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Phil Rockefeller
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January 26, 2012

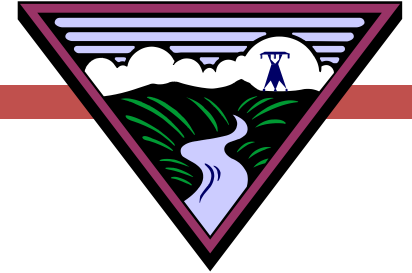
MEMORANDUM

TO: Chairman Rockefeller and members of the Fish and Wildlife Committee

FROM: Tony Grover, Fish and Wildlife Division Director

SUBJECT: Discussion of habitat monitoring and reporting strategy by Bonneville Power Administration - Lorri Bodi, Vice President, Environment Fish and Wildlife and Bill Maslen, Manager, Fish and Wildlife, both BPA

Lorri Bodi and Bill Maslen of Bonneville Power Administration will discuss a developing concept for Project-level Action Effectiveness monitoring. This initiative is being developed by BPA in response to reporting requirements under the FCRPS Biological Opinion.

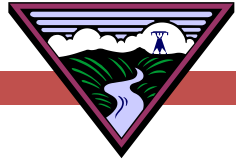


Updated Annual Reporting: Research, Monitoring & Evaluation (RM&E)

Bill Maslen, Director of Fish and Wildlife
Bonneville Power Administration

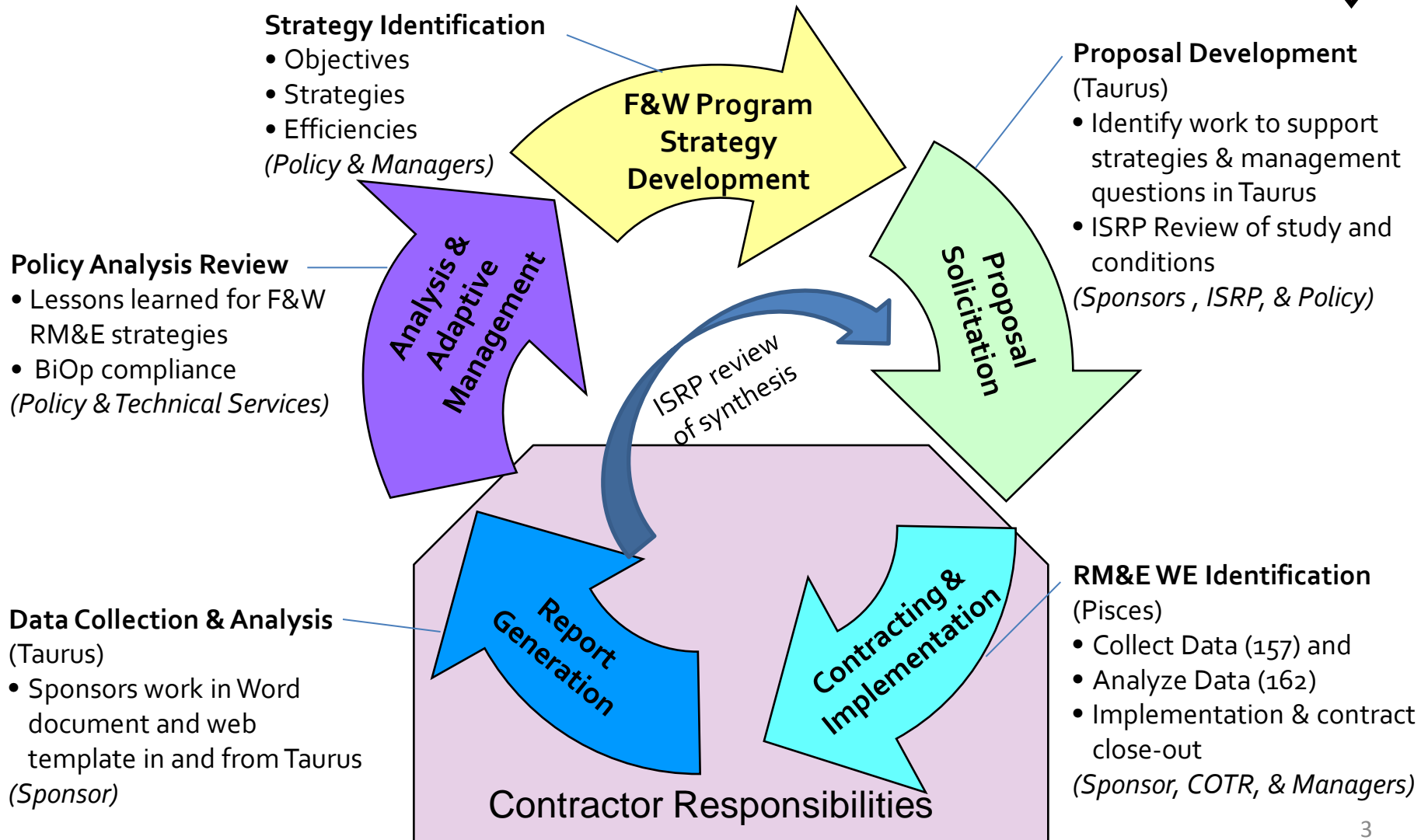
February 7, 2012
Northwest Power and Conservation Council

