PACIFIC NORTHWEST AQUATIC MONITORING PARTNERSHIP

Annual Report for 2008

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SUBMITTED BY
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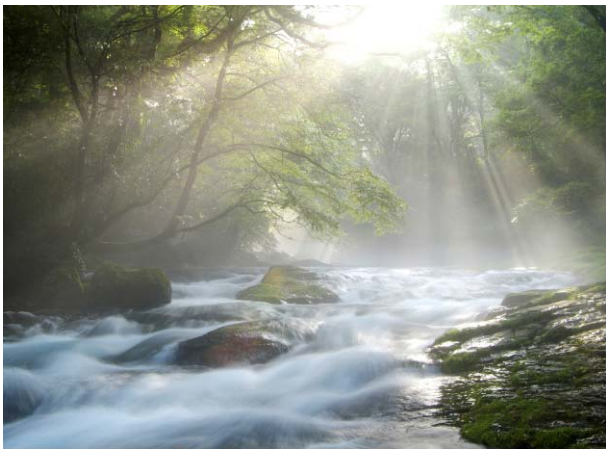


In 2008, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) continued to focus on providing opportunities for inter-organizational committees to work together to identify needs and address elements of its goals. Participation in PNAMP continued to grow, with more contributors to workgroups and tasks. In addition, PNAMP secured an additional signatory partner this year. Although a number of Washington Department of Fish and Wildlife (WDFW) staff have participated in workgroups and Steering Committee discussions over the years, WDFW formally signed the PNAMP charter in March 2008.

In recognition that improved information management is central to improving monitoring coordination and ultimately, information availability for decision making, the PNAMP Steering Committee continued work with regional information management entities to foster a regional environmental information strategy. Many Steering Committee representatives participated in two executive summit meetings this year (now formally known as the Northwest Environmental Information Sharing (NWEIS)) Executive Summit. At the most recent NWEIS Summit in October 2008, the Steering Committee presented executives with a compilation of high level indicators (HLI) and a summary report to identify current HLI use in the Pacific Northwest and recommend next steps. PNAMP was asked to continue to assist NWEIS executives with HLI work by further refining the initial compilation to include: more focus on aquatic ecosystem/watershed health indicators, surveying more entities, gathering 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).

PNAMP continued to advance coordination goals by hosting a number of work group meetings and workshops that allowed participants to collaborate on projects and exchange information about their respective agencies' monitoring activities. Many technical experts contributed to PNAMP work group and subcommittee meetings in order to continue progress on current tasks and initiate new tasks. These tasks included:

- 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 development of a regional monitoring terminology glossary & protocol catalogue tool (Protocol Manager/Protocol Library),

- data management support for monitoring,
- demonstration of “master sample” based integrated status and trend monitoring project in the Lower Columbia River ESU,
- continued work toward a inventory of effectiveness monitoring projects,
- initiation of a task to determine how to evaluate the quality of effectiveness monitoring projects,
- drafting a manuscript outlining the results from the habitat Protocol Comparison study,
- drafting proposals to initiate additional habitat method comparison work,
- and consideration of new needs, such as coordination between aquatic and riparian monitoring and evaluation of applications of remote sensing tools for monitoring.

PNAMP hired additional staff this year. The new Data Steward is responsible for moving data management tasks forward, in particular the protocol library and monitoring terminology glossary. The Coordination Team furthered their efforts to more effectively track in-kind contributions from participants this year. This task has been somewhat challenging due to the fact that the Coordination Team cannot accurately track time participants spend on PNAMP issues other than meetings without input from participants. The Coordination Team also proposed a new structure for current and new tasks in the work plan process so time spent on tasks is used efficiently and information can flow more easily between technical experts and the Steering Committee.

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 by all. PNAMP produced a new edition of *PNAMP Pursuits* with special focus on invasive species. We continue to make improvements to the PNAMP website and are in the process of exploring collaboration website opportunities.

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.

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. In 2004, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) emerged from an ad hoc effort to become 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 2008, 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 the right combination of types 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 workgroups and subcommittees that focus on specific projects and tasks. The Steering Committee is composed of representatives from all entities that are signatory to the Charter and leaders of the technical workgroups, 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 workgroup, subcommittee, 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, Workgroup 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 a new 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 as 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 is co-chair of the Data Management Workgroup and is responsible for moving data management tasks forward, in particular 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 government and non-government 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 conferences in 2008. 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. In 2008, the Coordination Team, with input from PNAMP members, produced the second edition of *PNAMP Pursuits* in September of 2008 (link). This special edition of the newsletter focused on efforts related to monitoring aquatic invasive species in the region.

