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Sent: Thursday, April 08, 2010 5:37 PM

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Cc: bquan@cbfwa.org; Brian Lipscomb; Dave Ward; Jann Eckman; neil.ward@cbfwa.org; Pat Burgess; Tom Iverson; Trina Gerlack

Subject: Notice of April 21, 2010 Meeting~MAG Salmon Managers Review of Coordinated Assessments Work Plan

Attachments: CoordinatedAssessments_April8draft.doc; April21MAGSalmonMgrs_PotentialParticipantsTable.doc; April21MtgNoticeDistribution.pdf

TO: Members Advisory Group (MAG) Salmon Managers and Policy Leads

(MAG members should coordinate among their agency/Tribe to determine who can best represent their interests. Columbia Basin Fish and Wildlife (CBFWA) staff has provided the attached table of potential participants in this effort, expecting that the MAG representatives and Policy Leads contained in the table would probably be most suited for this initial meeting.)

RE: Notice of April 21, 2010 Meeting ~ MAG Salmon Managers Review of Coordinated Assessments Work Plan

GOAL: To finalize expected outcomes and pre-work items and confirm schedules and participants for workshops, building from the Anadromous Salmonid Monitoring Strategy workshops held last fall in Skamania, to develop coordinated ongoing assessments for Anadromous Salmonids in the Columbia River Basin.

PURPOSE: The agencies and Tribes have directed CBFWA to focus coordination efforts on supporting and participating in ongoing assessments and to report those assessments in the Status of the Resource (SOTR). To accomplish this, it is recognized that a monitoring strategy must be in place to provide the necessary data to inform the assessments. The Anadromous Salmonid Monitoring Strategy has accomplished this for Anadromous Salmonids. In order to clarify and memorialize ongoing assessments for this monitoring strategy, the CBFWA staff, working with others in the region, have developed the attached proposal for a series of workshops at the regional and sub-regional scales. The purpose of this meeting is verification of this proposal including the table describing the workshops and expected outcomes, the timeline for the workshops, and the list of participants.

CBFWA MAG Meeting of the Salmon Managers
Wednesday, April 21, 2010
8:00a.m. to 12:00p.m. (PDT)

@ CBFWA Offices Portland, Oregon

Face to Face Participation is Strongly Encouraged.

For those who can't attend in person, WebEx w/Integrative Teleconference has been arranged:

WebEx w/Integrative Teleconference:

Select: [MAG Salmon Managers Review Meeting April 21 WebEx Logon w/Integrative Teleconference](#)

Login First: Enter your name and email address

Session password: salmon (lower case)

Click "Join Now" and follow prompts to dial into the teleconference/online session.

Please see attached document “*Coordinated Assessments for Salmon and Steelhead*” and contemplate the following questions:

- Do the proposal and workshop outlines clearly characterize the expected goals and outcomes?
- Is the full suite of workshops essential to accomplish the goal?
- Are the workshops characterized correctly relative to assessment and data management that is needed to facilitate ongoing assessments into the future?
- Is the timeline appropriate to accommodate the Members participation throughout the course of the summer and into early Fall?

Proposed Agenda

*Review attached “**Coordinated Assessments for Salmon and Steelhead**” document and finalize:*

- a. Description of effort*
 - b. Workshop description*
 - c. Timeline*
 - d. Participants*
- 2. Discuss and confirm other assessment efforts underway and their relationship to this effort.*
 - a. NOAA 5-year check in*
 - b. CRITFC data management effort for Accords*
 - 3. Next steps*

Please contact Tom Iverson (tom.iverson@cbfwa.org) or Brian Lipscomb (brian.lipscomb@cbfwa.org) or call 503/229-0191 with questions about this meeting. CBFWA staff is available to assist with any pre-work discussions or analyses necessary to support your participation.

Thank you,

Brian Lipscomb
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cc: CBFWA Staff

Coordinated Assessments for Salmon and Steelhead

Collaborative Information Management to Support Ongoing Assessments of VSP, Hatchery, and Tributary Habitat Effectiveness for Columbia River Basin Anadromous Salmon

Through the [Columbia River Basin Anadromous Salmonid Monitoring Strategy](#) (ASMS), the Federal Columbia River Power System (FCRPS) Action Agencies and Fishery Co-Managers have agreed to the necessary monitoring to provide data to answer key management questions related to VSP Parameters and habitat and hatchery effectiveness assessments. Performing these assessments and reporting answers to these management questions on an ongoing basis is needed to assure effective evaluation of the Federal Power System Biological Opinion (BiOp), progress toward the recovery of salmonids listed under the Endangered Species Act (ESA), and the anadromous salmonid elements of the Columbia River Fish and Wildlife Program. This document is intended to facilitate several workshops. These workshops will gather the co-managers and other key agencies within the sub-regions of the ASMS and develop assessment and data sharing strategies for meeting reporting requirements, identifying gaps in data management and sharing capacities currently limiting the automation of data reporting, and establishing strategies to close these gaps and address any limiting capacities.

