PACIFIC NORTHWEST AQUATIC MONITORING PARTNERSHIP

Annual Report for 2009

Performance Period:
January 1, 2009 - December 31, 2009

DATE SUBMITTED
March 15, 2010

SUBMITTED BY
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PNAMP Publication No. 2010-003

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Executive Summary

In 2009, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) continued to focus on providing opportunities for inter-organizational committees to work together to identify needs and address elements of its goals. PNAMP has largely moved away from the traditional workgroup meeting structure to a more task driven meeting approach. Using this structure for each proposed task, PNAMP is able to gather interested Steering Committee (SC) members and technical experts as a leadership team. The intention is that this leadership team guides the progress of the task and acts as an intermediate step between the larger workgroup and the SC. We have found that this structure allows better SC/workgroup exchange, without asking every SC member to track every activity. It also maintains the concept of garnering support from a larger forum of technical experts that are able to contribute to an open, inclusive process if they choose.

PNAMP focused on tasks related to four main existing topics in 2009: Data Management, Integrated Status and Trends Monitoring (ISTM) Demonstration Project, High Level Indicators (HLIs), and the Tagging, Telemetry, and Marking Project. In addition, PNAMP began work on a new focus topic - Project Implementation Tracking. PNAMP advanced its coordination goals and objectives for these topics by hosting workshops, work sessions, and meetings. Steering Committee members and technical experts participated in these meetings to exchange information about their own programs and to coordinate on existing tasks and initiate new tasks related to the topics mentioned above, including:

- further development of a regional monitoring terminology glossary and protocol catalogue tool (Protocol Manager/Protocol Library),
- hosting technology exchange meetings in order to update an existing inventory of local needs and regional data management activities and products and share data management lessons learned,
- development of a metadata guidance document,
- data management support for monitoring,
- continued work to demonstrate a "master sample" based integrated status and trend monitoring project in the Lower Columbia River recovery area,
- continued work on a project to publish information to support monitoring needs with respect to fish population monitoring methods (the Tagging, Telemetry, and Marking Project),
- further refinement of the initial PNAMP HLI compilation to include: more focus on aquatic ecosystem/watershed health indicators, surveying more entities, more information on indicators in use, identifying gaps in data collection to inform existing/desired indicators, and identifying recommendations for selection/development of HLIs for ecosystem/watershed health (including outlining the selection process),
- and consideration of new needs, such as coordination between project implementation tracking systems and considerations for web portal development.

In addition, the PNAMP Steering Committee approved two recommendations this year that were sent to the Executive Network for consideration in November.

The PNAMP Coordination Team continued to facilitate dialog between experts to move forward with ongoing and new tasks. In addition, they continued their efforts to track in kind contributions at meetings, workshops and other PNAMP hosted events.

Lastly, in addition to specific tasks, PNAMP continuously strives to emphasize communication as a tool to support collaboration and provides a forum where monitoring practitioners and policy staff can interact and exchange information. PNAMP operates by open, inclusive processes and all meetings and documents are readily accessible to all. PNAMP did a major update to its website this year with the intent that the new structure would allow for easier access to information and better collaboration among its participants.

We believe the opportunity provided by PNAMP to assist experts to collectively focus on issues, results, and future needs related to monitoring increases coordination and collaboration in the near term, and increases effectiveness and efficiency of aquatic resource monitoring on a regional scale in the long term.

USGS

Background

Federal, state, tribal, local, and private aquatic monitoring programs in the Pacific Northwest have evolved independently in response to different organizational mandates, jurisdictional needs, issues and questions. Planning and coordination of federal, state and tribal monitoring activities have evolved slowly but steadily over the past ten years. Five years ago, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) became a formal institution charged with providing a forum for coordination of aquatic monitoring efforts in the region. The geographic area of this coordination includes the Pacific Northwest region from Northern California to Canada where participating entities are implementing monitoring efforts. As of 2009, 20 state, tribal, federal, and regional entities signed the PNAMP Charter (Appendix A).

The basis of PNAMP is that monitoring will be improved if: all programs use consistent monitoring approaches and protocols; follow a scientific foundation; support monitoring policy and management objectives; and collect and present information in a manner that can be shared. These goals will require considerable effort and commitment to collaboration by many entities and individuals. PNAMP strives to provide the forum where this collaboration can occur and to facilitate the exchange among technical experts and between technical and policy staff that is necessary to accomplish these goals.

Although we are eager for more participation, we believe PNAMP has a good combination of participants to address these goals. PNAMP's organizational structure includes a Steering Committee, Coordination Team (Coordinator, Assistant Coordinator, and Data Steward) and a number of technical working groups that focus on specific projects and tasks. The Steering Committee is composed of representatives from all entities that are signatory to the Charter (link) and technical task leaders, a combination which allows the interface of technical and policy interests. The agency representatives are responsible for communication to PNAMP regarding their respective agencies' work and needs, as well as delivering PNAMP progress and challenges to their agencies.

Recently, PNAMP has developed a better understanding of how the goals and tasks of each technical working group and individual partners are inherently interdependent. PNAMP has identified and been working on a number of concepts important to establishing a regional partnership for aquatic resource monitoring that bridge technical focus areas and individual agencies. These are critical elements of a large scale, efficient, coordinated effort to monitor resources. We refer to these as "cross cut tasks":

- Protocols: what to measure and how to measure it

- Survey design: how to decide where and when to monitor
- Data management: what are our data needs; what must we do before, during, and after data collection to facilitate data sharing
- Monitoring inventory: better facilitate coordination by describing 'who is doing what monitoring where'
- High level indicators: seek agreement on a set of indicators (and metrics necessary to determine indicators) to describe landscape level changes in the region
- Regional network of monitoring efforts: explore ways to continuously improve our efficiency and effectiveness of monitoring on a regional scale

Each of these tasks is complex and resolution involves collaboration with other regional and national organizations, as well as many individual participants. However, successful coordination and collaboration on these fundamentals could be a first step in the creation of a regional monitoring effort.

The PNAMP Steering Committee, Task Leaders and Coordination Team share the responsibility to work across PNAMP to accomplish our goals efficiently and consistently. We encourage those in the region who seek assistance with aquatic resource monitoring issues to contribute to PNAMP. Coordination on complex topics with many partners takes time and hard work. Since PNAMP is a voluntary organization, our progress is directly correlated to participation. Support and open communication are essential for PNAMP to be able to respond to needs of the region; we need to hear from both technical and policy staff what is needed for better coordinated aquatic resource monitoring.

