PACIFIC NORTHWEST AQUATIC MONITORING PARTNERSHIP

2013

Annual Report

PNAMP Publication No. 2014-003

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Executive Summary

The Pacific Northwest Aquatic Monitoring Partnership (PNAMP) continued promoting integration of monitoring resources and building tools to support monitoring in 2013. Integration of the different monitoring focal areas, of practitioners from a variety of organizations, and of monitoring programs goals and objectives is essential to improving the quality and consistency of monitoring in the region.

PNAMP operates through inter-organizational teams to make progress on a variety of projects identified to support partner needs and PNAMP goals. These teams are largely ad hoc and formed for the specific purpose of achieving the objectives of the identified projects. For each project, the PNAMP Coordination Team identified interested Steering Committee (SC) members and subject matter experts to form the working teams that provide guidance and leadership. In addition, the teams acted as an intermediate between the larger group of interested participants and the SC, thus maintaining the concept of better SC/participant exchange. The PNAMP Coordination Team continued to facilitate dialog among experts to move forward with ongoing and new projects. In addition, the Coordination Team continued their efforts to track in kind contributions at meetings, workshops, and other PNAMP hosted events; in 2013 this estimate amounted to over 4,400 hours by 73 organizations.

In 2013, PNAMP focused on projects related to these topics data management, integration of monitoring, monitoring design, species and watershed monitoring, and technologies to advance monitoring. PNAMP advanced its coordination goals and objectives for these topics by hosting workshops, work sessions, and meetings. Steering Committee members and subject matter experts participated in these meetings to exchange information about their own programs, coordinate on existing projects, and initiate new tasks, including:

- supporting data management at multiple scales for aquatic monitoring;
- planning a series of workshops for coordinating data management and exchange to support improved assessments and reporting in the Columbia River Basin;
- working to implement metadata recommendations;
- continuing work to demonstrate a “master sample” based integrated status and trend monitoring project in the Lower Columbia River recovery area;
- coordinating with municipal stormwater managers in Southwest Washington to develop an integrated status and trends monitoring design for the Lower Columbia region;
- managing a monitoring protocol and method library (with 833 protocols and 1,535 methods in the system at the end of 2013);
- developing online tools to support monitoring design and site management;
- providing training and support related to the use of online tools;
- moderating a community forum to discuss protocols and methods;

- developing a standard taxonomic effort agreement for the Pacific Northwest to facilitate the sharing of macroinvertebrate data;
- planning and hosting a forum focused on topics related to remote sensing acquisition and application/analysis in aquatic habitats;
- maintaining the PNAMP website for better information discovery and delivery; and
- planning additional work related to web tools and resources

Lastly, in addition to specific project tasks, PNAMP continued to emphasize communication as a tool to support collaboration and provided a forum where monitoring practitioners and policy staff could interact and exchange information. PNAMP operates by open, inclusive processes and all meetings and documents are readily accessible on the PNAMP website.

The opportunity provided by the PNAMP forum to allow its partners and participants 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.

Introduction

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 monitoring activities have evolved slowly but steadily over the past ten years. The Pacific Northwest Aquatic Monitoring Partnership (PNAMP) became a formal institution in 2004, 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. Currently, 20 state, tribal, federal, and regional entities are signatory partners of the PNAMP charter (Appendix A).

The guiding principles behind PNAMP are 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 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 subject matter and policy experts that is necessary to accomplish these goals. Although we are always supportive of more participation, we believe PNAMP has a good combination of participants to address these goals.

The different mandates driving monitoring and subsequent management, policy and reporting responses require collaboration with other regional and national organizations, as well as many individual participating organizations. Regardless of the complexity involved, PNAMP believes that support of coordination and collaboration based on the four guiding principles is important for a successful regional monitoring network.

PNAMP staff, Steering Committee members, and facilitator Robin Gumpert think strategically about the next five years at the biennial PNAMP strategic planning meeting.

PNAMP's organizational structure includes a Steering Committee (SC), staff to serve as coordinators and facilitators for specific topics of interest (Coordination Team), and a number of subject matter experts participating in working teams that focus on specific projects and their related tasks. The SC is composed of representatives from all organizations that are signatory to the Charter (link to PNAMP Charter page) and working team leads, a combination that allows the interface of

technical and policy interests. The representatives are responsible for communication to PNAMP regarding their respective organizations' work and needs, as well as delivering PNAMP progress and challenges to their organizations. Participants from the working teams largely contribute in-kind hours to support PNAMP projects. PNAMP has found that in some cases it is necessary to secure dedicated time from individuals in order to move forward quickly on the tasks related to a project. In these instances, time may be supported by PNAMP funding, usually for a person to serve as a lead for a particular task.