Objectives

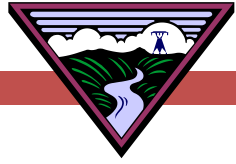


- Capture information collected
- Standardize format
- Support management & policy decisions
- Support 2011 RME+ Categorical Review Programmatic Recommendations
 - No. 1: Reporting and use of project, program results
 - No. 6: Research projects in general

Reporting Phases

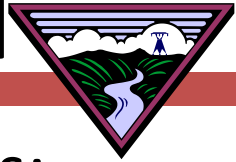


Overview

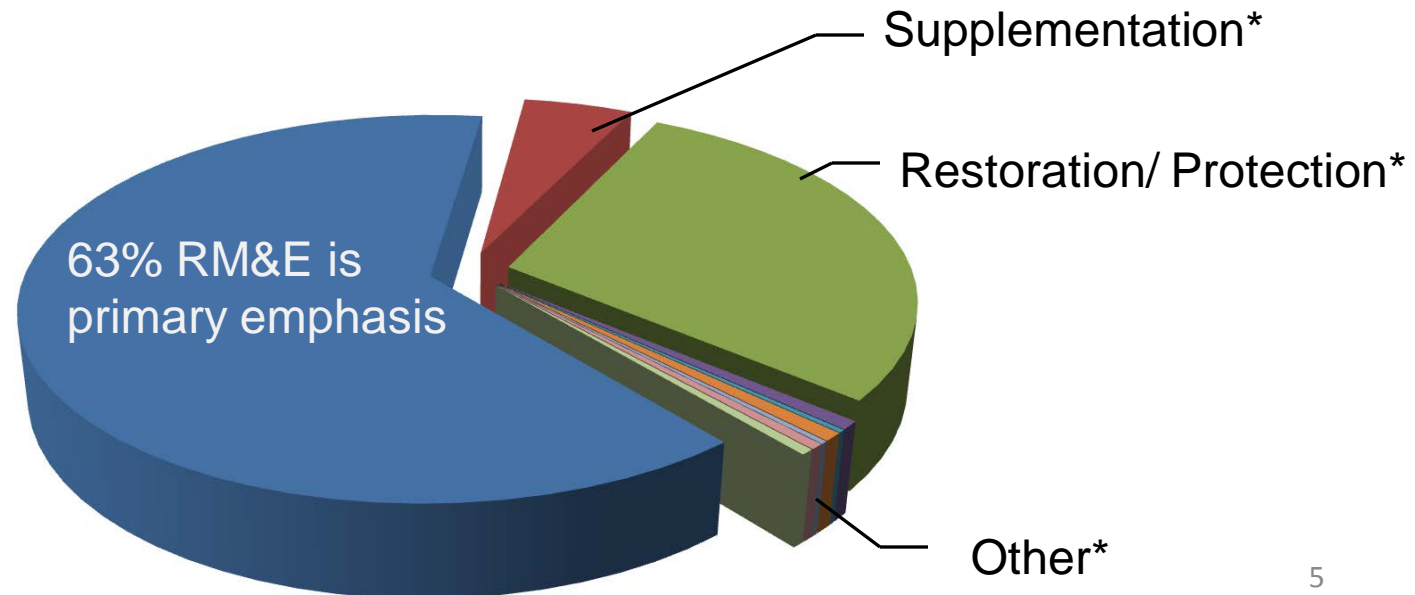


- Which Sponsors are impacted
- Updated Annual Reporting
 1. Structured Template
 2. Standard Content:
 - RM&E Strategies
 - FCRPS Reasonable & Prudent Alternatives (RPAs)
- Outreach Process