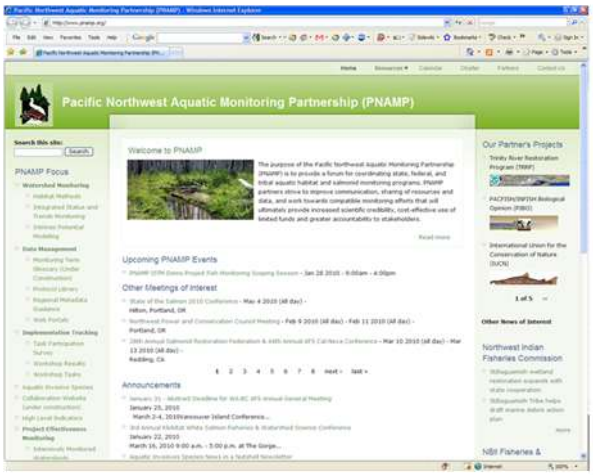
Coordination Team Activities

The PNAMP Coordination Team includes the Coordinator (Jennifer Bayer), Assistant Coordinator (Jacque Schei), and the Data Steward (Sean Quigley). The Coordination Team's goals are to facilitate the transfer of information within PNAMP and across all relevant organizations, work to support relationships between science and monitoring and to promote communication among organizations to help assure that monitoring plans and information are coordinated across the Pacific Northwest. The Coordination Team works to initiate and facilitate the development, presentation, and distribution of products aimed at heightening understanding of PNAMP issues, successes, and problems and to serve as a clearinghouse for PNAMP activities and products.

The Coordination Team is responsible for administrative requirements of PNAMP activities (e.g. meeting logistical support, record keeping, and maintenance of membership information). In addition, the Data Steward chairs the Data Management Leadership Team and is responsible for moving specific data management tasks forward, such as the protocol library and monitoring terminology glossary.

Organizational support was provided to PNAMP by developing and negotiating fiscal support with government and non-government entities, and managing budgets and associated contracts with those entities. Required progress reporting regarding the Coordination Team's activities (within PNAMP) and PNAMP activities to interested external parties was completed. PNAMP was represented by the Coordination Team at several meetings, workshops, and conferences in 2009. In addition, the Coordinator conducted briefings at meetings, for individual agencies, executives, etc. throughout the region as requested regarding PNAMP's activities.

The Coordination Team continues to seek appropriate outlets for communicating PNAMP's work beyond required progress reporting. The PNAMP website (www.pnamp.org) continued to improve in 2009, with the migration of the site to a new platform.



With help from Peter Westhagen (University of Washington, Columbia Basin Research Group) the Coordination Team moved the site from the Columbia Basin Fish and Wildlife Authority's (CBFWA) server to the University of Washington (UW) server. While the use of CBFWA's space and IT support was much appreciated, the current arrangement will allow the Coordination Team more flexibility in editing the structure and content of the website. The structure of the website has again been slightly modified to provide more focus on the topics that PNAMP is engaged in. The home page has also been modified to provide up to date information about events and links to announcements, partners' programs, and environmental news from around the region. Plans for 2010 include more investigation into how to use the new site as a collaboration tool for group discussions and draft document sharing.

Coordination Team Activities: Organizational Development

PNAMP is a dynamic, growing association of state, federal, and tribal partners, with projects and tasks almost entirely supported by in-kind contributions from these entities' staff. While managing projects in this volunteer-based environment is challenging, the results are very rewarding. One concern is our ability to account for these in-kind contributions from participants. Over the years, the Coordination Team has tried various ways to track in-kind contributions. We have found it to be relatively easy to track meeting hours and assign in-kind contributions based on attendance at PNAMP meetings (Table 1, 2). The Coordination Team has attempted to track time participants spent working on PNAMP tasks outside of meetings, but this is a very challenging task because it requires input directly from participants. It has been difficult to get a comprehensive tally for the year from participants and task leads. Requests were

sent to some participants and task leads during the year asking for an estimate of hours spent on PNAMP activities; however, there were relatively few responses to these requests. Since we were not able to come up with an accurate assessment of these hours in 2009, we are not reporting any estimates here. The Coordination Team plans to continue sending requests for in-kind estimates to participants in 2010, with the anticipation that participants will gradually become accustomed to tracking and reporting their own time.

Table 1. Estimated hours contributed by entities to PNAMP meetings. Hours were assigned to each meeting attendee for every PNAMP meeting from January 1 to December 31, 2009. Meeting times were assigned at time and a half to account for travel and prep times. For example, if a meeting lasted 6 hours, participants were assigned 9 hours. Teleconference times were counted as is. In addition, these estimates assign the full meeting time to each meeting attendee, regardless of if they attended the whole meeting or not. Note: Contractors/consultants were assigned to the funding agency where possible (noted in entity name). The rest of the contractors/consultants were grouped as one entity.

Entity	Total Hours	Hours for Steering Committee Only
Alaska Department of Fish and Game	3.00	---
Bonneville Power Administration and contractors	656.75	181.5
California Department of Fish & Game	1.50	---
Columbia Basin Fish & Wildlife Authority	98.50	52.5
Colville Confederated Tribes	18.00	18.0
Columbia River Estuary Study Taskforce	4.50	---
Columbia River Inter-Tribal Fish Commission	208.50	60.5
Conservation Biology Institute	16.50	---
Consultants (grouped)	81.00	---
Defenders of Wildlife	12.00	---
Ecotrust	98.00	9.0
Environmental Protection Agency	111.50	49.0
Foundations of Success	30.50	---
Idaho Department of Fish & Game	1.50	---
Lower Columbia River Estuary Partnership	30.00	---
Lower Columbia River Fish Recovery Board	78.00	5.0
Montana Department of Fish, Wildlife and Parks	14.00	---
National Center for Ecological Analysis and Synthesis	14.00	---
Nez Perce Tribe	36.50	---
NOAA Fisheries and contractors	400.75	79.0
Northwest Indian Fisheries Commission	48.25	30.0
Northwest Power and Conservation Council	210.75	72.0

Oregon Department of Environmental Quality	3.00	---
Oregon Department of Fish & Wildlife	145.00	17.0
Oregon Department of Information Services	18.00	---
Oregon State University	49.50	4.5
Oregon Watershed Enhancement Board	48.75	10.5
Pacific Northwest National Laboratories	7.50	---
Pacific States Marine Fisheries Commission	204.00	61.5
Portland State University	4.00	---
Puget Sound Partnership	10.50	---
Snake River Salmon Recovery Board	12.00	---
The Evergreen State University	4.00	---
The Nature Conservancy	32.50	---
University of Oregon	16.00	---
University of Washington	64.50	---
U.S. Army Corps of Engineers	26.00	14.0
U.S. Bureau of Land Management	41.00	---
U.S. Bureau of Reclamation	165.50	45.0
U.S. Forest Service	41.00	19.5
U.S. Geological Survey	189.75	38.0
Washington Department of Fish & Wildlife	191.00	55.0
Washington Department of Ecology	71.00	44.5
Washington Department of Natural Resources	11.00	---
Washington Governor's Salmon Recovery Office	122.75	59.5
Washington Recreation and Conservation Office	126.50	63.0
Yakima Basin Fish & Wildlife Recovery Board	34.50	---

Table 2. Estimated hours contributed by topical category to PNAMP meetings. Hours were assigned to each meeting attendee for every PNAMP meeting from January 1 to December 31, 2009. Meeting times were assigned at time and a half to account for travel time and prep times for the meeting. For example, if a meeting lasted 6 hours, participants were assigned 9 hours for that meeting. This was only done for on-site meetings. Teleconference times were counted as is. In addition, these estimates assign the full meeting time to each meeting attendee, regardless of if they attended the whole meeting or not.