The PNAMP Steering Committee, Coordination Team, and participants 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 subject matter and policy experts on what is needed for better coordinated aquatic resource monitoring.

Results and Discussion

PNAMP is a forum for the community of aquatic monitoring practitioners in the Pacific Northwest. The PNAMP Coordination Team hosts the forum to facilitate collaboration around aquatic monitoring topics of interest, promote best practices for monitoring, and encourage coordination and integration of monitoring activities as appropriate. The forum's activities are conducted by participant working groups and teams as endorsed by the partner-based steering committee. All PNAMP activities are open to anyone who wishes to participate.

Coordination Team Activities

The PNAMP Coordination Team is employed by the U.S. Geological Survey (USGS), Northwest Region Executive Office. The PNAMP Coordination Team includes a Coordinator (Jennifer Bayer), an Assistant Coordinator (Jacque Schei), and two staff biologists (Amy Puls and Becca Scully). The former communication specialist position held by Sarah Beldin was vacated in late January 2013, and was replaced with a new position focused on supporting the online tools developed by PNAMP. This position was filled by Becca Scully in July 2013.

The Coordination Team's goals are to facilitate the transfer of information within PNAMP and across all relevant organizations, support relationships between science and monitoring, and 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.

PNAMP Coordination Staff. Pictured left to right: Amy Puls, Jen Bayer, Becca Scully, and Jacque Schei. Photo credit: M. Newsom, USBOR.

The Coordination Team is responsible for administrative requirements of PNAMP activities (e.g. meeting logistical support, record keeping, and maintenance of participant information). At least one member of the Coordination Staff serves as a lead or co-lead for all PNAMP projects to ensure the project moves along in a timely manner. The PNAMP Coordinator is responsible for planning and convening quarterly Steering Committee meetings.

In 2013, organizational support was provided 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.

The Coordination Team continued to seek appropriate outlets for communicating PNAMP's work beyond required progress reporting. The Coordination Team represented PNAMP at several external meetings, workshops, and conferences in 2013. In addition, the Coordinator conducted briefings at meetings and for individual organizations and their executives regarding PNAMP activities throughout the region as requested.

The PNAMP website (www.pnamp.org) remained a vital communication tool to provide up to date information about PNAMP events and projects, and increase the availability of biological and natural resources information at the regional and national level. While the content of the website was maintained by PNAMP staff, technical support and hosting of the website was provided through an outside vendor. The first half of the year was covered by a Cooperative Ecosystem Studies Unit (CESU) agreement with the University of Idaho. When that agreement ended in July 2013, a new contract was initiated with Sitka Technology Group. Sitka was able to migrate the PNAMP website to their servers and host it throughout the remainder of 2013.

In addition to the main PNAMP site, the Coordination Team also managed several other sites that are completed or are in development for the various web resource projects described in the Monitoring Resources section below.

In-Kind Contributions

PNAMP is a dynamic, growing association of state, federal, and tribal partners and includes a variety of participants from other organizations. Projects are supported by staff and working teams, who are almost entirely supported by in-kind contributions from their organizations. While managing projects in this volunteer-based environment is challenging, the results are very rewarding.

It is important to us to acknowledge the generosity of 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 and estimates of meeting prep or driving time (Tables 1 and 2). For 2013 we calculated over 4,400 hours of in-kind contributions of time from meeting participation alone. This is nearly double the amount of hours seen in previous years (Figure 1). This increase is mainly attributable to the large number of participants in the two-day Intensively Monitored Watersheds (IMW) workshop. The Coordination Team has attempted to track time participants spent working on PNAMP projects outside of meetings, but this is challenging 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 have been made to participants asking them to track hours spent on PNAMP activities during the year; however, relatively few participants actually do. Since we were not able to come up with an accurate assessment of these hours in 2013, we are not reporting any estimates here. The Coordination Team plans to continue requesting in-kind estimates from participants in the future.

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, 2013. In person meetings 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 of in-kind contribution. Teleconference times were counted as recorded. These estimates assign the full meeting time to each meeting attendee, regardless of if they attended the whole meeting or not.