To support these data sharing and assessment needs, it is critical to have a comprehensive data management strategy that provides a regional data structure design capable of moving information from data collection, sharing, and evaluation to reporting for informed decision making. A successful data management strategy will require: (i) adopting compatible information system standards and protocols to allow “connecting the dots” across disparate systems from the local level all the way to the regional or national level; and, (ii) ensuring that data from different sources can be translated to mean the same thing, thereby allowing independent databases to be combined into a compatible format for regional use.

To accomplish this, the ASMS sub-regional groups with key data management staff will be gathered and asked to identify the following:

1. Protocols, methods, and assumptions that will be used to assess and report VSP Parameters and habitat and hatchery effectiveness on an ongoing basis;
2. Data that will be used in these assessments and what project or monitoring effort will generate the data;

3. Schedule that indicates the anticipated timing for completing status assessments on a regular, ongoing basis;
4. Entity or entities responsible for the various assessments; and,
5. Gaps that are limiting the development of a data exchange network that will allow for automation of the data flows necessary to support coordinated ongoing assessments and reporting and strategies to fill these gaps.
6. Proposals and/or adjustments to current Northwest Power and Conservation Council's (NPCC) Fish and Wildlife Program data management projects and business practices to meet the above data needs.

This endeavor builds on progress made by the region on various components of data management. For example, significant progress has recently been made through completion of recommendations, guidance, tools, and strategies that have resulted from the activities of regional coordination groups, sub-regional and watershed-specific demonstration projects, as well as tribal, state, and other organizations. Furthermore, the ASMS sub-regional groups with key data management staff will make their data management recommendations based on improving the current portfolio of NPCC Fish and Wildlife Program data management projects and business practices, thus using these to build towards the needed data management and sharing tool. The relevant data management projects currently include:

1990-080-00	Columbia Basin Pit-Tag Information	Pacific States Marine Fisheries Commission (PSMFC)
1994-033-00	Fish Passage Center	Pacific States Marine Fisheries Commission (PSMFC)
1996-019-00	Data Access in Real Time (DART)	University of Washington
1988-108-04	StreamNet {Coordinated Information System (CIS)/ Northwest Environmental Database (NED)	Pacific States Marine Fisheries Commission (PSMFC)
2003-072-00	Integrated Biodiversity Information System (IBIS)	Northwest Habitat Institute (NWHI)
2003-017-00	Integrated Status and Effectiveness Monitoring Program (ISEMP)	National Oceanic and Atmospheric Administration (NOAA)

Additionally, this process will both consider how other ongoing efforts, as listed below, can contribute data to meet the data needs for VSP, habitat effectiveness and hatchery effectiveness,

as well as how the outcome of this process may assist in facilitating data needed for these same efforts. For example:

- ESA Biological Opinions and Recovery Planning reporting
- NOAA ESA Five-Year Reviews , Biennial ESA Reports to Congress, and annual Pacific Coastal Salmon Recovery Fund Reports to Congress
 - Current FCRPS BiOp RPAs, RM&E Implementation Recommendations, and Assessment reporting
 - Columbia River Collaboration - Anadromous Salmonid Monitoring Strategy
 - Individual Recovery Board Monitoring Strategies
 - Regional Technical Team assessments and reporting
- Columbia River Fish Accords Data Integration Project(s)
 - Yakama Nation Status and Trends Assessment Report
 - Columbia River Inter-Tribal Fish Commission data management projects
- Pacific Northwest Aquatic Monitoring Partnership's (PNAMP) Northwest Region-wide High Level Indicators
- NPCC Columbia River Basin High Level Indicators
- NPCC Monitoring, Evaluation, Research and Reporting Framework (MERR)
- Columbia Basin Fish and Wildlife Authority's (CBFWA) Report on the Status of the Fish and Wildlife Resources in the Columbia River Basin (SOTR)
- Ad-Hoc Supplementation Working Group report on basin-wide hatchery RM&E recommendations (Appendix C)
- US v Oregon hatchery monitoring requirements
- NOAA Fisheries Monitoring Guidance