Topical Category	**Total Hours**
Data Management Topics (Leadership Team, Protocol Manager/Protocol Library, Tech Exchange, Metadata)	730.5
High Level Indicators	78.3
Integrated Status and Trends Monitoring Demonstration Project	463.0
Project Implementation Tracking Workshop	1147.5

Steering Committee	988.5
Tagging Telemetry and Marking Project	36.0
Web Portals Workshop	485.5

Workgroup and Subcommittee Activities

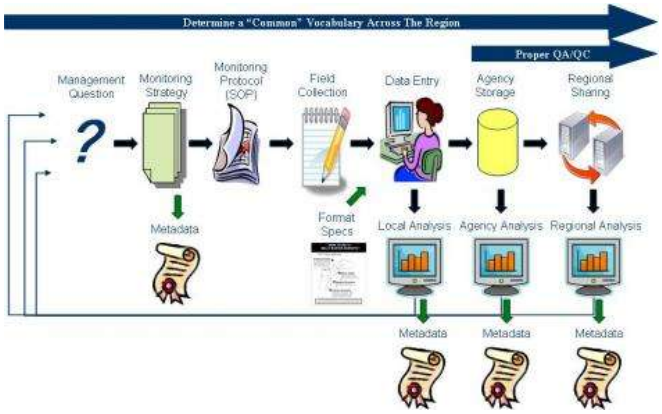
Traditionally, there have been a number of technical workgroups (WGs) and subcommittees in PNAMP that would meet on a regular basis to exchange information and/or work on tasks. PNAMP has maintained these workgroups for a number of years, but has seen many tasks that apply to multiple workgroups. Last year, PNAMP started to move away from the typical WG meeting structure to a more task driven meeting approach, allowing for better information distribution among participants in cases where a topic/theme cuts across multiple WGs. PNAMP continued this trend in 2009, largely doing away with regularly scheduled WG meetings in order to make the best use of everyone's time. Using a task focused meeting structure, PNAMP is able to gather interested Steering Committee (SC) members and technical experts to form a leadership team. This leadership team guides the progress of the task and acts as an intermediate step between the larger workgroup and the SC. We have found that this structure allows better SC/workgroup exchange without asking every SC member to track every activity. It also maintains the concept of garnering support from a larger forum of technical experts that are able to contribute to an open, inclusive process if they choose. We see relatively few technical experts actively engage in work tasks. The idea here is to more clearly recognize the smaller working group while maintaining the notion of a larger forum around them so we don't give the impression that participation is limited in any way.

To this end, PNAMP meetings and work sessions in 2009 focused on tasks related to these main topics: Data Management, Integrated Status and Trends Monitoring Demonstration Project, Tagging, Telemetry, and Marking Project, High Level Indicators. In addition, PNAMP's focus included a new topic in 2009 - Project Implementation Tracking. Several smaller working groups comprised of SC members and technical experts met regularly to work on specific tasks related to these main topics. Further details about tasks related to these topics can be found below. Other topics or tasks mentioned in previous PNAMP annual reports are still being tracked and accounted for, but largely did not make much progress in 2009. These topics and tasks, and plans for the future, are described briefly at the end of this section.

Data Management

In recent years, there has been significant attention on advancing data management in the region. PNAMP has recognized the importance of data management to regional monitoring activities and the highly technical

nature of data management discussions. To facilitate dialog between PNAMP technical workgroups, regional information management groups, and regional application development teams, PNAMP continues to support a Data Steward. The PNAMP Data Steward is also responsible for completing specific projects; providing recommendations to the PNAMP Coordinator and Steering Committee on regional data management issues, tools, and procedures; communicating with monitoring practitioners to identify needs; communicating user requirements to development teams. (PNAMP Data Management webpage)



PNAMP Data Management Leadership Team

Many groups throughout the region are discussing and working on data management and it has been difficult for PNAMP steering committee members and PNAMP partners to stay informed on details of these discussions and activities. PNAMP formed the Data Management Leadership Team (DMLT) to discuss and initiate data management tasks specific to PNAMP's needs. The DMLT met six times in 2009. Focus of these meetings was related to tasks described below in addition to other regional data management issues. In addition, the DMLT began discussions regarding establishing guidelines for the management of data to inform High Level Indicators across agencies and organization in the Pacific Northwest. The group drafted a white paper on this topic and expects to complete a final version in 2010. The DMLT will also continue to meet on a regular basis in 2010 to address regional data management needs.

Protocol Manager/Protocol Library

Protocol Manager is a tool originally developed by the National Park Service and USDA Forest Service for documenting protocols by allowing the creation, modification, and recording of methods pertaining to field collected monitoring data. PNAMP's Protocol Library will build on this effort, and is intended to be a high-level, web-based clearinghouse of protocols specific to the Pacific Northwest aquatic monitoring community. A part-time programmer was hired in April to assist with web-enabling the data access and presentation layers of the application. Currently, the ability to create and manage protocols and their associated components has been completed. Next steps include completing the reporting/searching aspects of the application, updating the content, and establish a workflow process through which protocols can be evaluated by one or more workgroups in PNAMP. Additionally, the ability to import metadata from other applications, and integrate with regional project management tools should be developed. (PNAMP Protocol Library webpage)

Monitoring Terminology Glossary

PNAMP has initiated the development of a glossary of terms related to aquatic monitoring

efforts in the Pacific Northwest. Specifically, the Glossary is intended to provide a collection of monitoring terms, their definitions, associations, and contextual classifications in a relational database format. This tool was developed with the following goals: Provide a succinct list of indicators and metrics for monitoring projects in the PNW; Provide a keyword thesaurus and controlled vocabulary to be used by other applications and tools; Reconcile differences in terminology between monitoring groups; Further define the 'who is doing what' aspect of metadata development for aquatic monitoring activities in the region. The data elements (or terms) were broken-out into a relational data structure created in MS Access. See the PNAMP webpage for updates as this product develops. Indicators and metrics from other regional data dictionaries have been added including the WA-ECY STM project, NOAA, and PNAMP. The content of the monitoring term glossary needs to be integrated with Protocol Library and other applications, in order to better categorize methods and protocols, and provide keyword associations.

