations. It also identifies the existing Action Agency-funded captive broodstock safety-net facilities for listed salmonids.

Implementation of safety-net hatchery actions can take several years and may require design and construction of new adult holding, spawning, incubation, and juvenile rearing facilities, as well

as weirs, adult traps, and juvenile acclimation ponds. The estimated timeframe for such actions would range from one year, if only a minor modification was required, to three to five years for major construction projects costing over \$1 million. Congressional approval is required for Bonneville Power Administration funding of capital projects (those projects costing \$1 million or more) under the Columbia River Basin Fish and Wildlife Program, a two-year approval process. Congressional appropriations would also be needed for capital improvements at hatchery facilities funded through Bonneville's Direct Funding Agreements with U.S. Bureau of Reclamation (BR), the U.S. Army Corps of Engineers (Corps), and U. S. Fish and Wildlife Service (USFWS) for its Lower Snake River Compensation Plan (LSRCP) hatchery program. For some new hatchery programs, an Environmental Impact Statement, requiring 18 months or more to complete, may be required to comply with the National Environmental Policy Act. A three-step review process would also be needed for all new hatchery programs under the Columbia River Basin Fish and Wildlife Program, even those that are not capital projects. Therefore, implementation of a safety-net hatchery element of the Long-term Contingency Plan is likely to take three to five years if a new facility is constructed, with a shorter timeframe (one to two years) if existing facilities are available.

Reintroduction

The ultimate goal of a safety-net program is to restore the population in its natural spawning and rearing habitat. In addition to the steps to build the hatchery program described above, reintroduction only can be successful when: 1) the available habitat can support a self-sustaining population and 2) adult returns are not likely to be limited by downstream (out-of-basin) factors such as migration barriers, predation rates, ocean conditions, and harvest.

Reintroduction techniques and concerns are discussed in McClure et al. (2011) and summarized in Section 6.1 (Reintroduction). The methods and strategies to be used to build a hatchery program in the case of a given safety-net program will be described in its HGMP and evaluated in NMFS' biological opinion. A specific reintroduction strategy will depend on habitat conditions some years (potentially a decade) in the future, and will be developed at that time in collaboration with the appropriate Regional Hatchery Planning Group.

Hatchery Reform

In the event that long-term contingency actions are triggered, NOAA Fisheries and BPA will convene the relevant Regional Hatchery Planning Group. This group will review status priority populations, indicators of future abundance, and status of any ongoing hatchery rapid response and safety-net programs. The hatchery long-term contingency action planning process is outlined in Table 7. The group may recommend long-term contingency actions, e.g., safety-net programs involving supplementation or captive brood, or modification of existing programs to meet more conservation-oriented goals.

Hatchery reform actions may include modified hatchery operations and release strategies to reduce mixed stock harvest problems. Processes are now underway to encourage and implement actions that reduce hatchery impacts to listed species. Within the existing management structure, NOAA Fisheries and the state and tribes will consider adjusting the future size, location and type of hatchery releases to provide harvest opportunities while providing adequate protection for

listed species. Future hatchery consultations will include contingency plans and actions as part of their adaptive management provisions.

Both the Hatchery Scientific Review Group (HSRG) and the USFWS Hatchery Review Team (HRT) have developed numerous hatchery reform recommendations that are available at the HSRG website: http://www.hatcheryreform.us/hrp/welcome_show.action and the HRT website: <http://www.fws.gov/pacific/Fisheries/Hatcheryreview/>. Examples of long-term contingency hatchery reform actions that could be implemented include reprogramming hatchery releases to areas away from primary populations, developing weirs and selective fishery options to limit the number of hatchery-origin spawners (pHOS) into watersheds with primary populations, and ensuring a high level of proportionate natural influence (PNI) for primary populations. Hatchery reform actions will involve considerable collaboration and may require approval of legal settlements such as *United States v. Oregon*. In the event that long-term contingency actions are triggered, the evaluation of hatchery production and its effects on listed species will be accelerated to determine whether alternative operational strategies should be implemented.

Table 7. Hatchery Long-Term Contingency Actions.

Timeframe	Action	Lead	Other Participants
Within 4 to 6 months of a Significant Decline Trigger being tripped.	Decision on need for LTC actions and appropriate actions	Action Agencies	NOAA
0 -30	Within 30 days following determination that LTC actions are needed, NOAA/BPA convene relevant Regional Hatchery Planning Group. Group will review status priority populations, indicators of future abundance, and status of any ongoing hatchery rapid response safety-net programs. The Group may recommend long-term contingency actions, e.g., safety-net programs involving hatchery supplementation or captive brood, or modification/reform of an existing program to meet conservation-oriented goals.	NOAA/BPA	Regional Hatchery Planning Group
Day 30-60	If the Regional Hatchery Planning Group recommends long-term contingency (LTC) action, the Group will develop a menu of LTC options for relevant population(s) for Regional Implementation Oversight Group (RIOG) review.	NOAA/Regional Hatchery Planning Group/ <i>U.S. v. Oregon</i>	Action Agencies
Day 60-90	RIOG coordination and review of "menu" of LTC options.		Regional Hatchery Planning Group, NOAA, Action Agencies
Day 90 - 120	Develop necessary draft HGMP for new or modified hatchery program(s). Complete a consultation-ready HGMP satisfactory to NOAA.	Hatchery Program Operator AA review	NOAA, Action Agencies
Day 120 - 180	Initiate and complete ESA Consultation for LTC actions described in consultation-ready HGMP.	Hatchery Operator and funding Action Agency	NOAA Action Agency
Variable timeframe	Initiate and complete NEPA process for proposed LTC action.	Action Agency/ Hatchery Operator	
Variable timeframe, up to two years for	Secure funding for construction and operation and maintenance (O&M) of the new or modified	Hatchery Operator	Action Agencies USFWS

<ul style="list-style-type: none"> ▪ Identify populations important to recovery and priority for hatchery RR and LTC actions. ▪ Identify any populations “off-limits” to hatchery intervention, e.g., risks outweigh benefits to wild population or wild population is a reference population. 	NOAA	Regional Hatchery Planning Group	ICTRT has identified populations needed for recovery. Recovery plans for these populations identify hatchery-related recovery actions.	2012
<ul style="list-style-type: none"> ▪ Determine priority for implementation of hatchery reform actions such as those recommended by the Hatchery Scientific Review Group (HSRG) and the USFWS Hatchery Review Team (HRT) http://www.hatcheryreform.us/hrp/welcome_show_action and the HRT website: http://www.fws.gov/pacific/Fisheries/Hatcheryreview/ 	NOAA/BPA			2012

6. Additional Long Term Contingency Actions

6.1 Reintroduction

Introduction

The AMIP assumed that reintroduction could be a tool to increase the diversity and abundance of an ESU in the case where a Significant Decline had been observed (i.e., an element of the AMIP's Long-term Contingency Plan). It required NOAA Fisheries to examine the conditions under which reintroductions of salmon into previously occupied areas downstream of Chief Joseph Dam and Hells Canyon would be suitable as a tool to decrease the risk of extinction. NOAA's Northwest Fisheries Science Center collaborated with area experts from the regional state and tribal fishery agencies to complete this review, including a review of the conditions under which reintroductions would be successful, and the biological benefits and costs of different techniques. The scientists' recommendations are described in the draft paper "Pacific salmon reintroductions in the Interior Columbia River basin: viability benefits and implementation guidelines" (McClure et al. 2011)¹² and their recommendations are discussed below.