Which Sponsors are Impacted

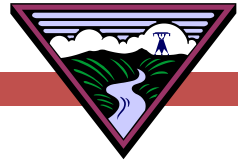


- 66 Sponsors with RM&E reporting work elements:
 - Analyze/Interpret Data (Work Element 162)
 - Collect/Generate/Validate Data (Work Element 157)
- 282 Projects with RM&E Reporting Requirements



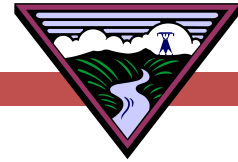
*Have RM&E reporting work elements

Updated Annual Reporting



- Support synthesis of project results
 - Estuary & Tributary Habitat RM&E Annual Syntheses
 - FCRPS BiOp reporting requirements
 - High-Level Indicator (HLI) reporting
- Key findings and lessons learned for more informed adaptive management of the Program

Structured Template

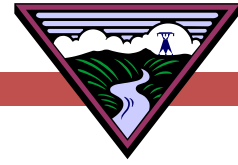


- Improve organization within reports
- Reporting Format
 - Executive Summary
 - Methods (MM.org)
 - Findings and implications by RM&E Category
 - RPA Appendix

Title Page	
Table of Contents	
Table of Figures	
Table of Tables	
I.	Executive Project Summary (Abstract)
II.	Introduction:
III.	Protocol: Methods; Design and Study Area
IV.	Results
V.	Synthesis of Findings: Discussion/Conclusions
VI.	References
Appendices	
A.	Use of Data & Products
B.	Other summary data or related reports

Report Template

Report Template Outputs



Report Template

1. Executive Summary
2. Introduction
3. Protocol
4. Results
5. Discussion/Conclusion
6. References
7. RPA Appendix

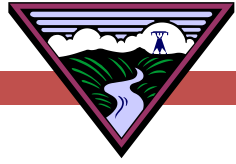
Standard Methods
(MonitoringMethods.org)

Standard Outputs (Indicators)

- E.g. Tributary Habitat by
- Habitat Limiting Factors
 - Habitat Status and Trends
 - Habitat Action Effectiveness



