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July 5, 2017

MEMORANDUM

TO: Council Members

FROM: Council Staff

SUBJECT: Update on review of tributary habitat monitoring and next steps on Council's monitoring and evaluation approach.

BACKGROUND:

Presenters: Leslie Bach, senior program manager
Nancy Leonard, fish, wildlife and ecosystem M&E manager
Mark Fritsch, project implementation manager

Summary: Council and Bonneville staff will provide a brief summary of discussions with Program habitat managers and sponsors regarding tributary habitat monitoring and evaluation. The summary will include information on the current use and utility of the tools and products from the three BPA monitoring projects, Integrated Status and Effectiveness Monitoring Program (ISEMP), Columbia Habitat Monitoring Program (CHaMP), and Action Effectiveness Monitoring (AEM). Staff will also provide an update on development of a program-focused tributary habitat monitoring approach with the expectation that the approach, once reviewed and approved by the Council, will be used to reshape projects funded for this purpose. Staff is seeking input from Council members on the proposed next steps, including the plan and timeline for completing the review and revised approach.

Relevance: This work focuses on implementing the Council's 2013 Conditions and recommendations for ensuring a cost-effective approach to tributary habitat monitoring and evaluation for informing effectiveness of program measures. It addresses Programmatic Issue #2 (i.e., *Habitat effectiveness monitoring and evaluation*) from the 2010-11 review of RME and AP Category of projects, including ISEMP, CHaMP, and AEM.

Background: In 2013 the Council requested that Bonneville provide a comprehensive review of the three tributary habitat monitoring projects. Information requested included how these projects meet the Program's needs for assessing the benefits of habitat actions as well as provide guidance for managers implementing habitat actions. Included in this request was that Bonneville provide an analytical framework for overall evaluation of tributary habitat actions.

Although some products and updates have been provided, the comprehensive review as described above has not occurred. At the [February 2017](#) and [March 2017](#) meetings, Council members requested that staff review current tributary habitat monitoring actions and the role of the ISEMP, CHaMP, and BPA AEM projects. This included conducting discussion meetings with co-managers and sponsors. This review will inform development of a program-focused tributary monitoring approach and identify products to carry-forward from ISEMP, CHaMP and AEM. A brief description of the three projects can be found in the [June 2017 Committee packet memo](#).

Discussion: A total of 32 meetings were jointly held by Council and Bonneville staff. Each meeting had multiple attendees and included staff from agencies, Tribes, coordinating organizations, conservation districts and consultants. The discussions addressed: 1) current approaches used to guide habitat restoration actions and monitor action effectiveness; 2) existing gaps; and 3) the use of tools and products developed through ISEMP, CHaMP, and AEM.

Attachment 1 provides a summary of the ISEMP and CHaMP tools, organized by their current role in habitat monitoring. Attachment 2 provides additional details on ISEMP and CHaMP and Attachment 3 provides information on the current use of AEM. Overall, in the geographies where these projects are operating, there is some use of the products and tools, however many entities identified a lack of alignment between the programmatic tools and the needs of restoration practitioners and fish and wildlife managers. In addition, there are many portions of the Basin that are not covered by these programmatic approaches to monitoring. Throughout the region, managers and sponsors are strongly invested in developing solid approaches for planning, monitoring and evaluation, but many feel that they lack technical and financial resources.

Using the information gathered through the discussions, Council and Bonneville staff are developing an approach for a program-focused tributary habitat monitoring strategy. This approach will incorporate pieces of the existing BPA monitoring projects, as relevant. Staff intends to solicit input and review of the approach by the fish and wildlife managers and sponsors. The expectation is that the revised approach, once reviewed and approved by the Council, will be used to reshape projects funded for this purpose. A generalized framework will be presented at this meeting, with the goal of completing a final monitoring strategy by the end of the calendar year. Staff would like feedback from Council members on the work completed to date and the plan and timeline for completing the monitoring strategy.