Entity	Total Hours	Hours for SC Only
Aquatic Biology Associates, Inc.	5.50	
Arizona Game and Fish Department	12.00	
Bonneville Power Administration	328.25	81.25
California Department of Fish and Wildlife	55.00	
City and County of San Francisco	6.00	
City of Aberdeen	4.50	
City of Battle Ground	19.50	
City of Kelso	21.00	
City of Longview	17.50	
City of Redmond	1.50	
City of Vancouver	30.00	
City of Washougal	10.50	
Clark County	44.50	
Columbia Basin Fish & Wildlife Foundation	131.00	
Columbia River Inter-Tribal Fish Commission	204.75	90.00
Colville Confederated Tribes	79.50	46.75
Confederated Tribes and Bands of the Yakama Nation	53.00	
Confederated Tribes of the Umatilla Indian Reservation	41.75	
Confederated Tribes of the Warm Springs Reservation	24.00	
Cordillera Consulting	1.50	
Cowlitz County	6.00	
Cowlitz Tribe	24.00	
EcoAnalysts, Inc.	5.50	
EcoLogic Research	48.00	
Ecotrust	24.00	
Fish First	10.50	
Freshwater Trust	48.00	
Idaho Department of Fish and Game	151.50	35.25
Independent Consultants	37.25	
King County Department of Natural Resources and Parks	3.50	
Lewis County Public Works	4.50	
Lower Columbia Estuary Partnership	37.50	

Table 2. Continued. Estimated hours contributed by entities to PNAMP meetings.

Entity	Total Hours	Hours for SC Only
Lower Columbia Fish Recovery Board	135.75	
MWH Global	6.00	
National Council for Air and Stream Improvement	1.50	
National Oceanic and Atmospheric Administration	373.75	
Nez Perce Tribe	81.50	
Northwest Indian Fisheries Commission	9.00	9.00
Northwest Power and Conservation Council	100.25	60.00
Oregon Department of Fish and Wildlife	291.00	
Oregon Department of Forestry	24.00	
Oregon State University	2.00	
Oregon Water Resources Department	85.75	37.75
Oregon Department of Environmental Quality	50.75	
Pacific Northwest National Laboratory	4.50	
Pacific States Marine Fisheries Commission	188.25	97.75
Portland State University	24.00	
Puget Sound Partnership	45.00	
Quantitative Consultants Inc.	24.00	
Rhithron Associates, Inc.	5.50	
Seattle City & Light	6.00	
Shoshone-Bannock Tribes of Fort Hall	19.50	
Sitka Technology Group	54.75	
Snake River Salmon Recovery Board	24.00	
Sonoma County Water Agency	24.00	
Statistical Design	37.00	
Terraqua Inc.	24.00	
Tetra Tech EC, Inc.	81.00	
University of California, San Diego	30.00	
University of Washington	37.50	
US Bureau of Land Management	10.00	
US Bureau of Reclamation	68.00	68.00
US Fish and Wildlife Service	96.25	
US Forest Service	87.00	
US Geological Survey	187.50	46.00
US Environmental Protection Agency	66.25	39.25
Utah State University	33.00	
Washington Department of Fish & Wildlife	294.00	89.00
Washington Governor's Salmon Recovery Office	132.00	94.50
Washington State Department of Ecology	171.75	41.75
Washington State Department of Transportation	6.00	
Washington State University	4.50	
Watershed Sciences	3.00	

Table 3. 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, 2013. 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 recorded. In addition, these estimates assign the full meeting time to each meeting attendee, regardless of if they attended the whole meeting or not.

Project or Topical Category	Total Hours
Coordinated Assessments	953
Data Best Practices	23
Effectiveness Monitoring Coordination, IMWs	1885
Habitat Data Sharing	65
Integrated Status and Trends Monitoring	490
Methods Review	174
MonitoringResources.org, web tools	86
Outreach and Communication	22
Steering Committee Meeting Series	744