Regional Metadata Guidance

Metadata describe the content, quality, condition, and other characteristics of data. Most commonly, metadata are used to enhance searching and discovery of data sets and to facilitate understanding of the meaning and proper use of datasets. For organizations that collect data, metadata help enhance the quality, usability and value of data for internal and external users. Organizations should view metadata creation as integral to their workflow and metadata as integral to datasets. In order to facilitate better metadata documentation in the region, PNAMP's Metadata WG coordinated with Environmental Data Services in 2009, to write a regional guidance document on metadata standards for ecological data. The guidance document describes four distinct metadata standards (Dublin Core, Content Standard for Digital Geospatial Metadata (CSDGM), North American Profile, and Ecological Metadata Language) and the intended use of each standard. The Metadata WG reviewed each standard in terms of appropriateness for describing ecological data and recommends the CSDGM with associated extension or Ecological Metadata Language standards for all datasets. The guidance document encourages funding entities to implement contracting language requiring metadata. It also encourages organizations to create metadata for the purpose of protecting investments in data generation and to enhance the quality, usability, and value of data produced by the organization. The document recommends organizations follow a phased approach to implementing metadata creation mandates:

Phase 1: Create full metadata for all future datasets
Phase 2: Create inventory-level metadata for all existing datasets
Phase 3: Use inventories to prioritize existing datasets
Phase 4: Create full metadata for priority datasets

It is anticipated that the guidance document will receive final approval from the PNAMP Steering Committee in early 2010. In 2010, the Metadata WG will work to advance the implementation recommendations identified in

the document. The full document can be found on the PNAMP Metadata webpage.

Technology Transfer Series

In 2009, Environmental Data Services collaborated with the PNAMP Data Steward to facilitate technology exchange meetings with federal, state, tribal and academic organizations in support of PNAMP coordination efforts. The meetings targeted technical experts and aimed to share lessons learned from existing efforts, identify and review existing data management tools, increase standardization among agencies, and advance data sharing efforts. A total of fourteen meetings were held in 2009. These meeting identified common challenges, successful approaches, and an inventory of tools. Many data practitioners in the region faced similar challenges including:

- Data integration and synchronization across multiple databases
- Lack of documentation (study design, metrics, protocols, and methods)
- Generating data entry forms that meet local expectations and state-wide standards
- Endless tail-chasing to meet current reporting requirements
- Lack of policy-level support
- Difficulties with funding for meeting regional data management requirements

Additionally, data practitioners expressed concerns about their roles and responsibilities within regional data management efforts, the lack of clear specifications to define software functionality requirements, and difficulties in receiving data from data generators. Several successful approaches were generally acknowledged:

- Adaptive development process with frequent feedback from biologists
- Separation of data storage and data analysis utilities
- Auto-generation of data entry forms from protocol documentation

Practitioners who participated in the meetings appreciated the opportunity to exchange experiences and lessons learned and to participate in the advancement of approaches to regional data management efforts. Participants also expressed an interest in continued discussion in monthly web-based seminars on regional data management and application development topics. Further details, meeting notes, and an inventory of existing tools can be found on the PNAMP website (link).

Regional Data Management Strategy

Several PNAMP SC members have requested that the PNAMP Coordination Team assist with re-starting the dialogue about regional coordination of data management needs for monitoring. An agreed-upon strategy for data management should serve the following organizational functions:

1. Provide a consistent set of goals and objectives with an over-arching purpose such as “to enhance data sharing, access, integrity, and usability”. This “Master Plan” should convey the long-term vision of the state which an organization hopes to achieve, and when it hopes to achieve this improved state. This might be at the end of ten years, for example.

2. Layout a "Strategic Plan" highlighting the shorter-term strategies to achieve the "Master Plan", including at least a broad timeline of events.
3. Identify the specific tasks and projects that must occur in order to achieve each of the short-term strategies of the strategic plan.
4. Identify the rules, standards, and solutions that will be used to guide and implement the projects and tasks in each phase of the strategic plan.

It should be mentioned, however, that many aspects of a strategy should be amenable to change as new knowledge or technology is made available, and to effectively react to unforeseen challenges.

A small group has had some informal discussions and the Data Steward has served as editor of the beginnings of a document to describe a 'roadmap to implementation' of these ideas for PNAMP partners. This is intended to grow from previous efforts, benefiting the recent Columbia River Fish and Wildlife Program efforts to coordinate anadromous fish monitoring, which recognized that data management coordination is an essential element of improving monitoring. PNAMP and the Columbia Basin Fish & Wildlife Authority (CBFWA) were identified in that forum to assist with developing a regional data management strategy. PNAMP and CBFWA will work together in 2010 to move forward on this task.

Web Portals Workshop

In October 2009, PNAMP hosted a workshop to gather technical experts, existing and planned portal administrators, and others who may have feedback on the many considerations for web portal development and use by aquatic monitoring data practitioners and managers. We asked portal administrators to provide some information in advance to help guide the development of the workshop (link to survey responses). At the workshop, participants heard presentations that related to the different stages of developing a portal and the audience was invited to question these presenters during a panel discussion. The participants spent the remainder of the day brainstorming barriers and opportunities related to web portals - what works, what doesn't, what can we move forward with, what are some solutions to the barriers presented? Some familiar themes emerged (see short summary of key findings below), as well as new ideas for solutions. Specific ideas for action items that we can move forward with were also presented, including initiating an informal review of portals and providing feedback to administrators.

Short summary of key findings from the Web Portals Workshop:

Tasks/topics that were identified as most critical/highest priority to address:

- Metadata

- Improved feedback between portals and decision/policy (including clarifying priorities of what data needs to be collected)
- Changing views on data (should be shared, not considered 'territory')
- Funding issues (lack of, data sharing requirements written into contracts)
- Data flow
- Regional guidelines for exchange of information
- Shared vision
- Using Open Geospatial Consortium Standards

The PNAMP Coordination Team plans to pick up on these threads in early 2010. To see the presentations, notes, and other resources from the workshop, please visit the new PNAMP Web Portals webpage: http://www.pnamp.org/ws_portal.