Necessary elements of a data exchange network:

While the immediate need to report population assessments for the BiOp will require an ad hoc approach based on existing data management capabilities in the participating agencies, the long term goal is to develop a consistent regional approach that will allow automated flow of data. To meet this goal a data exchange network will be explored, allowing participating agencies to publish their relevant data in a standardized format as 'web services' on the Internet. This will allow those conducting assessments and assembling the various reports to directly access the needed data.

Necessary elements for an exchange network include:

- Documentation of the data in a structured metadata format
- Data adhere to a formal quality control process
- Data are available on the Internet as 'web services'

Specific elements of an exchange network must include:

- Data Exchange Templates
- Data Sharing Agreements

- Metadata
- Standardized terminology, including data definitions
- Protocol Documentation
- Data Quality Assurance and Control
- Database Design and Administration
- Required Database Infrastructure

Currently some of the needed elements have been developed, such as the StreamNet Data Sharing Guide and PNAMP Metadata Guidance, or should be easily developed by modifying existing products such as guidance for quality assurance and quality control. Other elements are currently in-development through PNAMP, including guidance for developing data exchange formats & implementing & maintaining data exchange networks, guidance for protocol/method documentation found in the developing PNAMP Protocol Library, guidance for developing data sharing agreements, and guidance for data stewards.

Another element that needs to be addressed as we move toward completion of the required data management functions described below, is to ensure that participating agencies and organizations are ready, in terms of their infrastructure and access to needed expertise, to publish their relevant data in a standardized format as ‘web services’ on the Internet.

Data Exchange Templates:

Similar data from multiple sources must be compatible before they can be combined and analyzed. A Data Exchange Template (a.k.a. Data Exchange Format) defines a common structure for each specific type of data to be shared over the network. The agency collecting the data can either store the data in the required format or translate the data into the common format for sharing. A collaborative process with data managers and biologists from the sub-regional workshop groups will need to develop the templates after the data needs are defined through the regional workshops. A number of regional and national groups already have experience developing these templates and would be useful in this process. There is also guidance available from the USEPA Environmental Information Exchange Network (www.exchangenetwor.net).

Data Sharing Agreements:

A template for a common data sharing agreement should be created so that the agencies, tribes and other organizations wishing to participate understand the safeguards and responsibilities related to sharing their data. Key components of the agreement should include:

- Purpose of the agreement
- Legal and liability framework
- Intentions of data use and access by other web services, partners and data users
- Roles and responsibilities of network administrators, data providers, and data users
- Quality, timeliness and availability of data

- Function of the exchange network

Metadata

Metadata describe the content, quality, condition, and other characteristics of data, and are sometimes referred to as “data about data”. Metadata must explain the content and format of the information, the source of the information, the methodology used to collect it, its spatial aspects and its reliability following accepted metadata standards. Guidance on appropriate metadata standard should be obtained from the PNAMP *Regional Guidance on Metadata for Environmental Data*, (Rentmeester, 2010 - <http://www.pnamp.org/metadata>). Implementation of metadata standards by partners of this effort will enhance searching of existing data sets and discovery of new data sets and are required for the exchange network. Additionally, this will help data users understand the meaning and proper use of datasets. Metadata standards can also may help to automate workflows within organizations and across multi-jurisdictional needs, such as with VSP assessments.

Standardized terminology

Standardized terminology and data definitions are important to simplify information sharing, but, achieving consistent use of language is very challenging. This workshops described in this process will result in description of specific data needs for conducting assessments for anadromous fish and habitat in the Columbia River Basin. With this knowledge, we will develop data dictionaries to define each data element and to standardize general terminology. This is an essential step in assuring that shared data are fully and accurately understood by data users.

Protocol Documentation

The protocols and methods followed during data collection must be clearly described in the metadata. Protocols and methods should be published and peer reviewed, and the sampling framework and survey design should be described as part of the methods. Other components should include the procedures used for collecting, managing and analyzing the data and describe the expectations for interpreting and using the data. The PNAMP Protocol Library is a tool that can be used to describe protocols and provides a simple means to refer to the protocols and methods used when writing metadata.