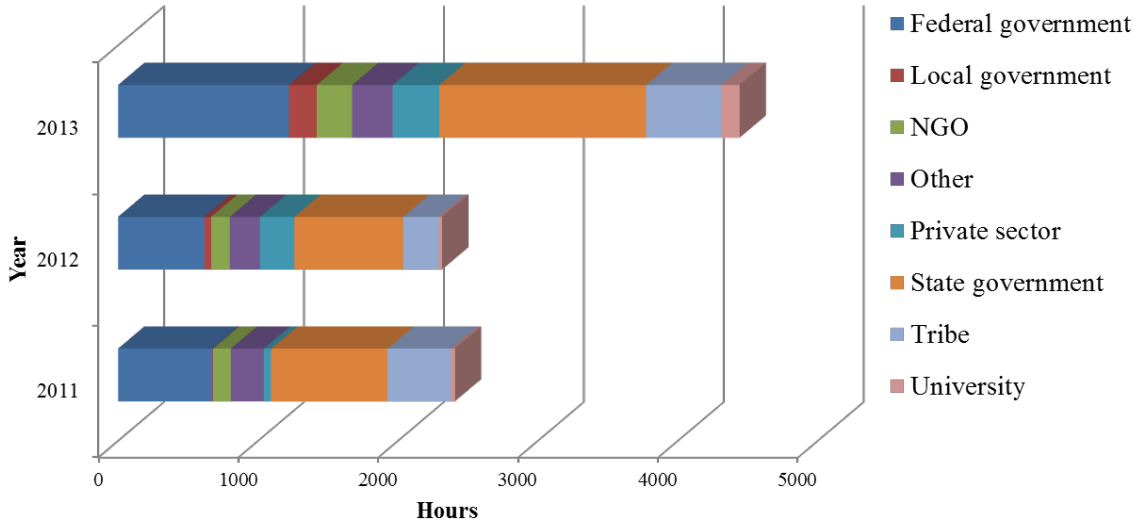


Figure 1. Estimated hours contributed to PNAMP meetings for 2011 to 2013. Hours were assigned to each meeting attendee for every PNAMP meeting from January 1, 2011 to December 31, 2013. In person meetings were assigned at time and a half to account for travel and prep times. For example, if a meeting lasted 6 hours, participants were assigned 9 hours of in-kind contribution. Teleconference times were counted as recorded. These estimates assign the full meeting time to each meeting attendee, regardless of if they attended the whole meeting or not. Hours were then grouped by their entity category and year. The entity category of "other" was used in cases when the other seven categories were not appropriate.

Project Activities

For several years, PNAMP's work and associated meetings and work sessions have been driven by ongoing and new projects. This is in contrast to the previous approach of standing work group meetings (organized around topics) throughout the year. The project-focused structure allows for better information distribution among participants in cases where a project cuts across multiple topical areas.

Using a project-focused structure, PNAMP is able to gather interested SC members and subject matter experts to form working teams that focus on completing specific tasks for the project. These teams guide the progress of the project and act as intermediaries 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 allows support from a larger forum of subject matter experts who are able to contribute to an open, inclusive process if they choose. The project-focused structure recognizes the smaller work teams while maintaining the framework of a larger forum of interested participants

In addition, PNAMP has found that it is important to have a dedicated lead for all projects, whether it is someone from the Coordination Team, a SC member, or subject matter expert who participates in PNAMP. In the absence of a lead who can dedicate time to move things along, PNAMP has found that final products can be significantly delayed, much to the frustration of interested parties. In cases where no volunteer lead has been identified via in-kind time contribution, PNAMP has distributed funds to support the time of a lead, as the budget allows.

PNAMP meetings and work sessions in 2013 focused on tasks related to these main projects: MoitoringResources.org (includes all web resource development), Coordinated Assessments, Habitat Data Sharing, Data Best Practices, Remote Sensing Forum, Methods Review, Integrated Status and Trends Monitoring Demonstration Project and Effectiveness Monitoring Coordination and Assessment. Several smaller work teams met regularly to focus on specific tasks identified with these projects. Details for each project are described below. Topics or projects not listed above that have been mentioned in previous PNAMP annual reports are still being tracked; however, they were not a focus in 2013.

MonitoringResources.org

For several years, PNAMP has partnered with Sitka Technology Group to develop online resources to create a network of information and tools to support a variety of monitoring needs. The Monitoring Resources site is the base for this network of tools and information. It is intended as a place to integrate existing and future PNAMP web resources so they work together to provide an efficient interface for users. Monitoring Resources contains the framework that provides central user and organizational management and houses all other PNAMP applications, including Monitoring Methods, Sample Designer, Site Manager, Monitoring Explorer, Monitoring Advisor, and the Metadata Builder. This integration allows for more efficient transfer of information and less burden on users. The tools are intended to help monitoring

practitioners plan and implement effective, efficient, high quality monitoring projects. They provide guidance and support for design and documentation of a monitoring project from the early design stage through implementation and generation of descriptive statistics. Using these tools allow practitioners to easily document information about their projects and programs and share it with many partners. Resource managers, funders, and policy makers benefit by getting a comprehensive view of existing and proposed monitoring projects in a region that allows them to better understand how well priorities are being met, as well as where there are gaps and overlaps in monitoring.