Integrated Status and Trends Monitoring Demonstration Project

The Integrated Status and Trends Monitoring Demonstration Project (ISTM demo project) has been developed over three years with collaborative effort involving PNAMP partners and other local partners in the Lower Columbia River (LCR). The ISTM demo project is intended to demonstrate an approach and utility of an integrated design framework for the collection of information to address questions on the status and trends of physical, chemical, and biological attributes in stream networks. After many discussions to scope and refine the project, the group decided to conduct a demonstration project in the LCR recovery area. The ISTM demo project will provide entities tasked with monitoring fish populations and aquatic habitat in the Pacific Northwest with a roadmap for integration of scientifically sound monitoring programs intended to meet the needs of decision-makers and managers. Specifically, it will apply this approach and develop recommendations for integrated monitoring plans (based on monitoring conducted by the Oregon Department of Fish and Wildlife, the U.S. Forest Service, NOAA Fisheries, the Lower Columbia Fish Recovery Board, the Washington Department of Fish and Wildlife, and the Washington Department of Ecology) for salmon, steelhead, and potentially bull trout populations listed under the Endangered Species Act (ESA), and their habitats in the LCR. Among the many monitoring components, key features of this effort are improved understanding of the extent and qualities of existing information, key gaps, and how a region-wide "master sample" concept can be applied to select sampling locations where appropriate. Generic objectives in the ISTM demo project for both habitat and fish are:

1. Identify decisions, questions, and monitoring objectives
2. Review existing programs and designs
3. Identify monitoring designs, sampling frames, protocols, and analytical tools
4. Use trade-off analyses to develop recommendations for monitoring
5. Recommend implementation and reporting mechanisms

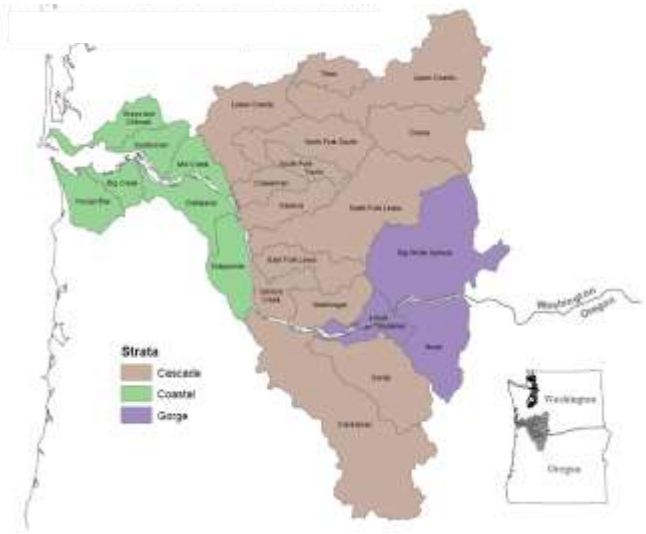
The PNAMP SC identified the ISTM demo project as one of our highest priorities and the

project made substantial progress in 2009. In addition, the ISTM demo project received "highest recommendation" rating from the Columbia River Fish and Wildlife Program efforts to coordinate anadromous fish monitoring. In the Lower Columbia group, there was unified support for this project to be funded by Bonneville Power Administration (BPA). Progress on the project has been broken out into sections and detailed below. Each component is in a different state of maturity, but the Coordination Team facilitated progress and ensured that all were linked as necessary to benefit the project as a whole.

Overview of Project Progress

To date, the ISTM workgroup has held several workshops and drafted several progress reports. This project has been reviewed and critiqued by the PNAMP Steering Committee throughout its history and has benefited from input of many technical experts around the region as well as past and ongoing monitoring projects. In 2010, PNAMP will schedule a review of all components of the ISTM demo project with the ISRP (Independent Scientific Review Panel). Development of the ISTM project has been facilitated by the PNAMP Coordinator as part of PNAMP activities in conjunction with other PNAMP tasks in order to fully capitalize on partners' in-kind contributions of staff time, which has been the primary mechanism to advance this work to date.

In 2009, the group completed two additional papers to help describe and support the project. The first provides an overview of the project, including background, goals, objectives and progress to date (link). The second paper provides a description of the master sample concept (link). It describes the benefits of using sampling locations drawn from a master sample to assess salmon and steelhead viability in a variety of habitat types, based on an assessment of stream and riparian habitat conditions. In addition, it also describes the site selection process and rationale for encouraging the use of comparable protocols for common indicators and describes potential data sharing opportunities created via the use of appropriate agency specific data portals or other venues.



Oregon State University Master Sample Tracking Tool

(Task leads: Don Stevens, Clif Johnston, Lisa Madsen, Phil Larsen)

The purpose of this component is to develop a prototype master sample management tool using the LCR region and to provide the necessary statistical support for the development. The management tool would be a web-based master sample tracking and management system to support sample selection from the population domain. The

system would allow users to know who else has selected sites from the master sample covering stream networks in their domains; to design individual or integrated monitoring programs; to know how existing sites relate to a common master sample; and what they are collecting at the site over time. In conjunction with the development and use of the web-based master sample management tool a need is anticipated for dedicated analytical support for design and utilization of results of the monitoring design based on master sample.

Bonneville Power Administration funded this work in July of 2009. In the following months, a prototype management tool was developed using the Washington master sample of LCR sites. The tool currently has the capability to select sites based on county, salmon recovery region, USGS hydrologic code, or WRIA (Water Resource Inventory Area). The preliminary search results then can be further refined by imposing additional criteria, e.g., owner type. In addition, a preliminary interface to the R language has been developed to select a sample of specified size from the subset of sites that meet screening criteria, and to create panels if desired.

An advisory workgroup consisting of representatives from various stakeholders and interested parties was formed. The prototype tool was reviewed by the advisory panel in October 2009, and subsequently modified in response to workgroup comments.

A draft user's guide has been developed and is currently under internal review and revision. A preliminary list of analysis tools has been developed, and R code to implement the tools is available.

Anticipated progress for 2010: The format of the Oregon master sample for the Lower Columbia does not match the format of the Washington master sample. Those differences will be resolved and the management tool extended to handle Oregon sites. The interface to R for sample selection will be extended to include stratification and variable probability options. An interface to the analysis tools will be implemented. Sampling and analysis tools will be tested and reviewed by the advisory workgroup. Their suggested adjustments and refinements will be prioritized, and, when feasible, implemented. The draft user's guide will be released to the advisory workgroup, and edited in response to the group's feedback.

Fish Monitoring Component
(Task leads: Dan Rawding, Jeff Rodgers, Bernadette Graham Hudson)

Salmon and steelhead monitoring programs are needed for ESA status determinations and to evaluate the response of fish populations to the implementation of the 2008 FCRPS (Federal Columbia River Power System) Biological Opinion. The goal of the fish monitoring component of the PNAMP ISTM demo project is to develop a coordinated Viable Salmonid Population (VSP) monitoring program that addresses key regional (priority) monitoring questions and develop study designs of sufficient quality and quantity to determine status of LCR salmon and steelhead. This process will provide entities tasked with monitoring fish populations in the Pacific Northwest with a road map of the steps needed

to develop an integrated, scientifically sound monitoring program that meets the needs of regional decision-makers and managers. As a demonstration project this approach will be applied to develop a specific monitoring plan for ESA listed salmon and steelhead populations in the LCR, concentrating on the monitoring of VSP parameters. This project is consistent with and is intended to complement the recent master sampling design currently being implemented in the LCR, and can integrate fish and habitat monitoring. The objectives for this project include:

1) Identify and prioritize decisions, questions and fish monitoring goals and objectives for LCR salmon and steelhead populations,
2) Determine adequacy of existing LCR salmon and steelhead monitoring programs, potential efficiencies, and existing gaps,
3) Identify feasible monitoring designs, sampling frames, protocols, and analytical tools,
4) Develop a set of fish population monitoring recommendations for the LCR based on Regional fish monitoring priorities established in Objective 1, cost-effectiveness, and a range of budgets, and
5) Recommend process for implementation, data management, reporting mechanisms and adaptive management for salmon and steelhead monitoring in the LCR

The Oregon Department of Fish and Wildlife (ODFW) and the Washington Department of Fish and Wildlife (WDFW) submitted a proposal for the fish monitoring component in 2009. Funding opportunities in fiscal year 2009 allowed us to receive funding for Objective 1 and the non-field work components of Objective 2. Following the start of the contract in September 2009, task leads began planning and pre-work for workshops to be held in early 2010. The intent is to use a series of workshops with monitoring program managers, ISTM participants, and the Joint Salmon Science Team (JSST) to prioritize fish monitoring needs. These needs will serve as the basis for the development of a specific LCR salmon and steelhead monitoring program based on different levels of resources (to be addressed at a later time). We will look to consolidate fish and tributary habitat tasks where possible - workshops being planned for the fish work may also include habitat tasks as well.