Long-Term Contingency Reintroduction Actions

NOAA Fisheries and the Action Agencies have determined that, in special circumstances, a safety-net hatchery program is an appropriate reintroduction tool as part of a long-term contingency plan (Section 5.3). Establishing such a program may be an essential action for conservation of an important evolutionary lineage or ESU that would likely go extinct without intervention. It is appropriate when there are no, or very few, other stocks remaining in an ESU that could be used as a reintroduction source in the future. Recovery of Sawtooth Valley (Snake River) sockeye salmon, which reached critically low abundances in the early 1990s, provides a good example of the role that a safety net hatchery can play in reintroduction.

A safety net hatchery program would likely involve a captive broodstock component in which some individuals are never released into the wild, but retained in the hatchery to provide a measure of insurance against total absence of returning adults in subsequent generations. The captive broodstock program or other program compatible with ultimate recovery goals could then be used to supplement any natural production that remains. More aggressive reintroductions could occur once factors leading to the initial decline have been addressed.

It is important to recognize that self-sustaining natural production should be the goal of any reintroduction program. The hatchery production element of a reintroduction effort should be viewed as a means of conserving essential genetic material and providing a crucial demographic boost during a period of exceedingly low returns. However, sustained hatchery production over many generations, even if properly managed, can pose serious evolutionary risks to natural production. Thus, the development of criteria for cessation of hatchery releases is a crucial

¹² McClure, M., J. Anderson, G. Pess, T. Cooney, R. Carmichael, C. Baldwin, Recovery Implementation Science Team, L. Weitkamp, D. Holzer, M. Sheer, S. Lindley. 2011. Pacific salmon reintroductions in the Interior Columbia River basin: viability benefits and implementation guidelines. Final Review draft.

component of any hatchery-dependent reintroduction effort. McClure et al. (2011) provide more details on the benefits, risks, and execution of hatchery production during reintroduction.

6.2 John Day Reservoir Operations at Minimum Operating Pool from April through June

The AMIP provided that by December 2011, the Corps, in coordination with the other federal agencies, will complete study plans to include milestones, scope and schedule, and a decision-making process. Implementation of this operation will require the Corps to conduct an evaluation and prepare National Environmental Policy Act documentation. These are necessary to seek authority from Congress to mitigate for related impacts, such as those identified in previous studies affecting irrigation, municipal water supplies, hatchery water supplies, anadromous and resident fish habitat, wildlife habitat, recreation sites, cultural resource sites, and adult passage facilities. This document will be completed by the end of February 2012.

6.3 Breaching Lower Snake River Dams

This Long Term Contingency Action is a science driven study of breaching one or more of the lower Snake River dams and is considered a contingency of last resort in the event there is a significant decline in the status of a Snake River species. This action would be recommended to Congress only when the best scientific information available indicates dam breaching would be effective and is necessary to avoid jeopardizing the continued existence of the affected Snake River species, taking into account the short-term and long-term impacts of such action. Additionally, a study of lower Snake River dam breaching will also have to consider the federal government's Treaty and Trust responsibilities to Indian Tribes, and compliance with other statutory and regulatory requirements.

The Corps, in the AMIP, committed to complete by March 2010 a Plan of Study laying out the scope, schedule, and budget to complete technical studies and a decision-making process concerning breaching the four lower Snake River dams. This Plan of Study was coordinated with NOAA Fisheries, the other Action Agencies and regional sovereigns. The Lower Snake River Fish Passage Improvement Study: Dam Breaching Update Plan of Study (Plan of Study) has been completed and can be found at http://www.nww.usace.army.mil/amip/lrsfip/report/plan_of_study_final_03_30_10.pdf

The completed Plan of Study is available if a Snake River spring/summer Chinook, steelhead, or fall Chinook Significant Decline Trigger is tripped. In this event, an All-H diagnosis including life-cycling modeling will be conducted in coordination with NOAA Fisheries, the RIOG, and other regional parties to determine if Rapid Response Actions are likely to be sufficient or if Long Term Contingency Actions are needed. This assessment will include determining if dam breaching is necessary to address and alleviate the biological trigger conditions for the applicable Snake River species. The goal is to have this analysis completed within 4 – 6 months of tripping a Significant Decline Trigger.

It is anticipated that updated and new information may be available if and when a Significant Decline Trigger is tripped. At such time, the Corps will review the Plan of Study to verify that the scope of studies and other assumptions and costs outlined in the plan are still applicable. The Plan of Study may require updating to incorporate new information, methodologies, and scientific data and, if necessary, revision of cost estimates. At that time, if it is determined that the Corps will proceed with technical studies, additional coordination with regional parties will be considered.

7. Summary of Actions by Listed Species

This chapter summarizes the potential rapid response and long-term contingency actions for the six listed species of Interior Columbia Chinook salmon and steelhead. These actions may be implemented to minimize or mitigate for a significant decline in the status of an ESU/DPS.

7.1 Snake River Spring/Summer Chinook ESU

Potential Rapid Response Actions

- **Potential rapid response hydro actions:** The Studies Review Work Group will develop specific actions in coordination with the Hydro Coordination Team. Potential actions focus on increasing adult and juvenile spring/summer Chinook survival during migration through the eight Snake and Columbia mainstem dams, with a priority to increase the number of adults returning to spawning grounds. Actions may include: 1) adjusting spill (Lower Granite, Ice Harbor, Lower Monumental, and/or McNary dams); 2) adjusting the operation of fish passage facilities; and/or 3) optimizing fish transportation.
- **Potential rapid response actions for predation control:** Actions will more aggressively target predatory fish, birds and invasive species at the dams to increase fish survival. This may include expanding avian predator hazing and/or increasing dam angling for targeted pikeminnow removal.
- **Potential rapid response harvest actions:** The abundance-based management provisions of the *U.S. v. Oregon* agreement comprise the rapid response plan for fisheries in the mainstem Columbia River. If additional protection is needed, NOAA Fisheries will use existing procedural provisions of the existing harvest agreements to seek consensus among the parties to modify the agreements.
- **Potential rapid response safety-net hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) modify existing HGMPs to include actions already identified through the Hatchery Scientific Review Group and/or Hatchery Review Team process, but not included in the current HGMP; 2) accelerate actions already in the HGMP; and/or 3) accelerate approval/permitting processes. Potential actions include: 1) additional reprogramming of production to minimize straying of hatchery-origin adults into the natural spawning habitat; 2) increasing the proportion of natural-origin broodstock in an integrated hatchery program; and/or 3) reprioritizing funding so actions already in the HGMP can be implemented earlier.

Potential Long-Term Contingency Actions

- **Potential long-term contingency hydro actions:** The Corps, in coordination with others, will identify and implement Phase II actions as identified in each project COP. Specific Phase II actions identified in each COP will be reviewed and reassessed using the latest fish survival information to determine appropriate candidate actions.
- **Potential long-term contingency actions for predation control:** These actions would accelerate and complement those taken under the RPA and other efforts. Such actions will be

implemented during the peak spring/summer Chinook passage and may include: 1) short-term lethal take of targeted avian predators at a specific location; 2) providing alternative prey for Foundation, Crescent, or East Sand Island bird colonies; and/or 3) establishing a bass and/or walleye dam angling and/or reward program similar to that established for pikeminnow.

- **Potential long-term contingency harvest actions:** NOAA Fisheries will review all fisheries and assess whether existing harvest management agreements provide adequate protection. If additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements, and its ESA authority to implement changes where required.
- **Potential long-term contingency hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) initiate new conservation hatchery programs, using supplementation and/or captive breeding, as appropriate, to avert extinction of at-risk salmon or steelhead populations; and/or 2) modify/reform existing hatchery programs to meet more conservation-oriented goals while also meeting legal harvest obligations.