Screen shot of the MonitoringResourcs.org home page.

In 2013, work continued to add functionality to the tools in the Monitoring Resources suite. Because of shifting priorities, some tasks slated for 2013 were deferred to the next development contract so we could focus more effort on developing the Monitoring Explorer. Details about changes to individual applications can be found in the following sections.

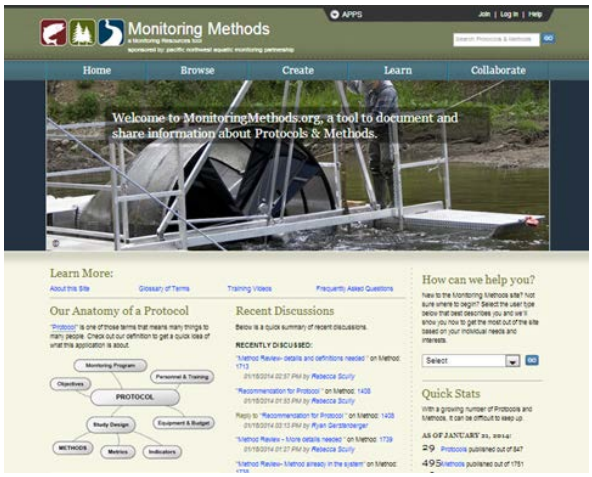
In 2013, PNAMP continued outreach, training and user support for all of the tools. The number of users with Monitoring Resources accounts, which provided them access to all tools, grew to 826, up from 598 users at the end of the previous year. User support involves responding to help requests submitted through the site itself or via emails or phone calls directly to staff. In addition, we conducted two training sessions for specific organizations, and three training sessions for BPA sponsors or COTRs. We also continued to look for other opportunities to implement a project tracking-type process for other organizations, similar to what BPA has done. This included outreach efforts to increase awareness of the tools, including nine briefings for various partners and others to provide background and demos of the tools and a presentation on the tools at the Salmon Recovery Conference. We have also recently submitted a proposal to USGS to integrate Monitoring Resources into some of their science programs to support documentation of projects and will know more about funding in 2014. There is also a proposal in the works for more development related to the Sample Designer, specifically to generalize the high-resolution 1:24,000 National Hydrography Dataset. Details on this proposal will be finalized in 2014 and information on funding will be known by March.

There are many remaining tasks to complete to make Monitoring Resources fully functional. We are currently seeking input and feedback on the tools as we continue into 2014. In addition, these tools are intended to support information sharing across other online systems, so we are also seeking input with respect to what systems and organizations to try to connect with. We feel it is imperative to the success of these tools to find additional partners to buy-in to the concepts of better

documentation and information sharing and provide support by encouraging or requiring use of the tools within their own organizations. (Monitoring Resources project page; Monitoring Resources application)

MonitoringMethods.org

In an effort to move forward with promoting improved business practice around documentation and to support standards development, PNAMP developed Monitoring Methods. Monitoring Methods is a free, online resource where monitoring practitioners can document methods and protocols or find information about others' methods and protocols, as well as definitions of monitoring terminology. Monitoring Methods also hosts a Community Forum to promote information exchange and collaboration between regional monitoring practitioners about topics of interest to this community. PNAMP makes information from Monitoring Methods available to other regional systems via web services.



Screen shot of Monitoring Methods.

In 2013, PNAMP received funds to add more features to Monitoring Methods. Major development in 2013 included:

- **Clone Protocol** – This feature allows users to make a copy of an existing protocol.
- **Customize Method** – Allows users to reference an existing method in their protocol and make annotations to the description if they do not implement the method exactly as described.
- **Bookmarks/Tags** – Allows users to flag content in system to appear in their profile page or to more easily find and revisit later.
- **Rich Text Editors** – Several fields in the edit forms of the method and protocol now have rich text editors that allow users to include formatted text such as bold, italic, subscript, superscript, special character, and symbols, as well as stylized text and images.
- **Method/Protocol Versioning** – Allows users to create a new version of a published method/protocol that they own, and track the history of versions.
- **Print Field Manual** – Creates a print view of the protocol details page for field use that eliminates non-essential details (comments, ratings, project and contract relationships, metric-method mapping) and inserts a title page and table of contents. The resulting manual can be saved as a Word document.
- **Program Filter for Add Method** – When adding methods to a protocol, users can now filter for all methods referenced by a specific monitoring

program. Methods that are approved by that program are indicated by a star.