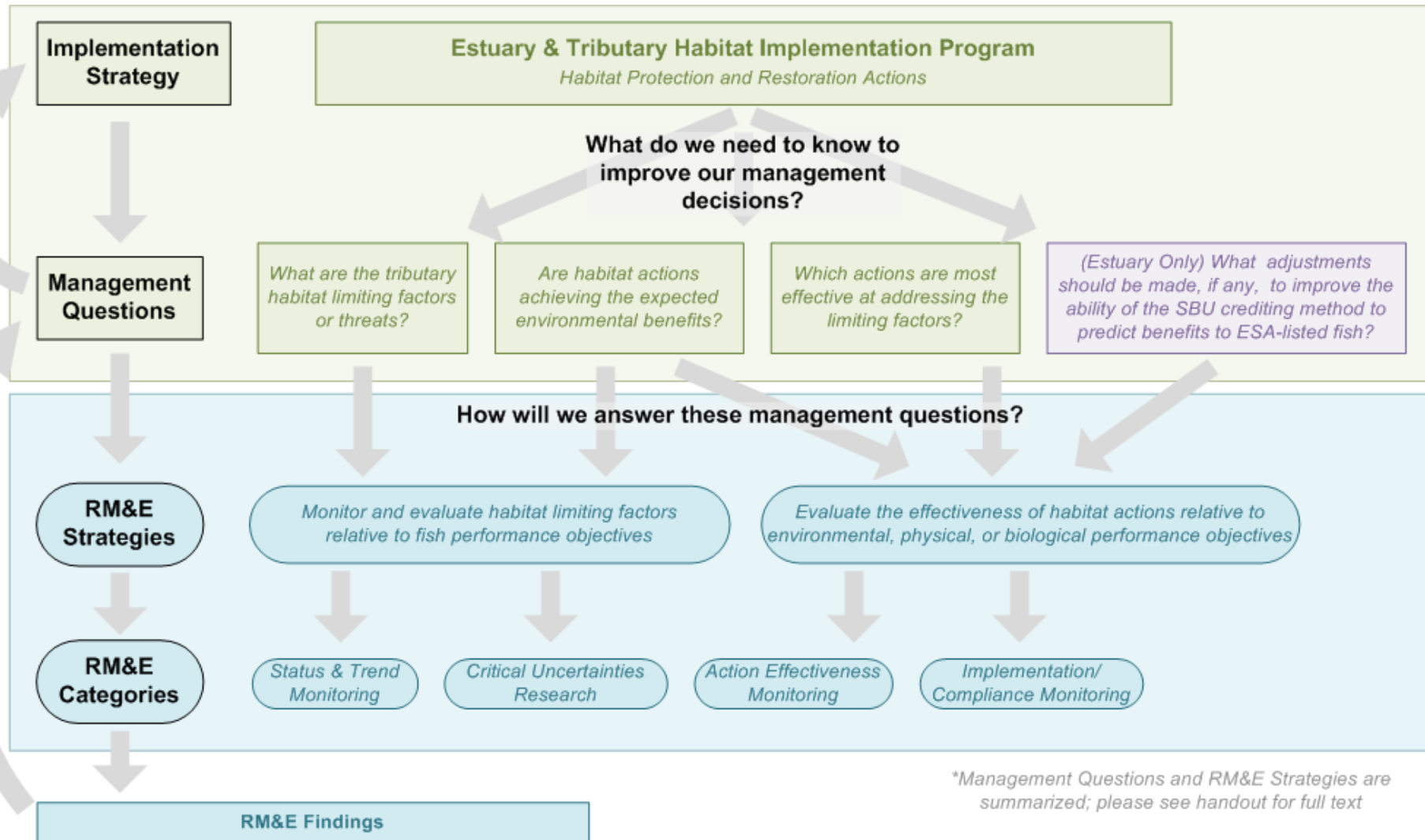
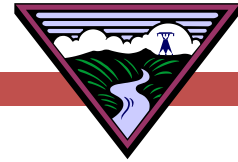
Standard Content



- F&W Strategies
 - Sponsors report how their results contribute
 - *Only* required to answer questions in appropriate RM&E category related to project work

- FCRPS BiOp RPAs
 - Appendix to Sponsor Annual Report

Management Questions & RM&E Strategies



Example Sponsor Reporting



- RME Strategy Question for Sponsors

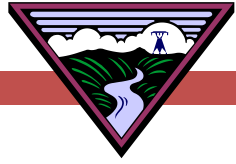
Are tributary actions achieving the expected biological and environmental improvements?

- Fish Passage Sponsor Response (Example)

After the obstruction was removed, we identified the following changes...

(E.g. density, abundance of juveniles and spawners by ESU/DPS)

Outreach Process



- Communication to Sponsors (September 2011)
- Technical Work Sessions (January/February 2012)
 - BPA Policy & COTRs
 - 11-member Project Sponsor Team
 - Corps, BOR, NPCC Staff coordination

Outreach Process (cont')



- Higher-level Coordination
 - BPA, AAs, NPCC
- Informal ISRP Review (approx. March 2012)
- Pilot Implementation – make available for voluntary use (2012)
- Contracting Requirement (2013)