Attachment 1: Summary of ISEMP/CHaMP products and tools and their current role in habitat monitoring.

Product/Tool	BPA Project	Purpose	Status	Locations
In use by managers and valuable for Program implementation and decision-making				
PIT-tag detection systems; fish in/out	ISEMP	Fish status and trends	In use; connected to other collection activities	IMWs; CHaMP sites; Various others
Used at some locations and/or potentially valuable for future Program implementation				
IWM outputs	ISEMP	Habitat-fish relationships; habitat effectiveness	In use in some areas	Lemhi, John Day/Bridge Creek, Entiat
Habitat Suitability Index (HSI)	ISEMP/CHaMP	Habitat Suitability	In use in some areas	CHaMP pilot watersheds
Habitat data	CHaMP	Habitat status and trend	In use in some areas	CHaMP pilot watersheds
Lower Granite Dam escapement model	ISEMP	Adult escapement	In use in some areas	Snake River and tributaries
Life-cycle models	ISEMP	Habitat benefits across life-cycle	In use in some areas; In development in other areas	Lemhi; Entiat; MF John Day; and Upper Salmon/ Yankee Fork
Mark/recapture models	ISEMP	Juvenile fish abundance	In development	Bridge Creek, Lemhi
Gross Primary Production	CHaMP	Gross Primary Productivity	In development	CHaMP pilot watersheds
Quantile Regression Forests	ISEMP	Carrying capacity	In development	Entiat, Grande Ronde, Lemhi, Wenatchee
Unclear value for informing Program implementation and decision-making				
Hydraulic model	CHaMP	Parameters for HSI	In use in some areas	CHaMP pilot watersheds
Network estimates of habitat metrics	CHaMP	Habitat status and trend	In development	CHaMP pilot watersheds plus several others
Geomorphic Unit Tool (GUT)	CHaMP	Identify geomorphic landforms	Limited use in some areas	
Geomorphic change detection (GCD)	CHaMP	Changes in habitat over time	Limited use in some areas	CHaMP pilot watersheds
Geomorphic assessments:	ISEMP/CHaMP	Various GIS tools designed	Variable level of development	

<ul style="list-style-type: none"> • Beaver Restoration Assessment Tool • Valley Bottom Extraction Tool • Riparian Condition Assessment Tool • Riparian Vegetation Departure Tool • Wood Recruitment Assessment Tool 		to help prioritize restoration actions		
Net rate of energy intake model (NREI)	ISEMP/ CHaMP	Carrying capacity	In development	Entiat, Grande Ronde, Lemhi, Wenatchee
Database and data access	ISEMP/ CHaMP	Data management and data access	CHaMPMonitoring.org some use with access difficulties; other data tools in development.	

Attachment 2: Summary of ISEMP/CHaMP resources and tools

This table is a summary to inform the NW Power and Conservation Council and Bonneville Power Administration (BPA) in their review of basinwide monitoring and evaluation. It focuses on two BPA projects, the Integrated Status and Effectiveness Monitoring Program (ISEMP; BPA Project No. 2003-011-00) and the Columbia Habitat Monitoring Program (CHaMP; Project No. 2011-006-00) and the watersheds specific to those projects.

ISEMP is a monitoring and evaluation design project that was initiated in 2003 as a series of pilots for testing monitoring indicators and metrics, sampling designs, evaluation procedures, data management, and large-scale coordination and implementation logistics. The project focuses on two key monitoring and evaluation programs: (i) subbasin-scale pilot status and trend monitoring efforts for anadromous salmonids and their habitat in the Wenatchee/Entiat, John Day and Salmon River basins, and (ii) effectiveness monitoring for suites of habitat restoration projects in selected watersheds within the three target subbasins above (aka IMWs). ISEMP was expanded to include an extensive program of installing, operating and maintaining instream PIT tag detection arrays in collaboration with co-managers. Additional efforts have focused on developing tools for evaluating fish-habitat relationships and action effectiveness.