Data Quality Assurance and Control

Data exchanged in the network should have been subjected to a quality assurance program to ensure that the data are as accurate as possible and suited to their intended purpose. Quality control can best be provided by those people most familiar with the data at all stages of the data flow. Agencies should establish a Quality Assurance (QA) program and track compliance. Field personnel should follow agency QA procedures. Funders can use contract language to require QA procedures be followed. Development and adherence to a QA plan will help ensure data accuracy and reliability in support of resource management and restoration actions.

Database Design and Administration

Data should be stored in relational databases housed and administered by organizations closest to the source of collection when feasible. The database should be made available on servers that allow all or some of the data to be accessible through web services. In cases where the resources to design, construct, and manage databases do not exist, alternative solutions should be established such as, using other organizations that have the required resources to incorporate these data and provide administrative access to client partners.

Required Database Infrastructure, including personnel

To participate in a data exchange network, agencies and other entities must have sufficient data management infrastructure to manage the data in a relational database, translate the data to the exchange format, and host the data on the Internet in XML format as web services. Infrastructure must include both the necessary hardware and sufficient data management personnel to operate it. Current infrastructure capacity likely varies among the participating agencies; where infrastructure is currently insufficient, a long term goal should be to improve the system to eliminate the inadequacy. In the interim, it may be necessary to host data through a partner agency or regional database project.

A broad set of skills and capabilities will be required of personnel to manage data and share it through the exchange network. The range of capabilities is beyond the means of any individual, so agencies will need to consider personnel requirements carefully. Among the required personnel capabilities are:

- Database design
- Database management
- Data management
- Metadata creation
- Oversight of quality assurance/quality control procedures
- Data system administration
- Programming
- Coordination with monitoring coordinators and data collectors
- Acquisition of data from data collectors if not part of an agency data system
- Coordination with data analysts
- Bridge gaps in current agency information technology capabilities and procedures

Timeline and Schedule (see attached gant chart)

Proposed Workshops for Coordinating Data Management & Exchange to Support Improved Columbia River Basin Assessments & Reporting

NEED	WORKSHOPS <i>[attendees]</i>	QUESTIONS	DELIVERABLES
<p>Coordinating our Assessments and Reporting, and the Information Flows that Support Them</p>	<p>PRE-WORK for Regional Policy Workshop #1</p>	<ul style="list-style-type: none"> • Distribute Anadromous Monitoring Strategy (AMS) and Sub-Framework document • Underscore that coordinated data management, assessments, and reporting are follow-on tasks to the AMS to which the “Skamania” participants committed to advancing. • Distribute data management workshops strategy/questions/deliverables, “roadmap” document, and relevant appendices • Distribute list of key policy/data management/biologist participants needed for the data management workshops • Distribute list of questions/consideration/implications the state and tribal agencies should consider internally in preparation for the regional and sub-regional data management workshops (see Bruce Schmidt’s “Implications” document). • Participants should be prepared to discuss: <ul style="list-style-type: none"> ⊕ What are your agency’s assessment and reporting needs? What assessments and reporting do you do now? On what schedule? How is that changing? ⊕ What inputs do you need from others to do your assessments? What do others need from you to do their assessments/reporting? What data flows best support these relationships? ⊕ How should current methods/protocols/ assumptions change to support more coordinated assessments? When should coordinated assessments be performed and who should conduct them? ⊕ What are the challenges/impediments for your agency in engaging in a coordinated data management, assessment, and reporting strategy? 	

NEED	WORKSHOPS <i>[attendees]</i>	QUESTIONS	DELIVERABLES
<p>Coordinating our Assessments and Reporting, and the Information Flows that Support Them</p>	<p>Regional Policy Workshop (#1)</p> <p><i>[Policy representatives and lead assessment and reporting staff]</i></p> <p><i>Recommend that we solicit as much of this information before hand as possible</i></p>	<ul style="list-style-type: none"> • Is your agency committed to supporting implementation of the AMS through coordinated data management, assessment and reporting? • At what level (e.g., field data, population-level derived metrics) is your agency prepared to integrate and share data? • Do you agree that the proposed strategy and deliverables for the workshops is an appropriate approach for designing the desirable data management strategies for the Columbia Basin, evaluating the existing gaps, and determining the resources necessary to implement and support coordinated data management, assessment, and reporting systems? • Is your agency prepared to commit the necessary staff to the data management workshops? • Is your agency prepared to consider the key questions and implications that a coordinated data management approach may pose for your agency? (see Bruce Schmidt's "Implications" document) 	<p>COMITTMENT TO WORKSHOPS</p> <ul style="list-style-type: none"> • Presentation of proposed workshops strategy and deliverables • Agreement from agency policy representatives that the proposed approach is appropriate and a critical component to advancing implementation of the AMS.