- **Training Videos** – Short video segments are now available to guide users through the documentation process for protocols and methods.

PNAMP recommends additional development in 2014 as funding allows. Development would be based on needs already identified or additional feedback from users. Some additional feedback received this year included:

- Allow upload of figures, forms, documents on customized methods
- Allow ordering of methods in protocol to match how methods are implemented in field
- Update 'Implementation Notes' tab in protocols/methods
- Integrate Sampler Designer information in Spatial Design page for those who have GRTS samples documented in Sample Designer
- Support documentation of videos
- Improve publish request workflow

By the end of 2013, there were 1,535 methods and 833 protocols in the system. Of these, there were 513 published methods and only 28 published protocols. PNAMP feels it is important to urge users to finalize (i.e., publish) their content instead of letting it sit for months, or years even, in draft or proposed state. In addition, it is important to the success of Monitoring Methods to have content in the system that will draw in new users, not turn them away. To that end, staff began an exercise in 2013 to identify poorly documented methods or methods not yet published that were not actively being maintained in the system and contact the owners to encourage them to update and publish the methods or delete them. The task was not complete at the end of the year and will be continued in 2014. The creation of methods duplicate to those that already exist in the system creates excessive clutter in a system. In order to maintain a more organized library of methods, PNAMP will be looking into better ways for highlighting well documented methods for users to see examples of what level of detail should be documented. We also recommend that program managers be identified in the system and begin 'approving' well documented methods for use in their programs. In addition, staff recommend that methods be entered (or poorly documented methods be updated) to fill any gaps in content.

PNAMP staff also continued to support users in documenting their protocols and methods in Monitoring Methods. Staff spent approximately three to seven hours per week supporting requests received via email, phone, or the support page on the website. Requests included help with login, any content entry issues, support with how to structure protocols and methods for specific projects, responding to discussion board comments, reviewing methods, and responding to requests to add new organizations or monitoring programs. A majority of support was related to requirements associated with BPA Fish and Wildlife contracts. There was a burst of activity at the end of the year, spurred by a message from BPA to project sponsors encouraging them to complete their protocol and method documentation. This resulted in an

increase in the level of support required for responding to support requests and reviewing methods and amounted to about 40-50 hours per week of staff time for the month of December. There is often a spurt of activity when BPA project sponsors have a deadline in their contracts. Often times, sponsors are expecting to be able to enter method and protocol details and have content published within a matter of days, when in reality the process can take much longer. The review process alone might take up to two weeks depending on PNAMP staff schedules. We recommend BPA project sponsors be informed of these timelines and suggest that they plan ahead for future contract deadlines.

Regarding reviewing methods, when a user requests publishing of their methods, PNAMP staff review individual methods for completeness in the step by step instructions, ensure the description mostly follows a generic format, and look for duplication in the system. Staff then provide feedback via the comments section in Monitoring Methods. In 2013, two subject matter experts supported PNAMP staff in a few of the more difficult fisheries analysis methods. Two researchers spent a total of about 15-20 hours supporting this effort and reviewed 15 methods. Because PNAMP staff are not experts in all methodologies documented in Monitoring Methods, we recommend that PNAMP build a network of professionals who are willing to review methods in their area of expertise. With enough people participating, it may only be a time commitment of one to two hours per month per individual. Method reviews by subject matter experts would provide more of a scientific review than what is currently being implemented by staff. It would be beneficial for BPA to encourage its project sponsors, and other partners to encourage technical staff, to share their expertise by volunteering to be method reviewers. (Monitoring Methods project page; Monitoring Methods application)

Monitoring Sample Designer, Site Manager & Explorer

Over the last several years, PNAMP has pursued development of two discrete, but integrated tools to support documentation of monitoring sampling designs and locations of data collection events. These applications, the Monitoring Sample Designer and the Monitoring Site Manager, were release in October 2012. The Sample Designer supports users in building a sample design. It is mainly focused on developing designs using a probabilistic site selection (using an algorithm called Generalized Random-Tessellation Stratified (GRTS)) to generate a spatially-balanced set of sites for status and trends monitoring; defining the target frame; stratification; site evaluation; and creating panels, but it will also support creation of other types of designs.