Expected Benefits from Actions

In most cases, a potential range of specific survival benefits for Snake River spring/summer Chinook will first need to be estimated based on a specific action for a defined location or reach. Potential survival benefits from a given action can vary considerably depending on the specific conditions that exist for a given year and location (flows, temperatures, numbers of predators, etc). These survival benefits from all the separate actions will be incorporated into a life cycle model to determine expected increases to adult returns from those actions.

7.2 Snake River Fall Chinook ESU

Potential Rapid Response Actions

- **Potential rapid response hydro actions:** The Studies Review Work Group will develop specific actions in coordination with the Hydro Coordination Team. Potential actions will focus on increasing adult and juvenile fall Chinook survival during outmigration through the eight Snake and Columbia mainstem dams, with a priority to increase the number of adults returning to spawning grounds. Actions may include: 1) adjusting spill (Lower Granite, Ice Harbor, Lower Monumental, and/or McNary dams); 2) adjusting the operation of fish passage facilities; and/or 3) optimizing fish transportation.
- **Potential rapid response actions for predation control:** Actions will more aggressively target predatory fish, birds and invasive species at the dams to increase fish survival. Actions will expand avian predator hazing and increase dam angling for targeted pikeminnow removal.
- **Potential rapid response harvest actions:** The abundance-based management provisions of the *U.S. v. Oregon* agreement comprise the rapid response plan for fisheries in the mainstem Columbia River. If additional protection is needed, NOAA Fisheries will use existing

procedural provisions of the existing harvest agreements to seek consensus among the parties to modify the agreements.

- **Potential rapid response safety-net hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) modify existing HGMPs to include actions already identified through the Hatchery Scientific Review Group and/or Hatchery Review Team process but not included in the current HGMP; 2) accelerate actions already in the HGMP; and/or 3) accelerate approval/permitting processes. Potential actions include: 1) additional reprogramming of production to minimize straying of hatchery-origin adults into the natural spawning habitat; 2) increasing the proportion of natural-origin broodstock in an integrated hatchery program; and/or 3) reprioritizing funding so actions already in the HGMP can be implemented earlier.

Potential Long-Term Contingency Actions

- **Potential long-term contingency hydro actions:** The Corps, in coordination with others, will identify and implement Phase II actions as identified in each project COP. Specific Phase II actions identified in each COP will be reviewed and reassessed using the latest fish survival information to determine appropriate candidate actions.
- **Potential long-term contingency actions for predation control:** These actions would complement those taken under the RPA and other efforts. Such actions will be implemented during the peak fall Chinook passage and may include: 1) short-term lethal take of targeted avian predators at a specific location; 2) providing alternative prey for Foundation, Crescent, or East Sand Island bird colonies; and/or 3) establishing a bass and/or walleye dam angling and/or reward program similar to that established for pikeminnow.
- **Potential long-term contingency harvest actions:** NOAA Fisheries will review all fisheries and assess whether existing harvest management agreements provide adequate protection. If additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements, and its ESA authority to implement changes where required.
- **Potential long-term contingency hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) initiate new conservation hatchery programs, using supplementation and/or captive breeding, as appropriate, to avert extinction of at-risk salmon or steelhead populations; and/or 2) modify/reform existing hatchery programs to meet more conservation-oriented goals while also meeting legal harvest obligations.

Expected Benefits from Actions

In most cases, a potential range of specific survival benefits for Snake River fall Chinook will first need to be estimated based on a specific action for a defined location or reach. Potential survival benefits from a given action can vary considerably depending on the specific conditions that exist for a given year and location (flows, temperatures, numbers of predators, etc). These survival benefits from all the separate actions will be incorporated into a life cycle model to determine expected increases to adult returns from those actions.

7.3 Snake River Steelhead DPS

Potential Rapid Response Actions

- **Potential rapid response hydro actions:** The Studies Review Work Group will develop specific actions in coordination with the Hydro Coordination Team. Potential actions focus on increasing adult and juvenile steelhead survival during outmigration through the eight Snake and Columbia mainstem dams, with a priority to increase the number of adults returning to spawning grounds. Actions may also increase respawning rates for kelts. Actions may include: 1) adjusting spill (Ice Harbor, Lower Monumental, and/or McNary dams); 2) adjusting the operation of fish passage facilities; and/or 3) optimizing fish transportation.
- **Potential rapid response actions for predation control:** Actions will more aggressively target predatory fish, birds and invasive species at the dams to increase fish survival. This may include expanding avian predator hazing and/or increasing dam angling for targeted pikeminnow removal.
- **Potential rapid response harvest actions:** The abundance-based management provisions of the *U.S. v. Oregon* agreement comprise the rapid response plan for fisheries in the mainstem Columbia River. If additional protection is needed, NOAA Fisheries will use existing procedural provisions of the existing harvest agreements to seek consensus among the parties to modify the agreements.
- **Potential rapid response safety-net hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) modify existing HGMPs to include actions already identified through the Hatchery Scientific Review Group and/or Hatchery Review Team process but not included in the current HGMP; 2) accelerate actions already in the HGMP; and/or 3) accelerate approval/permitting processes. Potential actions include: 1) additional reprogramming of production to minimize straying of hatchery-origin adults into the natural spawning habitat; 2) increasing the proportion of natural-origin broodstock in an integrated hatchery program; and/or 3) reprioritizing funding so actions already in the HGMP can be implemented earlier.

Potential Long-Term Contingency Actions

- **Potential long-term contingency hydro actions:** The Corps, in coordination with others, will identify and implement Phase II actions as identified in each project COP. Specific Phase II actions identified in each COP will be reviewed and reassessed using the latest fish survival information to determine appropriate candidate actions.
- **Potential long-term contingency actions for predation control:** These actions would complement those taken under the RPA and other efforts. Such actions will be implemented during the peak steelhead passage and may include: 1) short-term lethal take of targeted avian predators at a specific location; 2) providing alternative prey for Foundation, Crescent, or East Sand Island bird colonies; and/or 3) establishing a bass and/or walleye dam angling and/or reward program similar to that established for pikeminnow.

- **Potential long-term contingency harvest actions:** NOAA Fisheries will review all fisheries and assess whether existing harvest management agreements provide adequate protection. If additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements, and its ESA authority to implement changes where required.
- **Potential long-term contingency hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) initiate new conservation hatchery programs, using supplementation and/or captive breeding, as appropriate, to avert extinction of at-risk salmon or steelhead populations; and/or 2) modify/reform existing hatchery programs to meet more conservation-oriented goals while also meeting legal harvest obligations.

Expected Benefits from Actions

In most cases, a potential range of specific survival benefits for Snake River steelhead will first need to be estimated based on a specific action for a defined location or reach. Potential survival benefits from a given action can vary considerably depending on the specific conditions that exist for a given year and location (flows, temperatures, numbers of predators, etc). These survival benefits from all the separate actions will be incorporated into a life cycle model to determine expected increases to adult returns from those actions.