In addition, the PNAMP website continues to improve as the Coordination Team makes updates. The structure of the website was updated in 2008 and includes more workgroup and subcommittee information, a new search tool to make it easier to find documents, and a new look. PNAMP has also recognized a need for a collaboration website. This would be a place where members and interested parties could go to find up to date information, discussions, working documents, etc., about the projects and tasks PNAMP is working on. In addition, the site would be a place to display general information from the monitoring world - new publications, conference announcements, job announcements, new efforts not related to PNAMP. The Coordination Team started testing various options for this new concept and plans to have something to demo early in 2009.

Coordination Team Activities: Organizational Development

As a young organization not quite 5 years old, 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. This year, the PNAMP coordination team has increased their efforts to more effectively track in-kind contributions. Using new project management software, the team was able to better track meeting hours and assign in-kind contributions based on attendance at PNAMP meetings (Table 1, 2). In addition, the Coordination Team attempted to track time participants spent working on PNAMP tasks outside of meetings. This has been somewhat challenging due to the fact that we cannot accurately track time spent on PNAMP issues other than meetings without

input from participants. Requests were sent to some workgroup and task leads during the year asking for an estimate of hours spent on PNAMP activities for the year; however, there were relatively few responses to these requests (Appendix B). The Coordination Team plans to continue sending requests for in-kind estimates to participants every quarter in 2009, 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, 2008. 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 were assigned to the funding agency where possible (noted in entity name). The rest of the contractors were grouped as one entity.

Entity	Total Hours	Hours for Steering Committee Only
Bonneville Power Association and contractors	417.75	185.75
California Department of Fish & Game	49.25	2.00
Columbia Basin Fish & Wildlife Authority	82.75	59.75
Colville Confederated Tribes	19.50	19.50
Columbia River Inter-Tribal Fish Commission	212.25	42.75
Confederated Tribes of the Umatilla Indian Reservation	10.50	---
Contractors (grouped)	114.00	10.50
Ecotrust	3.00	---
Environmental Protection Agency	132.75	---
Idaho Department of Environmental Quality	10.50	---
Idaho Department of Fish & Game	23.00	23.00
Lower Columbia River Estuary Partnership	40.50	---
Lower Columbia River Fish Recovery Board	66.00	18.00
Nez Perce Tribe	34.50	---
NOAA Fisheries and contractors	554.50	246.75
Northwest Indian Fisheries Commission	74.25	53.25
Northwest Power and Conservation Council	99.00	58.50
Oregon Department of Environmental Quality	21.00	---
Oregon Department of Fish & Wildlife	159.75	9.00
Oregon Department of Forestry	21.00	---
Oregon Department of State Lands	6.00	---
Oregon State University	22.00	---

Oregon Watershed Enhancement Board	125.25	45.75
Pacific Northwest National Laboratories	7.50	---
Pacific States Marine Fisheries Commission	150.00	96.75
Portland State University	21.00	---
Puget Sound Partnership	4.50	---
U.S. Army Corps of Engineers	10.50	---
U.S. Bureau of Land Management	42.00	39.00
U.S. Bureau of Reclamation	202.75	107.75
U.S. Forest Service	273.50	63.50
U.S. Geological Survey	244.50	87.75
Washington Department of Fish & Wildlife	117.00	66.00
Washington Department of Ecology	95.25	47.25
Washington Department of Natural Resources	9.00	---
Washington Governor's Salmon Recovery Office	190.00	95.75
Washington Recreation and Conservation Office	123.25	77.75
Yakama Nation	10.50	---

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, 2008. 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**
Aquatic Invasive Species Monitoring	297.00
Data Management	111.00
Estuary Monitoring	91.50
Fish Population Monitoring	40.50
Project Effectiveness Monitoring	735.75
Remote Sensing	126.00
Steering Committee	1510.00
Watershed Monitoring	896.00

Also during 2008, the Coordination Team proposed a new structure for current and new tasks in the work plan process. Several Steering Committee (SC) members have commented that it is challenging to keep up with all of the PNAMP activities at a given moment. In order to better focus limited time, the Coordination Team has asked that all SC members commit to supporting at least a few items and act as a "champion" for a particular topic. These champions would work with a small group of technical experts in that topic to form a leadership team, which would act as an intermediate step between the larger workgroup and the SC. The intention is that this would allow better SC/Workgroup exchange, without asking every SC member to track every activity, while maintaining an open, inclusive process whereby the larger group of interested (but not as engaged) members are able to participate and comment if they choose.