Management Questions and RM&E Strategies based on the FW Program and FCRPS BiOP

Strategy Category	Management Questions	RM&E Strategies	RM&E Strategy Question(s) for Project Sponsors	Specific Guidance
Fish Population Status Monitoring	<ol style="list-style-type: none"> 1) What are the abundance, productivity, diversity, and spatial distribution of fish populations most affected by the FCRPS and other hydro projects? 2) What is the proportion of spawners within ESA-listed salmonid populations that are of hatchery and natural origin? 	<p>Strategy: Monitor the status and trend of anadromous and resident fish populations relative to Program or Provincial level biological objectives.</p> <p>Strategy: Develop regional fish population monitoring approaches with common data collection and data management protocols as part of collaborative cost-sharing and coordination with other regional monitoring programs and non-hydro agency responsibilities.</p>	<ol style="list-style-type: none"> 1. What are the status and trends of natural and hatchery abundance, productivity, diversity, and spatial and temporal distribution of fish populations? 2. What is the proportion of hatchery/natural origin spawners by populations? 	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Status and trends of natural and/or hatchery fish (resident and anadromous) populations by life stage: <ul style="list-style-type: none"> - Abundance (e.g., natural and hatchery adult spawner abundance by population) - Productivity - Spatial Distribution - Temporal Distribution - Diversity
Hydrosystem	<ol style="list-style-type: none"> 1) Are salmon and steelhead meeting juvenile and adult hydrosystem passage performance objectives? 2) What are the most effective configurations and operations for achieving desired performance objectives in the FCRPS? 3) What is the post-Bonneville mortality effect of changes in fish arrival timing and transportation to below Bonneville? 4) Under what conditions does in-river passage provide greater smolt-to-adult return (SAR) rates than transport? 	<p>Strategy: Monitor and evaluate fish performance within the hydro electric corridor relative to biological objectives.</p> <p>Strategy: Monitor and evaluate migration characteristics and river conditions relative to environmental and physical performance objectives.</p> <p>Strategy: Monitor and evaluate the effects of changes in hydro system configurations and operations.</p> <p>Strategy: Assess and investigate as appropriate critical uncertainties related to the scientific relationships that determine the survival and condition of fish passing thru or transported around the hydro system.</p>	<ol style="list-style-type: none"> 1. Are anadromous and resident fish species meeting juvenile and adult hydrosystem passage performance objectives? 2. What are the most effective configurations and operations for achieving desired performance objectives in the FCRPS? 3. What is the post-Bonneville mortality effect of changes in fish arrival timing and transportation to below Bonneville? 4. Under what conditions does in-river passage provide greater smolt-to-adult return (SAR) rates than transport? 	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Status and/or trends of natural and/or hatchery fish passage at a specific hydropower facility for each species monitored (e.g., Number of out-migrants steelhead at Bonneville Dam). 2. Status and/or trends of natural and/or hatchery fish passage by passage route for each species monitored. 3. Fish survival and run timing by species and life stage. 4. Conditions (e.g., flows, temperature, gas content) and passage techniques that yielded the best survival.
Tributary Habitat	<ol style="list-style-type: none"> 1) Are tributary habitat actions achieving the expected biological and environmental objectives (e.g. survival or habitat quality targets)? 2) What are the tributary habitat limiting factors or threats preventing the achievement of tributary habitat, fish and wildlife objectives? 3) What are the relationships between tributary habitat actions and changes in fish and wildlife (e.g., survival or 	<p>Strategy: Monitor and evaluate tributary habitat conditions that may be limiting achievement of biological objectives.</p> <p>Strategy: Evaluate the effectiveness of tributary habitat actions relative to environmental, physical, or biological objectives.</p>	<ol style="list-style-type: none"> 1. What are the tributary habitat limiting factors or threats preventing the achievement of desired tributary habitat objectives? 2. Are tributary actions achieving the expected biological and environmental improvements in habitat? 3. What are the relationships between tributary habitat actions and fish/wildlife survival or productivity increases, 4. What actions are most effective in 	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Status and/or trends of habitat conditions that impact fish: <ul style="list-style-type: none"> - channel depth and width - thalweg sinuosity - drift biomass - temperature - LWD volume - flow - sinuosity changes - bankfull flood prone width