7.4 Upper Columbia River Spring Chinook ESU

Potential Rapid Response Actions

- **Potential rapid response hydro actions:** The Studies Review Work Group will develop specific actions in coordination with the Hydro Coordination Team. Potential actions focus on increasing on adult and juvenile spring Chinook survival during outmigration at McNary, John Day, The Dalles and Bonneville dams, with a priority to increase the number of adults returning to spawning grounds. Actions may include: 1) adjusting spill (McNary and/or John Day dams); and/or 2) adjusting the operation of fish passage facilities.
- **Potential rapid response actions for predation control:** Actions will more aggressively target predatory fish, birds and invasive species at McNary, John Day, The Dalles, and Bonneville dams to increase fish survival. Actions will expand avian predator hazing and may increase dam angling for targeted pikeminnow removal
- **Potential rapid response harvest actions:** The abundance-based management provisions of the *U.S. v. Oregon* agreement comprise the rapid response plan for fisheries in the mainstem Columbia River. If additional protection is needed, NOAA Fisheries will use existing procedural provisions of the existing harvest agreements to seek consensus among the parties to modify the agreements.
- **Potential rapid response safety-net hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) modify existing HGMPs to include actions already identified through the Hatchery Scientific Review Group and/or Hatchery Review Team process but not included in the current HGMP; 2) accelerate actions

already in the HGMP; and/or 3) accelerate approval/permitting processes. Potential actions include: 1) additional reprogramming of production to minimize straying of hatchery-origin adults into the natural spawning habitat; 2) increasing the proportion of natural-origin broodstock in an integrated hatchery program; and/or 3) reprioritizing funding so actions already in the HGMP can be implemented earlier.

Potential Long-Term Contingency Actions

- **Potential long-term contingency hydro actions:** The Corps, in coordination with others, will identify and implement Phase II actions as identified in each project COP. Specific Phase II actions identified in each COP will be reviewed and reassessed using the latest fish survival information to determine appropriate candidate actions.
- **Potential long-term contingency actions for predation control:** These actions would complement those taken under the RPA and other efforts. Such actions will be implemented during the peak spring Chinook passage and may include: 1) short-term lethal take of targeted avian predators at a specific location; 2) providing alternative prey for Foundation, Crescent, or East Sand Island bird colonies; and/or 3) establishing a bass and/or walleye dam angling and/or reward program similar to that established for pikeminnow.
- **Potential long-term contingency harvest actions:** NOAA Fisheries will review all fisheries and assess whether existing harvest management agreements provide adequate protection. If additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements, and its ESA authority to implement changes where required.
- **Potential long-term contingency hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) initiate new conservation hatchery programs, using supplementation and/or captive breeding, as appropriate, to avert extinction of at-risk salmon or steelhead populations; and/or 2) modify/reform existing hatchery programs to meet more conservation-oriented goals while also meeting legal harvest obligations.

Expected Benefits from Actions

In most cases, a potential range of specific survival benefits for Upper Columbia River spring Chinook will first need to be estimated based on a specific action for a defined location or reach. Potential survival benefits from a given action can vary considerably depending on the specific conditions that exist for a given year and location (flows, temperatures, numbers of predators, etc). These survival benefits from all the separate actions will be incorporated into a life cycle model to determine expected increases to adult returns from those actions.

7.5 Upper Columbia River Steelhead DPS

Potential Rapid Response Actions

- **Potential rapid response hydro actions:** The Studies Review Work Group will develop specific actions in coordination with the Hydro Coordination Team. Potential actions focus on increasing adult and juvenile steelhead survival during outmigration through McNary, John Day, The Dalles, and Bonneville dams, with a priority to increase the number of adults returning to spawning grounds. Actions may also increase respawning rates for kelts. . Actions may include: 1) adjusting spill (McNary and/or John Day dams); and/or 2) adjusting the operation of fish passage facilities.
- **Potential rapid response actions for predation control:** Actions will more aggressively target predatory fish, birds and invasive species at McNary, John Day, The Dalles and Bonneville dams to increase fish survival. Actions will expand avian predator hazing and may increase dam angling for targeted pikeminnow removal
- **Potential rapid response harvest actions:** The abundance-based management provisions of the *U.S. v. Oregon* agreement comprise the rapid response plan for fisheries in the mainstem Columbia River. If additional protection is needed, NOAA Fisheries will use existing procedural provisions of the existing harvest agreements to seek consensus among the parties to modify the agreements.
- **Potential rapid response safety-net hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) modify existing HGMPs to include actions already identified through the Hatchery Scientific Review Group and/or Hatchery Review Team process but not included in the current HGMP; 2) accelerate actions already in the HGMP; and/or 3) accelerate approval/permitting processes. Potential actions include: 1) additional reprogramming of production to minimize straying of hatchery-origin adults into the natural spawning habitat; 2) increasing the proportion of natural-origin broodstock in an integrated hatchery program; and/or 3) reprioritizing funding so actions already in the HGMP can be implemented earlier.

Potential Long-Term Contingency Actions

- **Potential long-term contingency hydro actions:** The Corps, in coordination with others, will identify and implement Phase II actions as identified in each project COP. Specific Phase II actions identified in each COP will be reviewed and reassessed using the latest fish survival information to determine appropriate candidate actions.
- **Potential long-term contingency actions for predation control:** These actions would complement those taken under the RPA and other efforts. Such actions will be implemented during the peak steelhead passage and may include: 1) short-term lethal take of targeted avian predators at a specific location; 2) providing alternative prey for Foundation, Crescent, or East Sand Island bird colonies; and/or 3) establishing a bass and/or walleye dam angling and/or reward program similar to that established for pikeminnow.

- **Potential long-term contingency harvest actions:** NOAA Fisheries will review all fisheries and assess whether existing harvest management agreements provide adequate protection. If additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements, and its ESA authority to implement changes where required.
- **Potential long-term contingency hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) initiate new conservation hatchery programs, using supplementation and/or captive breeding, as appropriate, to avert extinction of at-risk salmon or steelhead populations; and/or 2) modify/reform existing hatchery programs to meet more conservation-oriented goals while also meeting legal harvest obligations.

Expected Benefits from Actions

In most cases, a potential range of specific survival benefits for Upper Columbia River steelhead will first need to be estimated based on a specific action for a defined location or reach. Potential survival benefits from a given action can vary considerably depending on the specific conditions that exist for a given year and location (flows, temperatures, numbers of predators, etc). These survival benefits from all the separate actions will be incorporated into a life cycle model to determine expected increases to adult returns from those actions.

7.6 Mid-Columbia River Steelhead DPS

Potential Rapid Response Actions

- **Potential rapid response hydro actions:** The Studies Review Work Group will develop specific actions in coordination with the Hydro Coordination Team. Potential actions focus on increasing adult and juvenile steelhead survival during outmigration through McNary, John Day, The Dalles, and Bonneville dams, with a priority to increase the number of adults returning to spawning grounds. Actions may also increase respawning rates for kelts. Actions may include: 1) adjusting spill (John Day Dam); and/or 2) adjusting the operation of fish passage facilities.
- **Potential rapid response actions for predation control:** Actions will more aggressively target predatory fish, birds and invasive species at McNary, John Day, The Dalles, and Bonneville dams to increase fish survival. Actions will expand avian predator hazing and may increase dam angling for targeted pikeminnow removal
- **Potential rapid response harvest actions:** The abundance-based management provisions of the *U.S. v. Oregon* agreement comprise the rapid response plan for fisheries in the mainstem Columbia River. If additional protection is needed, NOAA Fisheries will use existing procedural provisions of the existing harvest agreements to seek consensus among the parties to modify the agreements.
- **Potential rapid response safety-net hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) modify existing HGMPs to include actions already identified through the Hatchery Scientific Review Group and/or

Hatchery Review Team process but not included in the current HGMP; 2) accelerate actions already in the HGMP; and/or 3) accelerate approval/permitting processes. Potential actions include: 1) additional reprogramming of production to minimize straying of hatchery-origin adults into the natural spawning habitat; 2) increasing the proportion of natural-origin broodstock in an integrated hatchery program; and/or 3) reprioritizing funding so actions already in the HGMP can be implemented earlier.