The updated PNAMP work plan process includes these groups and steps (Table 3):

1. Core technical team(s) develops specific tasks, products, proposals for key strategic topics, etc
2. Review by small leadership team composed of technical and a few Steering Committee members (champions)
3. Present to full Steering Committee for review
4. Return to full technical (practitioner) Workgroup for feedback, development of core teams for other tasks, etc.
5. Continue steps as necessary.

PNAMP would like to maintain the concept that its workgroups are an open forum for technical experts (practitioners) in a given subject area to be supported to come together to review (in order to inform recommendations to the SC) and to discuss needs and priorities. However, we see relatively few technical folks actively engage in work tasks. The idea here is to more clearly recognize these smaller groups while maintaining notion of a larger forum around them so we don't give the impression that participation is limited in any way.

Table 3. Outline of newly proposed groups to be engaged in PNAMP work plan process and estimated yearly time commitment necessary.

Title	Members	Role	Estimated Meeting Frequency
Steering Committee	Representatives from signatory entities	Strategic planning, identify needs, review proposed tasks, find resources, review products, recommend to execs	Monthly
Leadership Team(s) (topical)	A few SC champions & a few technical experts, including WG leaders	Review progress, products, identify strategic needs	Approximately 2-4 times annually

Core technical team(s)	Technical experts	develop specific tasks, products, proposals for key strategic topics	As needed to complete individual tasks and products
Workgroup	technical experts (practitioner)	Open forum for feedback, brainstorm needs and priorities, development of core teams for new tasks	1 or 2 times annually

Workgroup and Subcommittee Activities

Currently, there are a number of technical workgroups (WGs) in PNAMP, as well as a number of subcommittees formed to tackle specific tasks. Workgroups and subcommittees have met throughout the year on an as needed basis. Workgroup leaders initiate these meetings; the Coordination Team leads meeting preparation, facilitation, and follow-up, and assists with WG products. PNAMP has maintained these workgroups for a number of years, but has seen many tasks that apply to multiple workgroups. We acknowledge that there are actually a few themes that cut across the workgroups ("cross cut topics") and have been gradually moving to a structure whereby these workgroups will be encouraged to focus on the specific tasks versus the more general topical themes of the workgroups. We will continue to support this gradual transition in 2009.

Watershed Monitoring Workgroup

In 2008, the Watershed Monitoring WG continued to focus on habitat methods and the idea of a 'master sample concept'. Two sub-groups have been working on these major themes, advancing work from the past four years.

Habitat Methods

The first work related to habitat methods was the Protocol Comparison Project**.** The goal of the PNAMP Protocol Comparison Project is to expand on previous work on defining acceptable levels of variability within stream habitat protocols. An evaluation was conducted on the correlation between attributes measured by different monitoring programs and more intensive ground measurements of the same attributes (i.e., the "truth"). A multi-author manuscript (to be published in 2009) will suggest minimally acceptable criteria that monitoring programs should have to meet when conducting stream evaluations. The benefits of such criteria should be integration of stream habitat data resources so as to increase statistical power, improve trend detection, and reduce total cost of aquatic monitoring programs.

To continue with the protocol thread, PNAMP hosted a Habitat Methods workshop in December of 2008. Workshop participants were asked to participate in a series of brief segments on a number of important topics related to habitat monitoring methods with the intent to identify needs and priorities for follow-up actions. Some potential next steps identified in this workshop were:

- Write short summary of recommendations from current findings (from Protocol Comparison Project) with a focus on results that can be used right now
- Establish collaborative workgroup to define what a "good protocol" is, establish standards
- Repeat Protocol Comparison Project in different geographic location (west side of the Cascades)
- Evaluate pre and post stream restoration project similar to Protocol Comparison Project and use ground based and terrestrial LiDAR in both years to demonstrate change over time
- Develop more detail on methods for specific metrics: goal is to improve precision, accuracy, consistency – still need to determine how to decide priorities
- Define core indicators to answer habitat condition management questions for long term decision making.
- Explore methods for non-wadeable rivers
- Explore integration of remote sensing with existing monitoring

Integrated Status and Trend Monitoring (ISTM) project

The ISTM 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 several months of discussion to scope and refine the project, the group decided to conduct a demonstration project in the Lower Columbia (LC) recovery area. The group will facilitate collaboration between state and federal agencies that are currently monitoring or plan to monitor stream networks in the LC by facilitating their sampling site selection process using the master sample that has been compiled for this region. The focus will be to provide an example of how to integrate existing monitoring and implement a coordinated site selection process 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.