The remainder of the tasks indentified in Objectives 2-5 of the proposal, including data management aspects for fish data capture, will be submitted to BPA in early 2010 for a funding decision.

Tributary Habitat Monitoring Component
(Task leads: Jeff Rodgers, Bernadette Graham Hudson, Bob Cusimano)

In response to ESA listings for salmon and steelhead, federal and state agencies, local governments, private industry, and the tribes have invested substantial resources to restore and protect the ecological function of rivers and streams in the Pacific Northwest. One of the important salmon recovery needs is the ability to describe, with known certainty, the current status and long-term trends of the habitat conditions (physical, chemical, and biological conditions) of these aquatic

resources. The goal of this project is to develop a coordinated habitat monitoring program for the Lower Columbia River ESU (Evolutionarily Significant Unit) that meets these information needs and ultimately answers the question: "Are the primary habitat factors limiting the viability of the salmon and steelhead populations and ESU increasing, decreasing, or stable?"

The objectives for this project include:

1) Determine and prioritize habitat monitoring questions and objectives for management agencies, including appropriate spatial and temporal scales;
2) Determine adequacy of existing monitoring programs, potential efficiencies, and existing gaps;
3) Identify feasible monitoring designs, sampling frames, protocols, and analytical tools
    - Identify a probability-based sampling design and site selection process (using a master sample from a linear based hydrographic system) that will allow for characterizing habitat status and trends throughout the LCR, to demonstrate the utility of the master sample approach for providing a consistent framework for regional habitat monitoring efforts;
    - Evaluate need for common list of habitat indicators and metrics or potential habitat indexing protocol that can be used to compare and analyze metrics across programs for evaluating potential limiting factors;
    - Integrate existing information and monitoring data, where possible, into the status assessment (may include data colleted outside of the master sample, as well as data collected from a master sample draw that would need different weighting);
    - Supplement baseline status and trend assessments with remote sensing techniques to assess watershed and land-cover/land-use conditions within the ESU;
4) Develop a set of habitat monitoring recommendations for the LCR based on regional priorities established in Objective 1, cost-effectiveness, and a range of budgets; and
5) Recommend process for implementation, data management, reporting mechanisms, and adaptive management of monitoring.

In late 2009, a small working group drafted a proposal for the tributary habitat monitoring component of the ISTM demo project and sent it to the PNAMP SC for review. The group

also recommended that the SC consider a request for funding from BPA for a dedicated staff person or contractor to serve as a lead technical expert and coordinator for this component. The SC agreed with this request and it was sent to BPA. BPA supported this request by asking one of their existing contractors (BioAnalysts, Inc.) to support the work. It is anticipated that the contractor will be funded in early 2010 to begin work as soon as possible.

We will look to consolidate fish and tributary habitat tasks where possible - workshops being planned for the fish work may also include habitat tasks as well.

Estuary Component

Similar to what is proposed for tributary habitat in the LCR, the inclusion of a component to demonstrate what is needed to implement an integrated monitoring program for estuaries and non-wadeable streams and rivers would be beneficial. Co-locating this work in the area proposed for the ISTM demo has advantages; similar to what has been described in this report for tributary streams, there are multiple jurisdictions that could be involved, multiple existing monitoring efforts that could be integrated (Simensted et al. 2005, Estuary Partnership 2008, PNNL), efforts to standardize sampling protocols (Roegner et al. 2008), and preliminary efforts to develop a master sample for the lower Columbia River and Estuary have been initiated (Estuary Partnership 2007). In addition, planning documents (Johnson et al. 2008, Bottom et al, 2008) exist that would ease the initiation of these efforts and that provide a clear starting point for the implementation of an integrated monitoring program in this area.

There has been growing interest in including estuary/mainstem monitoring needs in the ISTM demo project process. In 2009, several agencies met to discuss macroinvertebrate monitoring in the LCR recovery area. PNAMP will continue efforts to include this estuary component in the project. A meeting is planned for early 2010 to consider potential collaborations with entities not already engaged in the ISTM demo project.

Tagging, Telemetry, and Marking Project

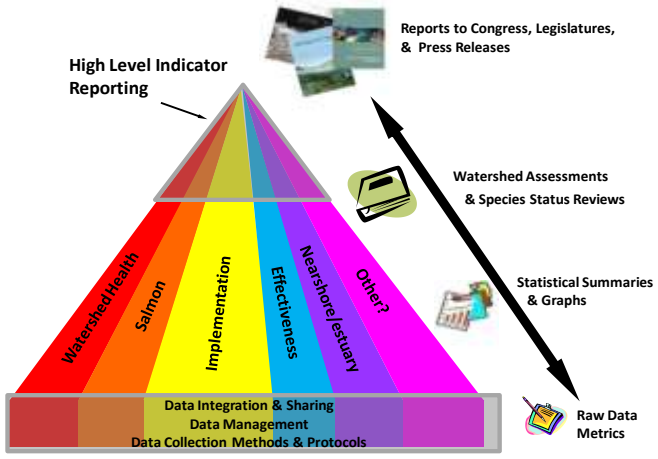
The Fish Population Monitoring WG has been focused for the past few years on the Tagging, Telemetry, and Marking Project (TTM). In 2007, the WG initiated a task to review and catalog tagging, telemetry, and marking protocols in the region. The proposed techniques guide is intended to provide new information, case studies, design and technological advances in tagging, telemetry, and marking. The final product will be a published compendium of materials. In 2009, a small working group formed to formally peer review submissions for the compendium. This Editorial Review Committee (ERC) conducted two peer reviews on each submitted manuscript and helped draft the conclusion chapter. The Coordination Team facilitated this process. In addition, USGS provided in-kind support for technical editing of all documents. It is expected that all pieces of the compendium will be finalized in January 2010 and the package will be sent to the USGS Enterprise Publishing Network for e-

publication. The final publication will be hosted on the PNAMP website when complete.