Potential Long-Term Contingency Actions

- **Potential long-term contingency hydro actions:** The Corps, in coordination with others, will identify and implement Phase II actions as identified in each project COP. Specific Phase II actions identified in each COP will be reviewed and reassessed using the latest fish survival information to determine appropriate candidate actions.
- **Potential long-term contingency actions for predation control:** These actions would complement those taken under the RPA and other efforts. Such actions will be implemented during the peak steelhead passage and may include: 1) short-term lethal take of targeted avian predators at a specific location; 2) providing alternative prey for Foundation, Crescent, or East Sand Island bird colonies; and/or 3) establishing a bass and/or walleye dam angling and/or reward program similar to that established for pikeminnow.
- **Potential long-term contingency harvest actions:** NOAA Fisheries will review all fisheries and assess whether existing harvest management agreements provide adequate protection. If additional protection is necessary, it will use existing procedural provisions of the agreements to seek consensus among the parties to modify the agreements, and its ESA authority to implement changes where required.
- **Potential long-term contingency hatchery actions:** Action Agencies and NOAA Fisheries will work with hatchery operators and fishery co-managers to: 1) initiate new conservation hatchery programs, using supplementation and/or captive breeding, as appropriate, to avert extinction of at-risk salmon or steelhead populations; and/or 2) modify/reform existing hatchery programs to meet more conservation-oriented goals while also meeting legal harvest obligations.

Expected Benefits from Actions

In most cases, a potential range of specific survival benefits for Mid-Columbia River steelhead will first need to be estimated based on a specific action for a defined location or reach.

Potential survival benefits from a given action can vary considerably depending on the specific conditions that exist for a given year and location (flows, temperatures, numbers of predators, etc). These survival benefits from all the separate actions will be incorporated into a life cycle model to determine expected increases to adult returns from those actions.

Appendix 1

2010 FCRPS BiOp Adaptive Management Framework

The adaptive management provisions in the 2007 BA and 2008 RPA establish contingency planning if fish abundance and productivity are decreasing at the time of the 2013 and 2016 Comprehensive Evaluations (RPA Action 3). As described in the 2007 FCRPS BA, decreasing abundance in 30% to 50% of a species' populations (as indicated by evaluations of recruits per spawner (R/S), lambda, and other productivity, biological, and environmental metrics), would initiate an All-H diagnosis to determine the limiting factors. The 2010 BiOp takes a more precautionary approach for implementing the RPA by enhancing the contingency planning processes to provide additional Early Warning Indicators and Significant Decline Triggers. This enhancement ensures that contingency planning can occur throughout the ten-year term of the 2008 BiOp and RPA, and at the earliest possible juncture after a problem is discovered.

The 2010 BiOp adaptive management framework is shown graphically in Figure A.1-1.

Figure 1: Refined Adaptive Management Implementation Provisions

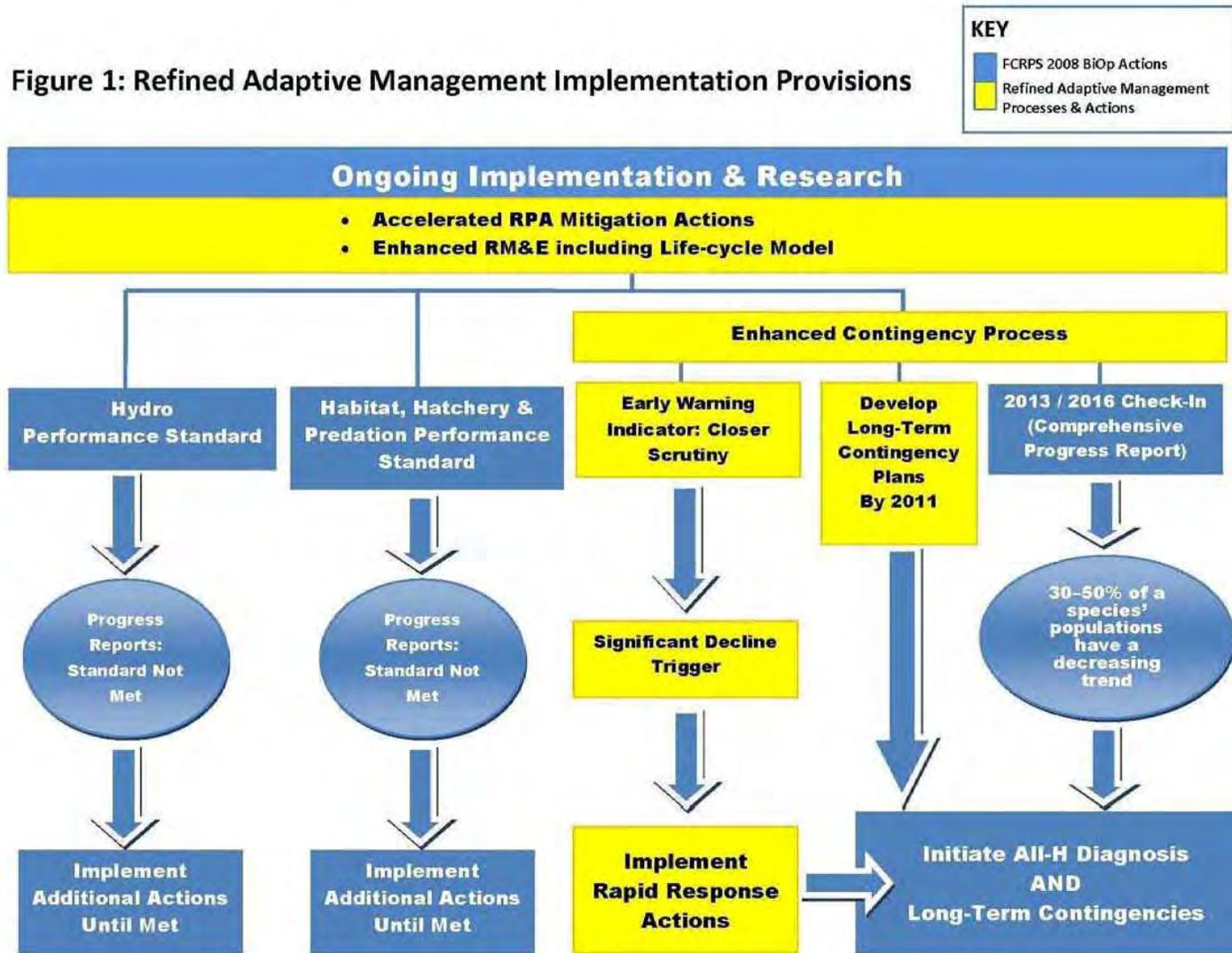


Figure A.1-1. Refined Adaptive Management Implementation Provisions.

Appendix 2

Interior Columbia Salmon and Steelhead Populations Being Propagated in Conservation Hatchery Programs

Tables A.2-1 through A.2-6 describe the conservation hatchery programs for Interior Columbia salmon and steelhead populations. Table A.2-7 discusses the existing action agency-funded captive broodstock safety-net facilities for listed salmonids.

Table A.2-1. Upper Columbia Spring Chinook Salmon ESU Populations¹³ Currently Propagated in a Conservation Hatchery Program.

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
Eastern Cascades	Methow River	Yes - Methow FH	WDFW	PUD		Currently propagated in a conservation hatchery program
		Yes - Winthrop NFH	USFWS	BOR/BPA		Currently propagated in a conservation hatchery program
	Entiat River	No	None			
	Wenatchee River	Yes - Eastbank FH	WDFW	PUD		Currently propagated in a conservation hatchery program
	Okanogan R - Extirpated					

Table A.2-2. Upper Columbia Steelhead DPS Populations and Currently t Propagated in a Conservation Hatchery Program.