Screen shot of the Monitoring Sample Designer.

The tool will also aid users in creation of permanent, sharable online documentation of their designs.

In 2013, we met with several organizations currently using GRTS in their monitoring programs to get feedback on the Sample Designer user interface to ensure the workflow made sense and captured the appropriate details. We also targeted those programs for upload of their existing designs into the Sample Designer. Several designs have been loaded to date, including many designs using the CHaMP protocol and the Watershed Health and Salmon Recovery protocol from the Washington Department of Ecology. Several more designs are still on the waiting list to be uploaded. There are currently 43 sample designs in the tool, 16 of which are finalized. We recommend increased support in the coming year to load additional designs. Since initial development, we have also expanded the Sample Designer tool to support creation and documentation of non-GRTS (non-probabilistic) designs. Currently, this support is limited to 'opportunistic' and 'census' survey types, but could be expanded if needed.

The Site Manager supports documentation of location or site information, specifically to support information associated with master samples and sample designs created in the Sample Designer. The Site Manager stores a variety of master samples from both linear stream networks and area- based water bodies such as the mainstem and estuary in the Pacific Northwest, stores attribute information for sites in each master sample, and is the place users can explore details about sites in master samples and sample designs used in monitoring projects. This is also the application that allows users to upload their own sites, legacy samples, attributes and evaluations. Currently, there are 19 finalized legacy samples that have been uploaded in the Site Manager to be used in sample designs.

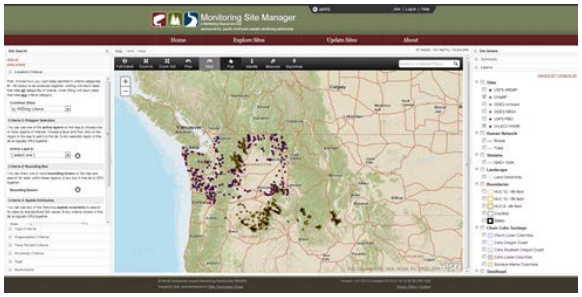
Screen shot of the Monitoring Site Manager.

In 2013, we identified master samples in use in the region and prioritized the upload of these samples into the Site Manager. To date, we have six master samples loaded (a combination of linear and area-based) and several more on the waiting list.

The Site Manager is also the tool that serves as the foundation for the Monitoring Explorer feature. The idea for the Monitoring Explorer was based on a variety of past PNAMP discussions and new tool development. Since 2005, PNAMP participants have expressed the need for a web-based tool that provides geographic locations in an interactive map-based format with monitoring activities linked to information about who is carrying out the activities and what is being monitored. PNAMP developed an idea for a tool that

would provide information associated with project sites from multiple organizations in one online resource so users wouldn't have to search through a variety of project tracking databases to gather the information they need. Proponents envision that this tool would support the ability to summarize current and historic monitoring activities and would assist in coordinating future activities. It should be noted that the intent is not for PNAMP to develop a tool that becomes a system of record for all monitoring location information in the region, but rather to develop a tool that has the ability to display a comprehensive list of location information from other systems.

In 2013, using funding from BPA, PNAMP and Sitka began development of the Monitoring Explorer feature. It currently provides access to a full-featured interactive GIS map that utilizes ArcGIS Server and several common layers for the region. The work to populate sites (locations) in the Monitoring Explorer began in fall of 2013. We currently have a full integration, meaning automatic updates when there are changes, to CHaMP sites. We have also received monitoring site metadata from other large monitoring programs in the region and have uploaded it into the Monitoring Explorer. These sites include information from the USFS PIBO and AREMP programs, Oregon Department of Environmental Quality Ambient Water Quality and National Rivers and Streams programs, and the Washington Department of Ecology Watershed Health and Salmon Recovery program. These data are not fully integrated in the sense that the Monitoring Resources system does not yet have an active web service link to the database where the location information is stored, so cannot be automatically updated. We recommend making these linkages fully integrated in the coming year, as well as setting up additional linkages with other organizations and with StreamNet to access more BPA project location metadata as well.



Screen shot of the Monitoring Explorer.