Strategy Category	Management Questions	RM&E Strategies	RM&E Strategy Question(s) for Project Sponsors	Specific Guidance
	<p>productivity increases)?</p> <p>4) What actions are most effective in achieving the desired change in habitat conditions, and fish and wildlife populations?</p>		<p>achieving the desired change in habitat condition and in fish/wildlife populations?</p> <p>5. Which actions are most cost-effective at addressing identified habitat impairments?</p>	<p>2. Change in biological conditions of fish and/or habitat quality:</p> <ul style="list-style-type: none"> - Juvenile salmon density and abundance (juvenile and adult) by spp. (fish/m²) - Spawner Density (fish/km, fish/redd) - Bioenergetics - Survival and productivity - Habitat metrics (TBD) <p>3. Relationships between tributary habitat actions and fish survival and productivity at the at the reach and/or population level (e.g., change in juvenile out-migrant survival)</p> <p>4. Actions that affect identified habitat impairments and information on cost-effectiveness</p>
Estuary, Plume and Ocean	<p>1) What are the limiting factors or threats, i.e., stressors and controlling factors, in the estuary preventing the achievement of desired habitat condition or fish objectives?</p> <p>2) Which actions are most effective at addressing the limiting factors preventing achievement of habitat, fish, or wildlife objectives?</p> <p>3) Are the estuary habitat actions achieving the expected biological and environmental benefits?</p> <p>4) Are the estuary habitat actions resulting in the expected, Salmon Benefit Units (SBU) targets?</p> <p>5) What adjustments should be made, if any, to improve the ability of the SBU crediting method to predict benefits to ESA-listed fish from ecosystem protection and restoration in the LCRE?</p> <p>6) How are fish populations impacted by plume and ocean conditions?</p>	<p>Strategy: Monitor and evaluate fish performance in the estuary and plume relative to environmental, physical, or biological objectives.</p> <p>Strategy: Monitor and evaluate estuary/ocean migration and habitat conditions that may be limiting achievement of biological objectives.</p> <p>Strategy: Evaluate the effectiveness of habitat actions in the estuary relative to environmental, physical, or biological objectives.</p> <p>Strategy: Assess and investigate as appropriate critical uncertainties related to the scientific relationships that determine the survival and condition of fish residing and/or migrating through the estuary and ocean.</p>	<p>1. Are aquatic, riparian, and upland estuary habitat actions achieving the expected environmental, physical or biological performance?</p> <p>2. What are the limiting factors or threats in the estuary/ocean preventing the achievement of desired habitat or fish objectives?</p> <p>3. What are the relationships between estuary habitat actions and fish survival or productivity increases?</p> <p>4. What actions are most effective?</p>	<p>For example, results or conclusions relevant to:</p> <p>1. Status and/or trends of habitat conditions that impact fish</p> <ul style="list-style-type: none"> - Drift biomass - Temperature - Flow - Vegetation Conditions - Bankfull Flood Prone Width <p>2. Changes in environmental or biological conditions of fish</p> <ul style="list-style-type: none"> - Juvenile salmon density by spp. (fish/m²); - Spawner Density (fish/km, fish/redd); - Bioenergetics <p>3. Relationships between tributary habitat actions and fish survival and productivity at the at the reach and/or population level (e.g., change in juvenile out-migrant survival)</p> <p>4. Actions that affect identified habitat impairments and which are most cost-effective</p>
Harvest	1) What is the effect of acquiring more	Strategy: Assess and investigate as	1. What is the effect of acquiring more	For example, results or conclusions relevant to:

Strategy Category	Management Questions	RM&E Strategies	RM&E Strategy Question(s) for Project Sponsors	Specific Guidance
	<p>accurate and precise in-river harvest estimates on the resultant estimates of straying and adult passage survival?</p> <p>2) Can selective fisheries targeting hatchery fish or healthy populations reduce impacts on ESA-listed populations? Is resident fish harvest in blocked areas consistent with native resident fish species conservation objectives?</p> <p>3) Is harvest consistent with the Council fish and wildlife program’s vision, e.g., not impeding mitigation?</p>	<p>appropriate critical uncertainties related to harvest estimates and harvest management practices.</p>	<p>accurate and precise in-river harvest estimates on the resultant estimates of straying and adult passage survival?</p> <p>2. Can selective fisheries targeting hatchery fish or healthy populations reduce impacts on ESA-listed populations?</p> <p>3. What are your in-river and ocean fisheries monitoring results and what are your estimates of stock composition and stock-specific abundance, escapement, catch, and age distribution?</p> <p>4. Adequate opportunities for consumptive and non consumptive resident fisheries in the blocked areas?</p>	<p>1. Status, trends and/or effectiveness results or estimates related to:</p> <ul style="list-style-type: none"> - stock composition - stock-specific abundance - escapement - catch and age distribution for in-river and/or select fisheries
Hatchery	<p>1) Are hatchery improvement programs and actions achieving the expected biological performance objectives?</p> <p>2) What is the proportion and origin of hatchery fish within naturally spawning salmon and steelhead populations?</p> <p>3) What deleterious effects does artificial production have on natural populations of anadromous fish?</p> <p>4) How can hatchery reforms reduce the deleterious effects of artificial production on listed populations?</p> <p>5) Can properly designed artificial production programs make a net positive contribution to recovery of listed populations?</p> <p>6) What is the reproductive success of hatchery fish spawning in the wild relative to the reproductive success of wild fish?</p>	<p>Strategy: Evaluate the effectiveness of hatchery safety-net/conservation programs and the effectiveness of hatchery reform actions on the achievement of biological performance objectives.</p> <p>Strategy: Assess and investigate as appropriate critical uncertainties regarding the effects of artificial propagation on the viability of wild fish populations.</p>	<p>1. Are hatchery improvement programs and actions achieving the expected biological performance objectives?</p> <p>2. What is the proportion and origin of hatchery fish within naturally spawning salmon and steelhead populations?</p> <p>a. Report annual PNI, NOS, pHOS values and describe the relevance to HSRG recommendations or HGMPs.</p> <p>3. What deleterious effects does artificial production have on natural populations of anadromous fish?</p> <p>4. How can hatchery reforms reduce the deleterious effects of artificial production on listed populations?</p> <p>5. Can properly designed artificial production programs make a net positive contribution to recovery of listed populations?</p> <p>6. What was the reproductive success of your hatchery fish spawning in the wild relative to the reproductive success of wild fish? Were there differences in spawning location?</p> <p>7. Of the fish produced in a hatchery what percentage of hatchery fish released are marked by species/stock?</p>	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Hatchery improvement programs and actions in the context of expected biological performance objectives (example Broodstock or Harvest management sliding scale). 2. Proportion and origin of hatchery fish within naturally spawning salmon and steelhead populations <ol style="list-style-type: none"> a. Annual PNI, NOS, pHOS values and relevance to HSRG recommendations or HGMPs. 3. Deleterious effects of artificial production on natural populations of anadromous fish 4. Hatchery reforms reducing the deleterious effects of artificial production on listed populations 5. Properly designed intervention programs using artificial production making a net positive contribution to recovery of listed populations 6. Reproductive success of your hatchery fish spawning in the wild relative to the reproductive success of wild fish. Were there differences in spawning location? 7. Of the fish produced in a hatchery, the percentage of hatchery fish released are marked by species/stock.