CHaMP is a pilot project designed to monitor fish habitat status and trends using a standardized monitoring protocol with a program-wide approach to data collection and management. It is currently applied in 8 pilot watersheds within the portion of the Columbia Basin accessible to anadromous salmonids. The monitoring effort supports correlations of basin-wide habitat condition with biological response indicators for fish to evaluate habitat management strategies and inform habitat restoration. The CHaMP pilot watersheds referred to in the table are the: Entiat, John Day, Lemhi, Methow, South Fork Salmon, Tucannon, Upper Grande Ronde, and Wenatchee.

Product/ Tool	BPA Project	Overall Purpose/ Output	Status of tool/method	Locations	Current Use
IMWs	ISEMP	Habitat-fish relationships and responses to restoration actions Habitat action effectiveness at the watershed/ population scale	On-going implementation	Lemhi, Bridge Creek/John Day, Entiat	Mainly used within the 3 IMW areas
Habitat metrics	CHaMP	Habitat status and trends	On-going implementation	CHaMP pilot watersheds	Limited
Network estimates of habitat metrics	CHaMP	Habitat status and trend using Globally Available Attributes	In Development	Testing at existing CHaMP watersheds; applying at several others	Unclear
Instream PIT Tag Detection Systems; spawning surveys; juvenile data	ISEMP	Fish status and trends	Ongoing implementation	3 IMWs and select CHaMP pilot watersheds. Others outside ISEMP project.	Yes
Mark/ Recapture Models	ISEMP	Juvenile fish abundance	In development	Bridge Creek, Lemhi	Unclear
Lower Granite Dam Escapement; Snake River tributary escapement; Sex and age structured escapement	ISEMP	Adult Escapement	In use	Snake River and Tributaries	Yes
Hydraulic model	CHaMP	Depth and velocity to be used with HSI and other metrics to estimate fish habitat capacity	In use in select areas	CHaMP pilot watersheds	Yes

Habitat Suitability Index (HSI)	ISEMP/ CHaMP	Habitat Suitability (Weighted Usable Area)	In use in select areas	CHaMP pilot watersheds	Yes
NREI	ISEMP/ CHaMP	Carrying Capacity	In development	Entiat, Grande Ronde, Lemhi (Hayden creek & lower Lemhi), Wenatchee	Unclear
Quantile Regression Forests (QRF)	ISEMP	Carrying Capacity	In development	Entiat, Grande Ronde, Lemhi (Hayden creek & lower Lemhi), Wenatchee	Limited
Geomorphic Unit Tool (GUT)	CHaMP	Identify geomorphic units (landforms) from DEMs	In use in select areas		Limited
Geomorphic change detection (GCD)	CHaMP	Changes in habitat in a reach over time by comparing DEMs	In use in select areas	CHaMP pilot watersheds	Limited
Geomorphic Assessments: Beaver Restoration Assessment Tool (BRAT) Valley Bottom Extraction Tool Confinement Tool Riparian Condition Assessment Tool	ISEMP/ CHaMP	 Capacity of the landscape to support beaver dam-building activity Delineates valley-bottoms from stream network information Stream channel confining margins Riparian condition at the reach scale	Variable – often developed for limited use in one or more watersheds	Depends on the specific tool	Limited - Some interest in future use

Riparian Vegetation Departure Index		Vegetation changes from pre-European settlement conditions			
Wood Recruitment Assessment Tool		Probably of Instream Wood Recruitment			
Gross Primary Production (using Conductivity or solar inputs)	CHaMP	Gross Primary Productivity	In development	CHaMP pilot watersheds	Unclear – but probably limited
Riverstyles	CHaMP	Recovery Potential	No longer supported by Bonneville	3 CHaMP watersheds: Wenatchee, Tuccanon, Lemhi; plus Asotin	No
Life-cycle models (informed by several sub-models)	ISEMP	Habitat benefits within context of entire life-cycle	In development	4 watersheds: Lemhi; Entiat; MF John Day; and Upper Salmon/ Yankee Fork	NOAA use; some use by local managers
Data Warehousing	CHaMP	Data management and data access	In development		No
CHaMP Workbench	CHaMP	Data management and data access	In development		No
Status and effectiveness monitoring databank (STEM)	ISEMP	Data management and data access	Developed for limited use		No