High Level Indicators

The PNAMP High Level Indicator (HLI) Subcommittee (mainly comprised of interested SC members) has been working with regional information management entities for the past few years to foster a regional environmental information strategy. The group has supported tasks from the Northwest Environmental Information Sharing (NWEIS) Executive Summits held in 2007 and 2008, producing a summary white paper, regarding HLIs, for executive consideration.

Executive participants of the NWEIS October 2008 meeting concurred that PNAMP should continue to be tasked to assist with their efforts to establish and use a core set of HLIs. In May 2009, PNAMP finalized a second HLI report (link to report) that provides a list of potential indicators, definitions and metrics in use for these indicators, data gaps, and recommendations for consideration by NWEIS. Unfortunately, NWEIS did not meet as planned in 2009 and is not planning to meet in the foreseeable future. PNAMP presented its second report to the NWEIS HLI task leads - Chris Drivdahl (Washington Governor's Salmon Recovery Office) and Suzanne Knapp (Oregon Governor's Natural Resources Cabinet). In addition, PNAMP submitted its report, along with an appropriate cover letter, to the Northwest Power and Conservation Council's request for public input on their draft indicators for the Fish & Wildlife Program.



Project Implementation Tracking

Project Implementation Tracking is a new topic for PNAMP in 2009. In the Pacific Northwest, significant time and money has been spent in research and development of action tracking systems for environmental conservation and restoration to meet individual organization needs for planning, compliance and reporting. With the need to demonstrate accomplishments toward shared goals and shrinking financial resources it has become more important to share results and accomplishments across jurisdictions, as well as to move toward more cooperative approaches for programmatic implementation of environmental strategies. Coordination of implementation tracking efforts offers an opportunity to establish partnerships to support environmental conservation and restoration activity planning, prioritization, gap analyses, fiscal accountability, and accomplishments reporting. It also provides a foundation to support action effectiveness evaluations, or report on the performance of implementation to help inform adaptive management and program compliance.

PNAMP hosted a workshop in December 2009 to start discussions on how to meet the needs identified above. The two day workshop, co-hosted by BPA, NOAA Fisheries, and PNAMP, focused on implementation tracking systems in the region. The workshop was designed to:

1) describe the current state of implementation indicator and metrics tracking, management and reporting;
2) share specific organization's plans for changes to these systems;
3) identify next steps to jointly develop products and tools to help standardize or integrate implementation efforts; and
4) provide opportunities to further develop regional products.

The workshop provided an opportunity for practitioners to identify opportunities to create tools, to crosswalk information between data systems, or common reporting indicators. Volunteers were sought to work on reaching agreement on implementation metrics, indicators or measures and tools to allow consistent reporting, which will facilitate aggregation of information across agency jurisdictions or topics. PNAMP and others will facilitate follow up actions in 2010. For more information about the workshop, visit the new Implementation Tracking page on the PNAMP website.

Other PNAMP Tasks/Topics

As mentioned above, other topics or tasks mentioned in previous PNAMP annual reports are still being tracked and accounted for, but did not make substantial progress in 2009. Below is a brief accounting of those efforts:

USGS

Project Effectiveness Monitoring

The Project Effectiveness Monitoring WG, which includes a subcommittee dedicated to Intensively Monitored Watershed (IMW) topics, is focused on addressing the need to understand the effectiveness of watershed health and salmon recovery investments in terms of their stated outcomes and the resulting effect on salmon populations, water quality, water quantity, and habitat. PNAMP supports the development of a regional framework for determining which habitat projects are most effective, including addressing habitat project implementation monitoring, effectiveness monitoring, and the response of fish populations (validation monitoring) through intensively monitored watersheds.

A task has been identified to inventory and evaluate effectiveness monitoring studies in the region. The intent of this task is to gather information on completed and currently active effectiveness monitoring studies as well as

those under development. The collection and subsequent evaluation of this information will allow for the development of a coordinated effectiveness monitoring network at a regional scale, facilitate potential integration of effectiveness monitoring with status and trend monitoring, and allow creation of tools to facilitate the evaluation of research and monitoring design and methods (link to draft project description).

The WG intended to make substantial progress on this task in early 2009 and use the information from the inventory to draft a synthesis document describing the preliminary findings. A report was drafted, but due to lack of support and participation by a broader group of practitioners, it was never finalized. In addition, the second part of the project, an assessment of the quality of the studies listed in the inventory, was never started.

PNAMP intends to look for a dedicated lead for this project in 2010 to complete the described tasks.

Intensively Monitored Watersheds

In 2005, PNAMP recommended establishing a regional network of "Intensively Monitored Watersheds" (IMWs) to evaluate the effectiveness of restoration projects, programs and policies at the landscape scale. Since that time, the working group has continued to review progress in context of PNAMP's phased approach to IMW implementation, including updated information for current IMWs, stratifying/classifying area, reviewing IMWs in context of criteria and classification, assessing implications of coverage/gaps, and making technical and policy recommendations.

After a 2008 IMW workshop, it was agreed that the next step is to update the entire IMW implementation plan from 2005, including the updated cost table, the context paper from 2007, and the assessment of quality paper from the larger Project Effectiveness Monitoring WG. This update will describe what they've learned about obstacles and opportunities in the last three years. The updated draft plan was expected in 2009, but due to time constraints on the lead editor, the revisions were not completed. PNAMP expects that the document will be finished in 2010. PNAMP also plans to host another workshop for practitioners to report on progress.

Estuary Monitoring Workgroup

Due to lack of WG leadership, the Estuary Monitoring WG did not progress on any tasks in 2009. There are plans to incorporate the expertise from the existing members of this WG in other ongoing tasks. The ISTM Demo Project and Project Effectiveness inventory project leads have already reached out to members of the Estuary Monitoring WG to include Estuary Monitoring components in their efforts.

Aquatic Invasives Species Monitoring Coordination

Over the years, PNAMP has hosted a number of work sessions focus on aquatic and riparian invasive/nonnative species monitoring coordination issues. But again, due to lack of leadership for this topic, the action items identified in the most recent work session are not progressing or are not progressing with the help of PNAMP at this point. However,

PNAMP plans to continue offering facilitation services to enhance the link between aquatic invasive species monitoring and existing monitoring programs where possible.

Remote Sensing Tools for Aquatic Monitoring

PNAMP has recognized a need to improve the availability of information about remote sensing applications that are used in the monitoring arena. In the past, PNAMP has hosted a session at an annual American Society for Photogrammetry and Remote Sensing conference and has finalized a publication of papers from the presenters (link to PNAMP Remote Sensing webpage). In April 2009, PNAMP co-hosted a remote sensing symposium at the American Fisheries Society's Washington and British Columbia Chapter Annual Meeting. The session was well attended and included an overview presentation from PNAMP.