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
Eastern Cascades	Wenatchee River	Yes - Eastbank FH	WDFW	PUD		Currently propagated in a conservation hatchery program
	Methow River	Yes - Winthrop NFH	USFWS	BOR/BPA		Currently propagated in a conservation hatchery program
		Methow FH	WDFW	PUD		
	Entiat River	No	None			
	Okanogan River	Yes - Cassimer Bar FH	CCT	NPCC/ BPA		Currently propagated in a conservation hatchery program
Rock Cr	No	None				

¹³ Reference: Table 3.d of “Interior Columbia Basin TRT: Viability Criteria for Application to Interior Columbia Basin Salmonids ESUs” authored by Interior Columbia Basin Technical Recover Team, July 2005

Table A.2-3. Mid-Columbia Steelhead DPS Populations Currently Propagated in a Conservation Hatchery Program.

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
Yakima	Upper Yakima	Yes - Kelt Reconditioning Program at Prosser FH	YIN/CRITFC	NPCC/ BPA		Potential Long-term contingency action: hatchery rearing of adults to maturity, artificial spawning, and propagation of offspring for supplementation program. (Would need to be able to identify population origin of parents to avoid loss of diversity when mating adults and when releasing offspring in the wild)
	Naches					
	Toppenish					
	Satus					
Eastern Cascades	Deschutes W.	Yes - Round Butte FH	ODFW	PGE & BPA		Currently propagated in a conservation hatchery program
	Deschutes E.	Yes - Round Butte FH	ODFW	PGE & BPA		Currently propagated in a conservation hatchery program
	Klickitat	No	None			
	Fifteenmile Cr	No	None			
	Rock Cr	No	None			
Umatilla/ Walla Walla	Umatilla	Yes -Umatilla FH	ODFW/ CTUIR	NPCC/ BPA		Currently propagated in a conservation hatchery program
	Walla Walla	No	None			
	Touchet	Yes - Touchet R. Endemic Program at Lyons Ferry FH	WDFW	LSRCP/ BPA		Currently propagated in a conservation hatchery program
John Day	Lower Mainstem	No	None			
	North Fork	No	None			
	Upper Mainstem	No	None			
	Middle Fork	No	None			
	South Fork	No	None			

Table A.2-4. Snake River Spring/Summer Chinook ESU Populations Currently Propagated in a Conservation Hatchery Program.

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
Lower Snake	Tucannon	Yes -Tucannon FH	WDFW	BPA/ LSRCP		Currently propagated in a conservation hatchery program
	Asoin - Functionally Extirpated					
Grande Ronde/ Imnaha	Catherine Creek	Yes -Lookingglass FH	ODFW	LSRCP/ NPCC/BPA		Currently propagated in a conservation hatchery program
	Upper Grande Ronde	Yes -Lookingglass FH	ODFW & CTUIR	LSRCP/ NPCC/BPA		Currently propagated in a conservation hatchery program
	Minam River	No	None			
	Wenaha River	No	None			
	Lostine/Wallowa Rivers	Yes -Lookingglass FH	NPT & ODFW	LSRCP/ NPCC/BPA		Currently propagated in a conservation hatchery program
	Imnaha River	Yes -Lookingglass FH	ODFW	LSRCP/ BPA		Currently propagated in a conservation hatchery program
	Big Sheep Creek - Functionally Extirpated Lookingglass - Functionally Extirpated	Reintroduction program	ODFW	LSRCP/ BPA		
South Fork Salmon	South Fork Salmon Mainstem	Yes -McCall FH	IDFG	LSRCP/ BPA		Currently propagated in a conservation hatchery program
	Secesh River	No	None			
	East Fork S. Fork Salmon (including Johnson Creek)	Yes - McCall FH & JCAPE	IDFG & NPT	LSRCP/ NPCC/BPA		Currently propagated in a conservation hatchery program
	Little Salmon River (including Rapid River)	No	None			
Middle Fork Salmon	Big Creek	No	None			
	Bear Valley/Elk Creek	No	None			
	Marsh Creek	No	None			
	Sulphur Creek	No	None			
	Camas Creek	No	None			
	Loon Creek	No	None			

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
	Chamberlain Creek	No	None			
	Lower Middle Fork Salmon (below Ind. Crk)	No	None			
	Upper Middle Fork Salmon (above Ind. Crk)	No	None			
Upper Salmon	Lemhi River	TBD	SBT	BPA		Conservation hatchery program in planning stage
	Valley Creek	No	None			
	Yankee Fork	Yes - Sawtooth FH/TBD	IDFG/ SBT	BPA		Conservation hatchery program in planning stage
	Upper Salmon River (above Redfish Lake)	Yes - Sawtooth FH	IDFG	LSRCP/ BPA		Currently propagated in a conservation hatchery program
	North Fork Salmon R	No	None			
	Lower Mainstem (below Redfish Lake)	No	None			
	East Fork Salmon R	Yes – Yes -Eagle FH & Manchester Lab	IDFG & NOAA	NPCC/ BPA		Currently propagated in a conservation hatchery program. Possibly expand the current Idaho Chinook Captive Propagation project (a captive rearing experiment) to a captive brood program?
	Pahsimeroi River	Yes - Pahsimeroi FH	IDFG	IPC		Currently propagated in a conservation hatchery program
	Panther Cr. Extirpated					

Table A.2-5. Snake River Fall Chinook Salmon ESU Populations Currently Propagated in a Conservation Hatchery Program.

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
Mainstem and Lower Tributaries	Snake River Fall Chinook	Yes - Lyons Ferry Hatchery	WDFW	LSRCP/ BPA		Snake River fall Chinook are currently being propagated at multiple Action Agency-funded facilities. No new propagation programs needed.
		Fall Chinook Acclimation Ponds (FCAP) Program	NPT	NPCC/ BPA LSRCP/ BPA		
		Nez Perce Tribal Hatchery	NPT	NPCC/ BPA		
		Incubation and rearing may also occur at:				
		Oxbow FH	IDFG	IPC		
		Irrigon FH	ODFW	LSRCP/ BPA		
		Umatilla FH	ODFW	LSRCP/ BPA		

Table A.2-6. Snake River Steelhead DPS Populations Currently Propagated in a Conservation Hatchery Program.

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
Lower Snake	Tucannon (A, but below LGR)	Yes - Endemic Program at Tucannon FH	WDFW	LSRCP/BPA		Currently propagated in a conservation hatchery program
	Asotin (A)	No	None			
Imnaha R	Imnaha R (A)	Yes -Wallowa and Irrigon FH	ODFW	LSRCP/BPA		Currently propagated in a conservation hatchery program
Grand Ronde	Upper Mainstem (A)	No	None			
	Lower Mainstem (A)	No	None			
	Joseph Creek (A)	No	None			
	Wallowa R. (A)	No	None			
Clearwater River	Lower Mainstem (A)	No	None			
	Lolo Cr (A & B)	No	None			
	Lochsa R (B)	No	None			
	Selway R (B)	No	None			
	South Fork (B)	No	None			
	North Fork Extirpated	Dworshak NFH ¹⁴	DSFWS	GDE/BPA		
	Chamberlain Cr (A)	No	None			
	Secesh River (B)	No	None			
	South Fork Salmon (B)	No	None			
	Panther Creek (A)	No	None			
	Lower Middle Fork Tribs (B)	No	None			
	Upper Middle Fork	No	None			

¹⁴ The origin of Dworshak NFH summer steelhead (B) stock was North Fork Clearwater River and the hatchery stock is part of DPS.