At the end of 2008, the group had begun drafting a paper to describe 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. The paper, expected in early 2009, will also highlight the site selection process and rationale for encouraging the use of comparable protocols for common indicators and describe potential data sharing opportunities created via the use of appropriate agency specific data portals or other venues.

The paper will also briefly discuss the benefits of embarking on a process to develop master samples and integrated monitoring programs for estuaries, non-wadeable stream and rivers, and nearshore ocean habitats. It is the desire of the group to keep the existing project (focused on tributary status and trend monitoring) moving along while creating opportunity for other ideas to be included (mainstem/estuary habitat and fish population monitoring). These elements are in differing states of maturity. In particular, there is a need for more discussion about the estuary/mainstem habitat monitoring and fish population monitoring components.

The group has suggested two specific elements that will help this project inform larger scale monitoring efforts: 1) a web-based master sample management tool that will enable regional monitoring partners to share monitoring information for integrated assessments; and 2) dedicated analytical support for design and utilization of results of the monitoring design based on master sample. Proposals are under development to request funding to meet these two needs and are expected in 2009. A workshop will be planned for early 2009 to make further progress on the overall project.

Intrinsic Potential Workshop

In November 2008, PNAMP and NOAA Fisheries hosted a workshop to improve the state of the knowledge on and consistency for Intrinsic Potential (IP) analyses used in the Pacific Northwest and California for salmon and resident salmonids. Intrinsic Potential-type analyses are spatial analyses that use intrinsic physical stream habitat variables to rate the habitat potential of stream reaches for aquatic species. Typically, IP models use a set of index curves or biological envelopes to relate each variable to fish preference and then combine indices to estimate an intrinsic reach score.

The workshop was well attended and participants had great input during the breakout working sessions (link to workshop summary). The next steps for the workshop planning group are to prepare a guidance document based on the workshop background strawman work (including IP templates and

references collected through the data call prior to the workshop), participant discussions, and notes from this workshop. This document will be distributed in early 2009. The planning group will also present any further work, project proposals, or summary ideas for continued progress at that time as well.

Project Effectiveness Monitoring Workgroup

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.

In 2008, the WG continued their task 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 plans to complete the inventory in early 2009 and use the information to draft a synthesis document describing the preliminary findings. The report will including information about the types of effectiveness monitoring studies represented, the geographic extent of the studies, and a gap analysis to identify study types and geographic areas where monitoring is lacking.

The second part of this project will also include an assessment of the quality of the studies listed in the inventory. The WG has drafted a document "*Assessing the Quality of Effectiveness Monitoring Projects*" as a guide for the method for assessing the quality (validity) of effectiveness monitoring projects at the project-scale (link to draft document). This draft document addresses the quality of effectiveness monitoring programs at the project or reach scale; although the methods could be applied at larger spatial scales. The results of this assessment will be used to develop a standard for which future project and watershed scale effectiveness monitoring programs can be evaluated and to determine areas of needed expansion and coordination for future effectiveness monitoring investments. The Project Effectiveness Monitoring WG is planning a workshop in March 2009 to present the results of the inventory to a broader group and to start discussions about how to assess the quality of projects.

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. Effectiveness monitoring at the IMW scale addresses the following general questions: Does the collective effect of restoration and/or management actions result in improved watershed condition and fish response? Why or why not? What are the causes of those responses?

In 2008, the IMW subcommittee hosted a two-day workshop in Corvallis, OR to review IMW efforts and progress since the last IMW Subcommittee meeting in January of 2007, and identify next steps for the group (link to workshop notes). The group reviewed 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. The 'Draft Characterization of Intensively Monitored Watersheds' table from the 2005 IMW Implementation Plan was updated for this meeting (link to updated table). There were detailed overviews and discussions of two sets of IMW-related activities (Watershed Research Cooperative (OSU) and ODFW Coastal Life Cycle basins) and several short summaries of IMW efforts in the region.