As technology is implemented and advanced, remote sensing demonstrates the strong likelihood that more precise and cost-effective data can be collected in coordination with traditional 'on the ground' habitat assessment techniques. PNAMP would like to facilitate dialog among experts where appropriate. We currently do not have a lead for this topic or any identified tasks, but continue to keep our eye out for additional opportunities.

Steering Committee Activities

The PNAMP Steering Committee (SC) provides the science-policy interface between the Executive partners and technical workgroups, guides work of technical workgroups, obtains resources needed to accomplish tasks, and directs the activities of the Coordinator. The SC provides assistance to PNAMP initiatives by participating in the formulation, development, and review of recommendations for activities of PNAMP workgroups and integrating these activities with agency activities. The SC facilitates the transfer of information between PNAMP and their respective agencies. By promoting communication among organizations, the SC strives to assure that monitoring plans and information are coordinated across the Pacific Northwest.

The SC met 8 times in 2009 for regular meetings. The primary activity at these meetings was tracking the progress of current activities and discussion of new tasks that align with PNAMP's goals. These meetings also facilitated information exchange between SC members and WG members. The PNAMP Coordination Team facilitated meetings and prepared notes following the meetings. In addition, the SC met for a two-day retreat in May 2009 to discuss the strategic direction and priorities for PNAMP. The outcome of the retreat was confirmation that PNAMP's primary role is to serve as a forum for communication and collaboration and that PNAMP should emphasize its unique role of cross-pollenization among and between other collaboration forums. There was also strong support that technical products are key to maintaining interest and relevancy and that PNAMP should strive to produce more discrete products, even though at times concerns were raised about focus and being stretched too thin. Finally, the SC identified the HLI and ISTM tasks as PNAMP's highest priorities.

The SC also continued to discuss priorities for current and new tasks appropriate to advance to BPA for funding in 2009-2010. Tasks under discussion include ISTM demo project tasks and data management tasks. These discussions will continue into 2010.

Finally, the PNAMP SC advanced two recommendations to the Executive Network in November of 2009. The first product was the 2009 HLI report - "High Level Indicators for Watershed Health and Salmon" (link; see more details in the HLI section above). The second product was "Considerations for Regional Data Collection, Sharing and Exchange" developed by StreamNet in June 2009 (link). This data sharing guide offers general guidance, independent of the purpose or use of the data, intended as a "nuts and bolts" description of the steps needed to establish a comprehensive approach to data sharing. It can inform development of new data management approaches and systems, or allow comparison of existing systems to these recommended components and provides a checklist of all aspects of data creation and use. It does not prescribe specific actions but attempts to list the issues and discuss the various paths available for addressing them.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The Steering Committee felt these two complementary products contributed to regional coordination of monitoring programs and increased sharing of data. Both documents contain timely recommendations that have resulted from extensive collaboration among PNAMP partners and technical experts.

Appendices

Appendix A. Entities signatory to the PNAMP Charter as of December 2009.

PNAMP Partners	PNAMP Steering Committee Rep	PNAMP Executive Network Representative
Bonneville Power Administration	Jim Geiselman	Greg Delwiche VP Environment, Fish and Wildlife
California Department of Fish and Game	Scott Downie	Gary Stacey Northern Regional Manager
Columbia Basin Fish and Wildlife Authority	Ken MacDonald	Elmer Ward/Brian Lipscomb Chair/ Executive Director
Columbia River Intertribal Fish Commission	Phil Roger	Paul Lumley Executive Director
Confederated Tribes of the Colville Reservation	John Arterburn	Joe Peone Director, Fish and Wildlife Department
Environmental Protection Agency	Gretchen Hayslip	Michelle Pirzadeh Acting Regional Administrator
NOAA Fisheries	Scott Rumsey	Barry Thom Acting Regional Administrator
Northwest Indian Fisheries Commission	Bruce Jones	Mike Grayum Executive Director
Northwest Power and Conservation Council	Nancy Leonard	Tony Grover Director of Fish and Wildlife Division
Oregon Watershed Enhancement Board	Greg Sieglitz	Tom Byler Executive Director
Pacific States Marine Fisheries Commission	Bruce Schmidt	Randy Fisher Executive Director
U.S. Army Corps of Engineers	David Clugston	Steven R. Miles, P.E. Colonel, U.S. Army Commander and Division Engineer
U.S. Bureau of Land Management	Al Doelker	Edward W. Shepard State Director, Oregon/Washington
U.S. Bureau of Reclamation	Michael Newsom	J. William McDonald Regional Director
U.S. Forest Service	Linda Ulmer	Mary Wagner Regional Forester PNW Region
U.S. Geological Survey	Steve Waste	Leslie Dierauf Northwest Area Executive
Washington Department of Ecology	Bob Cusimano	Josh Baldi Environmental Assessment Program Manager
Washington Department of Fish and Wildlife	Erik Neatherlin	Phil Anderson Director
Washington Governor's Salmon Recovery Office	Steve Leider	Kaleen Cottingham Director, WA RCO
Washington Recreation and Conservation Office	Ken Dzinbal	Kaleen Cottingham Director

Appendix B. List of documents referenced in this report and associated hyperlinks.

Page 2:
- PNAMP Charter http://www.pnamp.org/node/21

Page 8:
- PNAMP Data Management webpage http://www.pnamp.org/datamgt
- PNAMP Protocol Library webpage http://www.pnamp.org/PLib

Page 9:
- PNAMP Monitoring Terminology Glossary page http://pnamp.psmfc.org/index.asp

Page 10:
- PNAMP Metadata webpage http://www.pnamp.org/metadata
- Technology Transfer meeting page http://pnamp.psmfc.org/datamgt/index.asp?page=5

Page 11:
- Survey responses from PNAMP Web Portals Workshop http://www.pnamp.org/node/2621

Page 12:
- PNAMP Web Portals Workshop webpage http://www.pnamp.org/ws_portal

Page 13:
- ISTM Overview Report http://www.pnamp.org/node/2667
- ISTM Master Sample Concept Report http://www.pnamp.org/node/2666

Page 18:
- PNAMP 2009 High Level Indicators Report - http://www.pnamp.org/node/2060

Page 17:
- Proposal for Ecology of Yearling and Subyearling Salmonids in Shallow Tidal Freshwater Habitats in the Vicinity of the Sandy River Delta in the Lower Columbia River- http://www.cbfwa.org/solicitation/components/forms/Proposal.cfm?PropID=506

Page 19:
- PNAMP Implementation Tracking webpage http://www.pnamp.org/imp_tracking

Page 20:
- Project Effectiveness Monitoring draft document to describe assessment process http://www.pnamp.org/node/2053

Page 22:
- PNAMP 2009 High Level Indicators Report - http://www.pnamp.org/node/2060

Page 22:
- StreamNet Considerations for Regional Data Collection, Sharing and Exchange ftp://ftp.streamnet.org/pub/streamnet/projman_files/Data_Sharing_Guide_2009-06-01.pdf