Strategy Category	Management Questions	RM&E Strategies	RM&E Strategy Question(s) for Project Sponsors	Specific Guidance
<p>Predation and Invasive Species Management (toxic and climate change may pop up in the future so not sure if you want to add a generic question in case anyone is doing this as part of their work?)</p>	<ol style="list-style-type: none"> 1) What are the distributions, population sizes, and productivity for the major predators within the Columbia River Basin? Are there aquatic invasive species present within the habitat of Columbia Basin fish populations? 2) What are the impacts and consumption rates of major piscivorous, avian, and marine mammal predators on juvenile salmonids within the Columbia River Basin? 3) Are predation management programs and actions achieving the expected biological objectives, including consideration of inter- and intra-specific compensation? 4) Are there alternative management alternatives/actions to those currently being implemented to reduce the impact of predation? What are the most effective management alternatives/actions? 	<p>Strategy: Monitor the status of the Caspian Tern and the Double-Crested Cormorant populations in the Columbia River Estuary, their impacts on juvenile salmonids and the effectiveness of management strategies that may be implemented.</p> <p>Strategy: Monitor the status of Inland Avian Predator populations in the Mid-Columbia River, their impacts on juvenile salmonids and the effectiveness of management strategies that may be implemented.</p> <p>Strategy: Monitor the population status of marine mammals (e.g., Sea Lions and seals) below Bonneville Dam, their fish predation rates, and the effectiveness of deterrent actions.</p> <p>Strategy: Evaluate the effects of the northern pike minnow removal program and investigate strategies to reduce non-indigenous piscivorous (e.g., walleye, bass) predation on salmonids.</p> <p>Strategy: Develop guidelines and procedures for monitoring for presence and prevalence of aquatic invasive species.</p>	<ol style="list-style-type: none"> 1. What are the distributions, population sizes, and productivity for the major predators within the Columbia River Basin? 2. Are there aquatic invasive species present within the habitat of Columbia Basin fish populations? 3. What are the impacts and consumption rates of major piscivorous, avian, and marine mammal predators on juvenile salmonids within the Columbia River Basin? 4. Are predation management programs and actions achieving the expected biological performance objectives, including consideration of inter- and intra-specific compensation? 5. Are there alternative management alternatives/actions to those currently being implemented to reduce the impact of predation; and what are the most effective management alternatives/actions? 	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Status and/or trends of bird populations: <ul style="list-style-type: none"> - Abundance (e.g., adult or nest abundance by species/colony) - Productivity - Spatial Distribution 2. Status and/or trends on the presence and absence of invasive species (by type; distribution; and/or abundance) 3. Status and/or trends on predation rates; mortality survival rates of fish species. 4. Performance targets of specific management plans. 5. Suggestions for alternative management strategies/actions for to reduce the impact of predation.
<p>Wildlife</p>	<ol style="list-style-type: none"> 1) Are wildlife mitigation programs and actions achieving expected objectives (e.g. habitat unit or acreage)? 2) What are the most effective actions for achieving wildlife habitat unit or acreage objectives? 3) Are wildlife mitigation programs and actions maintaining the value and characteristics of existing, restored and created habitat? 4) How are wildlife species responding to mitigation actions? 	<p>Strategy: Evaluate the effectiveness of the wildlife mitigation program actions in meeting objectives.</p>	<ol style="list-style-type: none"> 1. Are wildlife mitigation programs and actions achieving expected habitat unit or acreage objectives? 2. What are the most effective actions for achieving wildlife habitat unit or acreage objectives? 	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Reported values of Pisces implementation metrics 2. Status, trends and/or effectiveness of wildlife species: <ul style="list-style-type: none"> - Abundance (by type) - Distribution

Strategy Category	Management Questions	RM&E Strategies	RM&E Strategy Question(s) for Project Sponsors	Specific Guidance
Coordination and Data Management	1) Is research and monitoring information accessible to the region and compatible with regional standards and protocols for monitoring, data collection and data access?	<p>Strategy: Actively support the coordination and standardization of regional and Program monitoring efforts with other federal, state, and tribal monitoring programs including the development and adoption of standard requirements for metrics, sample designs, data collection protocols, data dictionary, meta-data, and data access.</p> <p>Strategy: Work with regional federal, state and tribal agencies, and non-governmental entities to establish a coordinated, standardized, web-based distributed information network and a regional information management strategy for water, fish, and habitat data. Establish necessary administrative agreements to collaboratively implement and maintain the network and strategy.</p>	1. Is research and monitoring information accessible to the region and compatible with regional standards and protocols for monitoring, data collection and data access?	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Accessibility and documentation of monitoring data.
Project Implementation and Compliance Monitoring	1) Are actions being implemented, accomplished, and functionally maintained as proposed?	<p>Strategy: Maintain a comprehensive project implementation tracking system with standard performance metrics that are coordinated with other regional federal, state, and tribal project tracking systems.</p> <p>Strategy: Develop a project compliance monitoring program for independent post-project auditing of project performance to assess ongoing performance of habitat based mitigation projects in support of adaptive management planning.</p>	1. Are actions being implemented, accomplished, and functionally maintained as proposed?	<p>For example, results or conclusions relevant to:</p> <ol style="list-style-type: none"> 1. Implementation of actions and ongoing maintenance.