The subcommittee 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 report is expected in early 2009. The Subcommittee also plans to host another workshop in 2009.

Fish Population Monitoring Workgroup

The Fish Population Monitoring WG has been focused for the past few years on the Tagging, Telemetry, and Marking Project (TTM). In addition to the TTM project, the WG leads have plans to initiate discussions in 2009 related to developing a regional fish monitoring strategy. Current monitoring programs for determining adult and juvenile abundance have been developed over many years to support multiple management questions and decisions. The Fish Population Monitoring WG is seeking to assist in developing a broad regional strategy for monitoring anadromous fish that will address multiple management and reporting needs at various scales from the individual population to the region as a whole in a cost effective and efficient manner.

Tagging, Telemetry, and Marking Project

In 2007, the Fish Population Monitoring WG initiated a task to review and catalog tagging, telemetry, and marking protocols in the region. The proposed techniques guide will provide new information, case studies, design and technological advances and will describe methods and protocols. The closing chapters will provide a summary of commonalities and areas of technical convergence. In 2008, the leads for the Tagging, Telemetry, and Marking Project (TTM) provided the PNAMP Steering Committee with a detailed work plan for the product including identification of topical priorities and a timeline and commitments for completing. Several papers were submitted over the course of the year. At the end of 2008, the group began discussions about the editorial review process for submitted papers and dissemination of the final product.

The group will continue to focus on the editorial review process in early 2009, starting with a workshop intended to present the review process, divide papers into logical groupings, and identify reviewers for each paper. The final product is expected in fall 2009.

Estuary Monitoring Workgroup

The Estuary Monitoring WG held one meeting in early 2008. Due to lack of WG leadership, the Estuary Monitoring WG did not progress on any tasks in 2008. There are plans to incorporate the expertise from the existing members of this WG in other ongoing tasks from other WGs. The ISTM Demo Project and Project Effectiveness inventory project leads have already reached out to members of the Estuary Monitoring WG to include this topic in their efforts.

Data Management Workgroup

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 recognized the highly technical nature of data management discussions. 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. In 2008, there were many discussions regarding the role of PNAMP in assisting with the advance of regional data management. With the dissolution of the Northwest Environmental Data Network (NED), the broader range of data management tasks that NED focused on have been put on hold or taken up by other groups. With the addition of the new PNAMP Data Steward, the PNAMP Data Management WG was reinvigorated in 2008 to tackle data management tasks specific to PNAMP's needs. The PNAMP Data Steward is

responsible for specific projects and also facilitates dialog between PNAMP technical workgroups, regional information management groups, and regional application development teams. The Data Steward is responsible for 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.

The main tasks that the Data Steward and WG focused on in 2008 were the development of a protocol catalogue tool (Protocol Manager/Protocol Library) and a regional monitoring terminology glossary. The Data Steward has written recommendation white papers for both of these tools and progress on them is expected to continue in early 2009 (Protocol Manager/Protocol Library draft recommendation; monitoring terminology glossary draft recommendation).

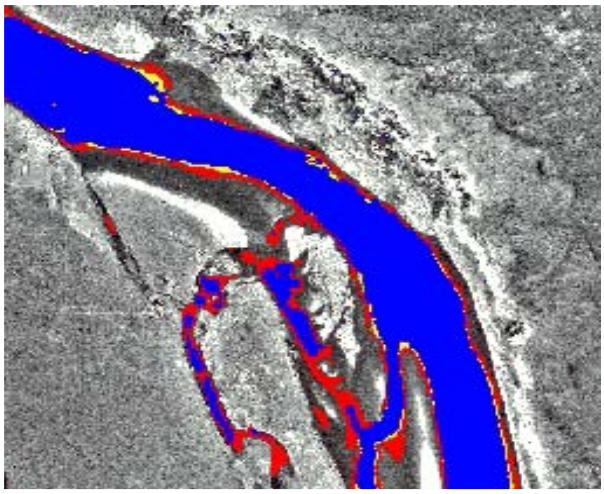
Also in 2008, the Data Management WG proposed several tasks to support monitoring, including providing regional guidance on metadata standards and evaluating existing metadata tools (link to metadata task description), conducting a series of technology transfer workshops for data management practitioners (link to technology transfer description), and developing best practice/guidance documents for field practitioners. Environmental Data Services has been contracted to support the metadata and technology transfer tasks. However, the PNAMP Data Steward will support these efforts by supporting identification of standards and tools to be reviewed, documenting feedback from PNAMP partners, and reviewing all recommendations. In addition, other members of the Data Management WG will be involved in helping these tasks progress.