MPG	Listed Population	Is the Listed Population Currently Being Propagated in a Hatchery Facility?	Facility Operator	Funding Source	Priority Population for Safety Net Program?	Rapid Response Actions/Comments
	Tribs (A)					
	North Fork (A)	No	None			
	Lemhi River (A)	No	None			
	Pahsimeroi River (A)	No	None			
	East Fork Salmon (A)	Yes - Sawtooth and Magic Valley FH	IDFG	LSRCP/ BPA		
	Upper Mainstem (A)	No				

Table A.2-7. Existing Action Agency-funded Captive Broodstock Safety-Net Facilities for Listed Salmonids¹⁵

Facility	Operator	Facility Description
Bonneville Captive Broodstock Facility	ODFW	In 1998, a new building and rearing facilities were constructed at Bonneville Fish Hatchery for the Oregon spring Chinook salmon captive brood stock program. Maturing adults are held in three circular fiberglass tanks, each 942 ft. ³ (20' x 3') in size. An additional four circular tanks (236 ft. ³ ea.) are available for holding and segregation. The spawning area consists of an anesthetizing tank, spawning table, fish health, fish research, and data entry stations
Manchester Marine Laboratory Captive Broodstock Facility	NOAA	The Manchester Research Station (MRS) is a seawater facility located on Clam Bay in Puget Sound. This facility includes an about 14,000 ft ² biosecure seawater rearing building currently containing twenty 20'x4' circular fiberglass tanks (about 1600 ft ³ total rearing volume) and about 10,000 ft ² of biosecure freshwater rearing buildings at a nearby satellite facility currently containing thirteen 12'x3' and ten 5'x2' circular fiberglass tanks and ten 18'x4'x2' fiberglass raceways (about 2000 ft ³ total)

¹⁵ These facilities are currently being used for captive broodstock safety-net programs for listed salmon. When a rapid response is triggered, it may be appropriate to take populations at extremely high risk of extinction into a captive broodstock program. If and when the need arises, there may be space available for new captive broodstock programs at these facilities.

Appendix 3

Response to Comments

Response to Comments on the Draft Rapid Response/Long-term Contingency Plan

Predation Management: Request that Agencies work with the Avian Management Plan development group to explore rapid response actions.

RESPONSE: The Avian management groups' - discussions about potential actions and benefits to include in the management plans have contributed alternatives that were used in the development of potential rapid response and long term contingency (RR/LTC) predation actions. Actions that will provide significant benefits are expected to be prioritized and implemented within the life of BiOp. Others actions may become potential RR/LTC actions if a trigger is activated, depending on the particular ESU/DPS involved and the conditions existing if such an event occurs. It is expected that the regional predation experts involved with establishing these avian management plans will also participate in regarding what RR/LTC actions will be implemented should the need arise.

Hatchery: Request that the Agencies consider whether it may be advisable to increase the number of hatchery fish allowed to spawn naturally rather than decrease the number of such fish as is currently proposed in the Rapid Response/Long-Term contingency plan.

RESPONSE: NOAA and the Action Agencies reviewed the following statement in the December draft RR/LTC plan: "... examples of actions that could be implemented as a rapid response include reprogramming production to minimize straying of hatchery-origin adults into the natural spawning habitat, reducing the proportion of hatchery-origin spawners (pHOS) in wild spawning areas, or increasing the proportion of natural-origin broodstock (pNOB) in an integrated hatchery program" NOAA and the Action Agencies decided that actions should provide more flexibility. The revised text in Section 5.2 (p. 23) states: "Rapid response actions include deviations from actions specified in HGMPs such as reprogramming production to modify ... the mix of natural-origin and hatchery-origin fish in the broodstock or on the spawning grounds ..." Corresponding changes were made in Table 5 (p.24).

Rapid Response Actions – Effectiveness: Suggest that the Agencies clarify whether/how they plan to validate the impacts of the rapid response actions and their effectiveness.

RESPONSE: Pre-implementation, the Agencies will assess the potential benefits of the proposed Rapid Response action(s) using the life-cycle model and COMPASS, comparisons to similar actions at the dam in question or at other dams and any other updated scientific information. After implementation, PIT tag reach survival estimates (for adults or juveniles) or other, similar data will be used to assess whether or not the actions were as effective as anticipated. This information will be reported in the annual progress or comprehensive reports.

Reintroduction: Request that the Agencies clarify the term “reintroduction” and address how the treatment in the Rapid Response/Long-Term Contingency Plan relates to reintroduction efforts such as the Snake River Sockeye Program and the Colville’s reintroduction program in the Okanogan.

RESPONSE: NOAA and the Action Agencies agreed with the commenter that clarification was needed to provide appropriate context for the term “reintroduction” as a potential long-term contingency action. The text in Sections 5.3 (p. 23) and 6.1 (p. 30) have been amended to address this concern. For example, revisions to Section 6.1 “LTC Reintroduction Actions” begins with this paragraph: “NOAA Fisheries and the Action Agencies have determined that, in special circumstances, a safety-net hatchery program is an appropriate reintroduction tool as part of a long-term contingency plan (Section 5.3). Establishing such a program may be an essential action for conservation of an important evolutionary lineage or ESU that would likely go extinct without intervention. It is appropriate when there are no, or very few, other stocks remaining in an ESU that could be used as a reintroduction source in the future. Recovery of Sawtooth Valley (Snake River) sockeye salmon, which reached critically low abundances in the early 1990s, provides a good example of the role that a safety net hatchery can play in reintroduction.” The reference to Section 5.3 is a new subsection under Hatchery Programs titled “Reintroduction,” which describes this activity as “[t]he ultimate goal of a safety-net program.”

Response to Comments on the Draft Rapid Response/Long-term Contingency Plan Received From the State of Oregon

Oregon: “Key elements of a legally and scientifically valid contingency plan would include: Implementation triggers that are tied to the performance expectations of the BiOp, and not solely to catastrophic declines such as the ‘Early Warning Indicator’ and the ‘Significant Decline Trigger’ described in the AMIP.”

RESPONSE: The AMIP was directly responsive to the recommendations of independent scientists who reviewed the 2008 BiOp at NOAA’s request. Briefly, the reviewers felt the BiOp’s projections of fish population response to the BiOp’s mitigation measures were reasonable, but urged that a contingency plan be developed to allow for a more immediate response to any sudden and unexpected declines in population abundance. Oregon proposes an additional contingency mechanism that would presumably provide additional mitigation in the event fish population trajectories during the term of the BiOp deviated significantly from the BiOp’s projections. However, the BiOp provides such a mechanism in the form of the 2013 and 2016 Comprehensive Evaluations called for in the RPA. As provided in the RPA table, “the Comprehensive Evaluations will also describe the status of the physical and biological factors identified in this RPA, and compare these with the expectations in the survival improvements identified in the Comprehensive Analysis or Supplemental Comprehensive Analysis... The Comprehensive Evaluation will include a discussion of the Action Agencies’ plan to address any shortcomings of current estimated survival improvements...”. We believe this is consistent and responsive to the comments from the State of Oregon.

Oregon: “The plan describes that Rapid Response Actions are intended to contribute to increased abundance ‘by the next season’s returning adults.’ While this is a laudable goal, it sets up an unreasonable assurance that implementing these actions will provide increased adult abundance in about one year.”

RESPONSE: Neither the AMIP nor the draft plan are intended to provide an increase in adult abundance in the year following implementation. The AMIP provides that the rapid response actions are to be implemented "as soon as practicable, but no later than 12 months from the date the trigger is tripped."