NEED	WORKSHOPS	QUESTIONS	DELIVERABLES
<p>Coordinated Strategies for Data Management and Exchange to Support Improved Columbia Basin Assessment and Reporting</p>	<p>PRE-WORK for Sub-Regional Technical Workshops (#1)</p> <p><i>[attendees]</i></p>	<ul style="list-style-type: none"> • Distribute proposed data-flow categories for organizing data management strategies and gaps. • Distribute a “strawman” description of the desired regional strategy for Basin-wide coordinated data management and information exchange. • Distribute NWFSC descriptions of existing data flows in recovery domains. • Distribute questionnaire tool for agencies to assess their current level of data management, and the magnitude of the gap for them to “switch” to the desired regional strategy • Participants to provide feedback on description of the desired regional strategy and to complete and return questionnaire. Participants will be provided a PowerPoint template for presenting a summary of their feedback and questionnaire results. 	
	<p>Sub-Regional Technical Workshops (#1)</p> <p><i>[assessment biologists and data technicians]</i></p>	<ul style="list-style-type: none"> • What sub-regional monitoring data is being, will be, or needs to be collected/managed to support the identified regional assessment and reporting needs? • What is the current data management approach, capacity and infrastructure? Is it sufficient to support the regional strategy? • What is the same and different about this sub region, what are the patterns? 	<p>INVENTORY AND INITIAL GAP ANALYSIS</p> <ul style="list-style-type: none"> • Results of “pre-work” questionnaires will be compiled to provide a coarse inventory of current data management and metadata practices • Participants will outline a sub-regional data flow and process for assessments to support coordinated information exchange, assessments, and reporting. • Participants will estimate the current gap in implementing coordinated data management, assessments, and reporting.

NEED	WORKSHOPS	QUESTIONS	DELIVERABLES
<p>Coordinated Strategies for Data Management and Exchange to Support Improved Columbia Basin Assessment and Reporting</p>	<p>Regional Technical Workgroups <i>Several regional workgroups are needed to advance products and guidance to assist sub-regions:</i></p> <ul style="list-style-type: none"> • Regional Data Flow and Assessment Strategy • Data Exchange Templates for each data flow category • Data Sharing Agreements • Metadata Standards • Standardized Terminology • Protocol & Method Documentation • Data Quality Assurance and Control • Database Design <p><i>[key assessment biologist and data technicians]</i></p>	<ul style="list-style-type: none"> • Based on information collected in sub-regional groups, the Regional Data Flow and Assessment Strategy Workgroup will evaluate “What are the alternative approaches for coordinating and integrating data management and exchange within and across sub-regions?” <p><u>Individual workgroups to consider:</u></p> <ul style="list-style-type: none"> • What collective tool/standards/guidance are needed to support sub-basin strategies and ensure Basin-wide coordination? 	<p>REGIONAL STRATEGY</p> <ul style="list-style-type: none"> • High level map for CRB data flows supporting target metrics. • Evaluation of alternative Basin-wide data management and information exchange strategies. <p>REGIONAL GUIDANCE AND TOOLS</p> <ul style="list-style-type: none"> • Workgroups will advance recommendations and/or tools for common data management components (e.g., regional standards for terminology, data exchange templates, protocol documentation, and database infrastructure • Workgroups will propose projects and costs for tools necessary to support implementation of coordinated sub-regional data management strategies.