Aquatic Invasives Species Monitoring Coordination

A subcommittee formed in late 2007 to focus on aquatic and riparian invasive/nonnative species monitoring coordination issues. In early 2008, PNAMP facilitated a workshop to identify actions that can be taken to advance the early detection network for nonnative species via collaboration with existing monitoring programs in the Pacific Northwest. The group also discussed the need for improved coordination among nonnative species data and information management systems and identified next steps with respect to meeting this need. The focus was to get beyond identification of general coordination, communication, and data management needs to identify specific near-term actions to improve early detection capabilities. The subcommittee identified several action items to pursue, but several have not taken off due to lack of leadership of this group.

PNAMP also hosted another work session in spring of 2008 to specifically address information management system needs identified in the first workshop. Again, due to lack of leadership for this topic, the action items identified in this 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. As an outlet for information about some current uses of remote sensing in the Pacific Northwest, PNAMP hosted a special session at the 2008 American Society for Photogrammetry and Remote Sensing (ASPRS) Annual Meeting. The special session, titled 'Remote Sensing Applications for Aquatic Resource Monitoring', was intended to share some current applications of remote sensing techniques in aquatic resource monitoring and to raise awareness in the remote sensing community of the need for improved remote sensing applications. The session included 11 presentations and concluded with an expert panel discussion that focused on current technologies and what needs those technologies address. PNAMP is planning on publishing a compilation of papers from the presenters of this session and an overview of the discussion. The publication will be out in early 2009 and will also be featured in the Tagging, Telemetry, and Marking techniques guide.

As a result of the special session, PNAMP has started a greater dialog among its members about remote sensing applications in aquatic resource monitoring and affiliations with a large number of experts. As the 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 continue the discussion to include a comparison of the cost, benefits, and tradeoffs of remote sensing technique integration with 'on the ground' work. It is our hope that this dialog continues to increase awareness to expand the base of knowledge and use of remote sensing techniques in aquatic resource monitoring and creates new connections to facilitate development of new remote sensing applications. To this end, PNAMP will co-host a remote sensing symposium at the American Fisheries Society's Washington and British Columbia Chapter Annual Meeting in April of 2009.

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 11 times in 2008 for regular, monthly 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. New in 2008 was the prospect of funding to help move PNAMP tasks along. Bonneville Power Association (BPA) set aside funding for tasks recommended by the PNAMP SC to BPA for implementation during the 2009 fiscal year. The SC discussed priorities for current and new tasks in light of this new money and we will see proposals and recommendations in the next year.

In 2008, the SC continued work with regional information management entities to foster a regional environmental information strategy. They continued to support tasks identified in the 2007 Executive Summit. In addition, many SC representatives participated in two executive summit meetings this year, now formally known as the Northwest Environmental Information Sharing (NWEIS) Executive Summit. In May 2008, SC representatives participated in a check-in teleconference for updates on the four main tasks identified at the first Summit. At that meeting, executives agreed to initiate the task of identifying high-level indicators (HLI) currently in use across the Pacific Northwest (PNW), with the understanding that this would inform the long term goal of achieving a core set of indicators that could be used to communicate salmon status and ecosystem health to Congress, legislatures, governors, and the public. Leaders for this task were identified as Chris Drivdahl (Washington Governor's Salmon Recovery Office) and Suzanne Knapp (Oregon Governor's Natural Resources Cabinet).

In July 2008, the leads formally requested assistance from PNAMP to identify: 1) common high-level indicators currently in use in the PNW; 2) who is using the indicator; and 3) metrics being used to support the indicator. The SC accepted the task and over the next few months proceeded to compile a list of HLIs and drafted a summary white paper (link to full report with HLI table). PNAMP's white paper summarized our approach, initial findings, and recommendations 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 high level indicators (HLI). Executive participants agreed to this vision and tasked PNAMP to explore high level aquatic ecosystem indicators for NWEIS consideration at a May 2009 meeting. PNAMP is to provide:

- List of potential indicators
- Definitions and metrics in use for these indicators
- Data gaps
- Recommendations for consideration by NWEIS

The SC will continue to work on this task in 2009 in preparation for the May NWEIS Executive Summit.

Appendices

Appendix A. Entities signatory to the PNAMP Charter as of December 2008.