Elsewhere, the AMIP says the new trigger, "if tripped, will activate a Rapid Response (within 1-12 months)." Thus, AMIP rapid response actions must be implemented within twelve months with the expectation that there will be an immediate improvement in survival, but the result of that improvement does not have to affect adults returning in that year. For example, improving juvenile survival would be an immediate improvement but would not result in improved adult returns for 1-3 years, depending on the species. This is acceptable and the contemplated result under the AMIP.

Oregon: “*The RIOG would be better served with a plan that provides a more meaningful assessment of expected survival benefits. While many of the identified actions could reasonably be expected to provide some additional survival benefit, as presented, some survival benefits range from no benefit at all to theoretically perfect fixes.*”

RESPONSE: The decision-making process laid out in the RR/LTC plan proposes to implement an all-H analysis in the event a significant decline trigger is tripped. This analysis is intended both to help determine the causes of the decline and to aid in determining which limiting factors should be addressed. A lifecycle modeling analysis would be employed to estimate the survival changes likely to result from the rapid response actions under consideration. This is intended both to help select the most effective actions, and to determine whether those actions are likely to be effective in reversing the decline. This analysis would also then be used to inform a decision as to whether long term contingency actions should be implemented. The life-cycle model is anticipated to be updated by the end of 2012. Mechanisms are therefore in place which will provide a meaningful assessment of survival benefits in the process of implementing RR/LTC actions.

Oregon: “*Identifying and readying short-term contingency actions with recognized survival benefits so that they can be implemented with little or no lead time when triggered. These short-term contingency actions should at least include: (1) providing spill to the gas caps or other biological constraints; (2) restoring flow augmentation lost from Montana and Idaho storage reservoirs to the levels called for in the 2000 RPA; and (3) securing additional flow augmentation from these and other resources so that it will be available when needed.*”

RESPONSE: The AMIP states: “Specific actions will be based on the most recent data available...”. Accordingly, specific rapid response hydro actions will focus on spill and transportation operations. The Action Agencies, NOAA, RIOG, and appropriate regional technical groups will work together to review and assess the most up to date survival data for the ESU of concern to identify specific actions, based on the best available science.

Oregon: “*Identification and advance preparation of long-term contingency actions, such as breaching the lower Snake River dams, during the term of the BiOp. Specifically, all necessary studies, authorizations, and mitigation measures should be pursued during the life of the BiOp so that these options of last resort can be implemented at or near the conclusion of the BiOp’s term, rather than a decade or more afterwards.*”

RESPONSE: The AMIP included a requirement for the Corps to prepare a Plan of Study identifying the process that would be initiated for evaluating whether Snake River dam would be effective in the event a Significant Decline Trigger is tripped. This Plan of Study was completed in March 2010. As addressed in the AMIP, the analysis of the status of the Snake River species does not support moving forward with evaluation of breaching the Snake River dams at this time. If a significant decline trigger is tripped in the future, and it is determined that consideration of this long-term contingency action is warranted to address the species affected, then a science driven study of breaching will be initiated as identified in the Plan of Study. Furthermore, NOAA and the Action Agencies do not believe that it would be responsible or prudent to divert

resources away from focused implementation of RPA actions that will improve fish survival in order to initiate the current Plan of Study, particularly when the NOAA's analysis in the 2008 BiOp, AMIP, and 2010 BiOp concluded that such an action is not necessary to avoid jeopardizing the continued existence of affected Snake River species.

Oregon: The RR/LTC plan's discussion of the range of potential benefits from increasing avian deterrent actions (primarily hazing) at the projects is overly optimistic at the upper end of the range and, in particular, for two of dams; further, a specific hard estimate is needed.

RESPONSE: Benefits from potential rapid response actions at a given dam were intentionally expressed as a range in recognition of several important factors. Primary among those factors is that the real benefits for actions taken in a given year will depend on the specific conditions (both environmentally and operationally) for that year, as well as the effectiveness of current and planned modifications at the dam and any potential dissuasion actions taken at the avian colonies. We agree that reaching the upper level of such a range of benefits would be very difficult to achieve, but expressing the theoretical potential provides the region with the means to weigh different types of actions. We also stated that there is significant movement of avian predators among the projects that will likely make the estimate of system wide benefits less than the total of the potential benefits at individual dams.

Oregon: The RR/LTC plan's statement that the agencies' avian predation management plans are soon approaching the ability to make meaningful estimates of benefits from colony based actions are of concern, citing that the final plans were not yet at 30% completion.

RESPONSE: We agree that a final Avian Predation Management Plan is some time off, but the region has spent considerable time reviewing the benefits analysis for both inland and estuary avian colony actions in order to prioritize the actions that will be included in the final plan. This analysis is quite clear on where beneficial actions are likely to make the most difference and provides meaningful relative comparisons of the value of those actions.

The Cormorant Management Plan also is not complete, but the agencies have received a draft report which includes estimates of the benefits from colony reductions and estimates of baseline predation rates. The agencies also are evaluating the effectiveness of nesting dissuasion activities on East Sand Island.

Oregon: The Corps' actions of working toward reducing current harassment activities at the projects to save O&M dollars seems incongruent with plans to increase harassment efforts should a trigger be hit.

RESPONSE: First, a long term program of maintenance-level harassment of avian predators is not comparable to a localized and intense effort to minimize predation during the peak outmigration passage of an ESU that has hit a trigger .

Furthermore, due to the success of recently installed avian wires and a better understanding of how birds move among the dams, the Corps can now more efficiently deploy harassment

activities and is therefore making more informed decisions regarding where and when to utilize its available O&M funds. .

Oregon: With regard to hatcheries, the draft plan calls for the establishment of three regional planning groups, comprised of state, federal, tribal, and Action Agency participants, who would make recommendations for any specific actions that might be implemented. But, no specific actions are identified in the draft plan

RESPONSE: Several examples of specific actions for Regional Hatchery Planning Group (RHPG) consideration are presented in the RR/LTC Plan. We expect RHPG members to identify additional prospective actions, which will then be reviewed by the entire RHPG. We expect the members of the RHPG to recommend for implementation the specific rapid response or long-term contingency action(s) they consider to be most biologically effective and cost-effective for a specific salmon/steelhead population.

Oregon: Oregon must have representation on the Snake River Regional Hatchery Planning Group

RESPONSE: We agree. Oregon will be asked to designate a representative on the Snake River RHPG as well as the Mid-Columbia RHPG. More broadly, the RR/LTC plan specifies that the RHPG's will be comprised of representatives from the Federal agencies and interested sovereigns, similarly to all of the other forums that are regularly utilized in implementing the AMIP and the RPA.

Oregon: While we agree that reducing hatchery risk is a reasonable action, risk reduction will need to be implemented permanently and it will take at least a fish generation before the wild population will respond with increased abundances.

RESPONSE: We generally agree. However, a safety-net hatchery supplementation program or captive brood program (actions that have risks to the wild population) will be continued until the cause of the severe decline in population abundance is corrected.

Oregon: Any hatchery actions need to provide a net biological benefit and some of the proposed actions that “could be implemented as a rapid response” have doubtful benefits.

RESPONSE: We expect the Regional Hatchery Planning Group (RHPGs) to recommend rapid response and long-term contingency actions that have solid benefits.

Oregon: Increasing proportion of natural-origin broodstock (pNOB) in an integrated hatchery program in the event a trigger is tripped is very risky. If a trigger is tripped, there are already too few wild fish in the natural spawning population. These few remaining wild spawners should not be ‘mined’ to increase pNOB.

RESPONSE: We agree. Broodstock “mining” should avoided when initiating an integrated hatchery program.