NEED	WORKSHOPS	QUESTIONS	DELIVERABLES
<p>Coordinated Strategies for Data Management and Exchange to Support Improved Columbia Basin Assessment and Reporting</p>	<p>Sub-Regional Technical Workshops (#2)</p> <p><i>[data technicians and the biologists]</i></p>	<ul style="list-style-type: none"> • What are the specific projects (e.g., database development, protocol and metadata documentation) and staff resources are needed to support the sub-regional data management strategy? • What are the costs and relative priorities of the identified project and staff resource needs? 	<p>PRIORITIZED PROJECTS</p> <ul style="list-style-type: none"> • Confirmed sub-regional data management strategy • Confirmed list of gaps to be filled to implement the sub-regional strategy • Prioritized list of discrete projects (e.g., database development, data entry tools, data documentation) and associated costs • Prioritized list of ongoing staff and infrastructural support needs (e.g., data stewards, database administrators) necessary to care and feed sub-regional data management “systems” once developed and implemented
	<p>Regional Policy Workshop (#2)</p> <p><i>[Policy representatives and lead assessment and reporting staff]</i></p>		<p>IMPLEMENTATION</p> <ul style="list-style-type: none"> • Policy agreement on consensus data management strategies. • Identification of one-time and ongoing agency resources available to implement the regional/sub-regional data management strategies • Prioritization of regional and sub-regional projects and ongoing needs • Commitment to implement data management strategies through prioritization of available resources and seeking new resources.

CBFWA MAG Meeting of the Salmon Managers

Wednesday, April 21, 2010

8:00a.m. to 12:00p.m. (PDT)

@ CBFWA Offices Portland, Oregon

Attendees: MAG members should coordinate among their agency/tribe to determine who can best represent their interests. CBFWA staff has provided the following list of potential participants in this effort, expecting that the MAG representatives and Policy Leads in the following table would probably be most suited for this initial meeting.

State Co-Managers	MAG Representatives	Policy Lead	Technical Lead	Data Technicians
IDFG	Lance Hebdon	Pete Hassemer	Alan Byrne Bill Schrader Charlie Petrosky	Bart Butterfield
ODFW	Tom Rien		Rich Carmichael Jeff Rodgers	Cedric Cooney
WDFW	Bill Tweit	Erik Netherlin	Dan Rawding Casey Baldwin Mark Schuck Andrew Murdoch	Brodie Cox
SRB-LC		Jeff Breckel		
SRB-SR		Steve Martin		
SRB-Yak		Alex Conley		
SRB-UC		Julie Morgan		James White

Tribal Co-Managers

Colville		John Arterburn		
Nez Perce	Dave Statler	Jay Hesse		
Shoshone-Bannock	Doug Taki	Doug Taki, Hunter Osborne	Lytle Denny	
Umatilla	Gary James	Gene Shippentower		Stacy Schumacher
Warm Springs	Brad Houslet	Brad Houslet		
Yakama	Paul Ward	Dave Fast Steve Parker	Keely Murdoch Bill Bosch	
CRITFC	Phil Roger	Phil Roger		Henry Franzoni

Federal Co-Managers

NOAA	Elizabeth Gaar	Scott Rumsey	Tom Cooney Paul McElhany	NWFSC?
USFWS	Mark Bagdovich			

CBFWA MAG Meeting of the Salmon Managers

Wednesday, April 21, 2010

Distribution – Potential Participants

MAG Salmon Managers

Phil Roger, CRITFC
Attorney Paul Ward, YN
Gary James, CTUIR
Brad Houslet, CTWS
Lance Hebdon, IDFG
Dave Statler, NPT
Elizabeth Gaar, NOAA Fisheries
Tom Rien, ODFW
Doug Taki, SBT
Mark Bagdovitz, USFWS
Bill Tweit, WDFW

Policy Lead

John Arterburn, CCT
Dave Fast, YN
Steve Parker, YN
Gene Shippentower, CTUIR
Peter Hassemer, IDFG
Jeff Breckel, LCFRB
Jay Hesse, NPT
Scott Rumsey, NOAA Fisheries
Hunter Osborne, SBT
Steve Martin, Snake River Salmon Recovery Board
Julie Morgan, Upper Columbia Salmon Recovery Board
Erik Netherlin, WDFW
Alex Conley, YBFWRB

Technical Lead

Casey Baldwin
Bill Bosch, YN
Alan Byrne, IDFG
Charlie Petrosky, IDFG
Tom Cooney, NOAA Fisheries
Paul McElhany, NOAA Fisheries
Richard Carmichael, ODFW
Biologist Lytle Denny, SBT
Andrew Murdoch, WDFW
Dan Rawding, WDFW
Jeff Rodgers, ODFW
Bill Schrader, IDFG
Mark Schuck, WDFW
Keely Murdoch, Yakama Nation Fisheries

Data Technicians

Henry Franzoni, CRITFC
Stacy Schumacher, CTUIR
Bart Butterfield, IDFG
Cedric Cooney, ODFW
Jim White, UCD
Brodie Cox, WDFW

cc: CBFWA Staff