Attachment 3: Summary of BPA Project Action Effectiveness Monitoring (AEM) Programmatic Products

This table is a summary to inform the NW Power and Conservation Council and Bonneville Power Administration (BPA) in their review of basinwide monitoring and evaluation. It focuses on the actions evaluated and products generated by BPA Project Action Effectiveness Monitoring (AEM) Programmatic.

Overview of AEM

AEM is a pilot project designed to develop a standardized, programmatic approach to project-level action effectiveness monitoring. The AEM approach is intended to move action effectiveness monitoring from a project-by-project approach to a coordinated, cost-effective, standardized and statistically-valid method for assessment. The intention is to work in a collaborative manner with project sponsors to guide and provide information about the effectiveness of habitat restoration actions that address habitat impairments (limiting factors).

- Geographic extent: Anadromous zone with ESA-listed salmon and steelhead.
- Applies two monitoring approaches that collect samples during summer low flow.
 - o Extensive Post Treatment (EPT): samples one time at 15 to 30 existing locations for a specific action.
 - o Multi-Before After Control Impact (MBACI): for a specific action subcategory (see table below), samples one time a year, twice before and five-times after the action is implemented. Goal is 10-15 implemented actions for an action subcategory.
- Tests the effect at the reach (action) scale of 4 categories of actions (12 subcategories) to answer the following questions:
 - What is the effect on habitat?
 - What is the effect on fish and other biota?
 - Within an action category, why are some sites more successful than others?
 - Are there differences in the detected effects among geographic areas (ESUs)?
- Products:
 - o Roll up of findings at the action subcategory level or ESU level.
 - o Summary of findings in annual report.
 - o Raw data available from a web-based database.
 - o Data reliability assessments.
- Current Co-manager use
 - o Unclear how used by co-managers. Most indicate they are not able to use the information.

- Findings reported at programmatic scale and may not match the scale needed to guide specific restoration actions.

12 Habitat Action sub-Categories and (method)	Current Status/Findings
Complete barriers (EPT)	Completed, 30 existing sites sampled during 2014 and 2015. Barrier removals successfully allowed fish to use the previously blocked habitat with no differences in fish detected.
Partial barriers (MBACI)	Ongoing
LWD/Boulders/Pool & complexity (EPT)	Initiated in 2016, should be completed in 2017
Bank stabilization (MBACI)	Ongoing
Engineered logjams/structures (EPT)	Not initiated
Levee set-back removal (MBACI)	Ongoing
Channel reconnection (MBACI)	Ongoing
Channel creation (MBACI)	Ongoing
Channel re-meandering (MBACI)	Ongoing
Fencing (MBACI)	Ongoing
Planting (EPT)	Not initiated
Invasive plant removal (EPT)	Not initiated

Review of Tributary Habitat Monitoring and Next Steps on Monitoring and Evaluation Approach

Leslie Bach, senior program manager

Nancy Leonard, ecosystem monitoring and evaluation manager

Mark Fritsch, project implementation manager

March 2017 Council Request

- **Conduct discussions with FW managers and sponsors on tributary habitat monitoring and evaluation, including use of products developed by CHaMP, ISEMP and AEM**
- **Provide a summary on the current use and utility of the tools and products developed by CHaMP, ISEMP and AEM**
- **Refine process and schedule for developing a Program-focused tributary habitat monitoring strategy**
- **Integrate with ongoing BPA/NOAA efforts**

Discussions With Fish and Wildlife Managers

Highlights from Discussions:

- **Prioritizing Restoration Actions:**
 - **Variety of approaches used, some developed through Program-related tools; some developed by other entities**
 - **Good coordination among practitioners and researchers, however most felt that their efforts were hampered by lack of resources (expertise and money) and access to information**
- **Evaluating Success of Habitat Work:**
 - **Use of CHaMP, ISEMP and AEM tools limited to pilot watersheds; scale of data is often an issue**
 - **Fish in/out data is a valuable component of current programs and needs to be expanded**

Highlights from Discussions (cont):

- **Data Management and Reporting:**
 - Variable around the region, but area of ongoing development
 - CHaMP/ISEMP data management system and web-based access is challenging
- **Gaps and Outstanding Needs:**
 - Access to technical expertise
 - Updated assessments of limiting factors
 - Expanded support for pit-tag arrays and maintenance
 - Consistency and transparency in data synthesis, reporting and analysis

Use/Utility of Products From CHaMP, ISEMP and AEM

In Use and Valuable for Program Implementation

- **PIT-tag detection systems**
- **Fish in/out facilities**

Portions in Use or Potentially Valuable for Program Implementation

- **IMW results where applicable**
- **Habitat Suitability Index**
- **Habitat Data**
- **Snake River escapement models**
- **Life-cycle model outputs where applicable**
- **Mark/recapture models**
- **Gross Primary Production**
- **Quantile Regression Forests**

Process and Schedule for Tributary Habitat Monitoring Approach

Program Logic Path

Focal fish species are impacted by habitat limiting factors

These impacts can be reduced by habitat actions.

Addressing limiting factors will contribute to protecting and enhancing focal fish species.

Documenting habitat and fish metrics at appropriate level-of-certainty will convey the Program's contribution to mitigation.

Sideboards

- **Focus on Council's Program needs (NW Power Act)**
- **Program mitigation does not require:**
 - **Cause to effect level of proof**
 - **Setting a specific habitat mitigation amount**
- **Build on Program investments: existing tools, models, plans, metrics, approaches**
- **Address gaps cost-effectively**

Tributary Habitat Monitoring Approach

Habitat Action Prioritization

- Focal Watersheds
- Condition, Processes and Trends
- Limiting Factors
- Objectives
- Priority Actions

Habitat Action Evaluation

- Implementation
- Effectiveness
 - Action performs as expected
 - Limiting factor(s) addressed
- Status and Trend
 - Habitat
 - Fish

Data Management and Reporting

- Standardized databases for data exchanges
- Publically-accessible websites
- End-user products
 - Data summaries, analysis and reporting
 - Dashboards



Habitat Action Prioritization

Focal Watersheds

Limiting Factors

Objectives

Actions

Habitat Action Evaluation

Implementation
Monitoring:

- By Objective
- By Limiting Factor

**ISRP reviews sponsor's
monitoring and
measurement plan**

Effectiveness Monitoring:

- Water Quantity
- Water Quality
- Habitat Complexity
- Habitat Quantity/
Connectivity
- Riparian Condition
- Biotic Factors

Fish In/Out
Monitoring:

- Adult
- Juvenile

Data Management and Reporting

Local
Database

Common
Synthesis Tool

Council Program Roll-up:

- Change in Limiting Factor
- Productivity



Updated Schedule

	Task
March - June	<ul style="list-style-type: none"> • Discussions with managers/sponsors on tributary habitat monitoring • Begin development of monitoring approach
June 13 th	Committee discussion regarding <ul style="list-style-type: none"> • Outcomes from discussions • ISEMP, CHaMP, AEM elements to continue, and gaps to fill • Coordination with BPA/NOAA process
July 11-12 th	<ul style="list-style-type: none"> • Council discussion on the monitoring approach and on CHaMP, ISEMP, and AEM projects. • Council direction for staff to move forward on approach, including review process with co-managers
Aug - Oct	<ul style="list-style-type: none"> • Refine and finalize monitoring approach and strategy
2017 – early 2018	<ul style="list-style-type: none"> • Integrate with BPA and NOAA’s tributary monitoring process and products

Discussion

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Questions