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	Larry Peterman Chair
Columbia River Intertribal Fish Commission	Phil Roger	Rob Lothrop Interim Executive Director
Confederated Tribes of the Colville Reservation	John Arterburn	Joe Peone Director, Fish and Wildlife Department
Environmental Protection Agency	Gretchen Hayslip	Elin D. Miller Regional Administrator
NOAA Fisheries	Scott Rumsey	Barry Thom Deputy Regional Administrator
Northwest Indian Fisheries Commission	Bruce Jones	Mike Grayum Executive Director
Northwest Power and Conservation Council	Nancy Leonard	Bill Booth Chair
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	Rock Peters	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	Linda Goodman Regional Forester PNW Region
U.S. Geological Survey	David Woodson	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 Interim Director
Washington Governor's Salmon Recovery Office	Steve Leider	Chris Drivdahl Director
Washington Recreation and Conservation Office	Ken Dzinbal	Kaleen Cottingham Director

Appendix B. Estimated in-kind contributions from entities participating in PNAMP activities other than meetings.

Table 1. Estimated in-kind contributions from entities participating in PNAMP activities other than meetings for calendar year 2008. Contributions are reported as they were submitted by participants. Please note that this list is by no means all inclusive of in-kind contributions outside of PNAMP meetings. This table only includes responses received by the Coordination Team. In addition, there were several email queries to the group over time, so these responses may only reflect partial year contributions for these participants. The number in parentheses behind the entity name reflects the number of people who submitted estimates for that entity.

Entity	Estimated Contribution
U.S. Forest Service (2)	166 hours
NOAA Fisheries & contractors (1)	800 hours
Oregon Watershed Enhancement Board (1)	150 hours
Pacific States Marine Fisheries Commission (1)	80 hours
Bioanalysts, Inc. (1)	80 hours
KWA Ecological Sciences (1)	283 hours
Washington Governor's Salmon Recovery Office (1)	162 hours
Tetra Tech EC, Inc. (1)	$5,600

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

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- *PNAMP Pursuits*, Special Aquatic Invasive Species Edition http://www.pnamp.org/web/workgroups/AIS/documents/General/2008_0908PNAMPPursuitsInvasivesNewsletter.pdf

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- PNAMP/NOAA Intrinsic Potential Workshop Summary http://www.pnamp.org/web/workgroups/WM/meetings/2008_1119/2008_1219IPWorkshopSummary.pdf

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- PNAMP Project Effectiveness Monitoring Inventory and Assessment of Distribution and Quality of Effectiveness Monitoring Project Description DRAFT http://www.pnamp.org/web/workgroups/PEM/documents/general/PNAMPEff_Inv_Desc20090109Revised2.doc
- Assessing the Quality of Effectiveness Monitoring Projects DRAFT http://www.pnamp.org/web/workgroups/PEM/documents/general/2009_0214QualityAssessmentEffMonProjects_draft.doc

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- PNAMP Intensively Monitored Watersheds Subcommittee Workshop, July 23-24, 2008, Notes http://www.pnamp.org/web/workgroups/PEM/meetings/2008_0723/2008_0723PNAMP_IMWnotes_final.doc
- 'Draft Characterization of Intensively Monitored Watersheds' table from the 2005 IMW Implementation Plan http://www.pnamp.org/web/workgroups/PEM/meetings/2008_0723/2008_0714IMWupdateAppendix08.doc

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- PNAMP Protocol Manager & Protocol Library Recommendation White Paper http://www.pnamp.org/web/workgroups/SC/meetings/2008_1030/2008_1023PMrec.doc
- PNAMP Monitoring Terminology Glossary Recommendation White Paper http://www.pnamp.org/web/workgroups/SC/meetings/2008_1030/2008_1023MonTermGlossWhitepaper.doc
- PNAMP Metadata Task Description http://www.pnamp.org/web/workgroups/SC/meetings/2008_1204/MetadataTask_20080922.doc
- PNAMP Technology Transfer Task Description http://www.pnamp.org/web/workgroups/SC/meetings/2008_1204/TechnologyTransferMeetings_20081124-1600%20final.doc

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- PNAMP High Level Indicators for Salmon and Ecosystem Health Report on Current Indicators for NWEIS October 2008 Summit http://www.pnamp.org/web/workgroups/General/meetings/2008_1009/2008_0929PNAMPHLI%20paperFINAL.pdf