To facilitate integration, we began discussions about developing a metadata exchange standard for use within the region by both producers and consumers of monitoring data to foster greater visibility and understanding of the diverse range of data collection happening throughout the region. We have met with StreamNet staff to discuss this effort as well and the group has agreed to refine the draft standard and develop a pilot exchange. The Monitoring Explorer is one example of a tool that will consume this new exchange standard. Once this standard is fully developed and has had an opportunity to be reviewed by a PNAMP technical review team, our plan is to adopt this standard as a PNAMP standard protocol and encourage its use wherever possible.

Development of the Monitoring Explorer search functionality was also initiated in late 2013. This will ultimately provide a multi-dimensional mechanism to search for monitoring data across space, time, and an

array of other relevant taxonomies. Since this effort is still under development, you will see several possible options for searching on the site, but few of them are currently functional. Eventually a variety of search mechanisms will allow policy makers, researchers, and data manager to quickly identify data collection sites of interest, observe relationships between those sites, download shapefiles of result sets, share maps across the internet, and dig deeper into site information. Since the Monitoring Explorer is a tool that from the outset was designed to integrate into PNAMP supported systems and BPA supported systems, helpful links to protocols and methods, study designs, data repositories, and contract / budget information is seamlessly integrated when that data is made available over the exchange, therefore leveraging our prior investments in these other tools.

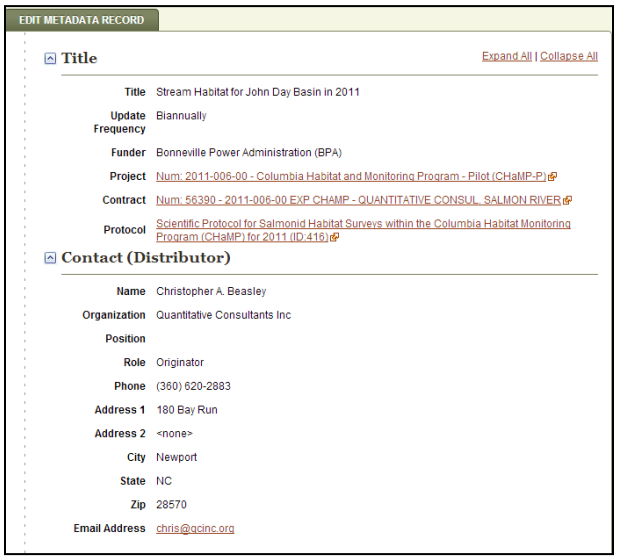
Lastly, PNAMP staff, along with Sitka, Phil Larsen, Bob Cusimano, and Chris Jordan, have been investigating the needs and costs associated with development of a new regional master sample based on the NHD hi-resolution hydro layer. As technology and datasets improve, users have expressed the desire to see updated information in master samples. In gathering feedback for the development of the Site Manager and Sample Designer, users expressed the need for a larger scale, a denser sample, and a wider variety of attributes. Washington State has recently adopted the use of the NHD hi-resolution hydro layer statewide, so programs like Ecology's Watershed Health and Salmon Recovery have identified a need to create a new master sample from this layer and migrate existing monitoring sites to this new frame. Other programs in the region that have expressed the need for a bigger scale or a denser master sample would need to do similar work if they wanted to move to a new master sample.

Instead of going down the path of creating multiple new hydro master samples to meet individual program needs, we think a coordinated effort, with input from all interested programs, would identify common needs, greatly reduce duplicative efforts, and ultimately be more efficient. In addition, there is widespread desire to see better coordination and data sharing between existing monitoring programs, and the use of one regional master sample would help facilitate this. If developed, the new master sample would be available through the Site Manager and could be accessed via the Sample Designer when creating new designs or could be downloaded in its entirety from the site. To date, we have contacted programs currently using GRTS monitoring in the region to determine their interest in participating in a discussion. Before creating a new master sample, we want to discuss needs and resources with interested parties. In addition, we would like to convene a separate group of statisticians to discuss technical details of integration of existing (legacy) sites into a new master sample. We have also submitted a proposal to USGS to try to garner additional funds to support this effort. (Sample Designer project page; Sample Designer application; Site Manager project page; Site Manager application; Monitoring Explorer application)

Metadata Builder

Prompted by the PNAMP 2011 Regional Metadata Tool Recommendations report, and a

2011 mandate for BPA's project sponsors to provide a metadata record for all new datasets, PNAMP partnered with Sitka Technology Group to develop a prototype metadata builder as part of the Monitoring Resources suite. The tool extracts data via web services from information systems (Pisces, Taurus (aka cbfish.org), and Monitoring Methods) that store data on individual contracts or individual protocols. The prototype develops a 'discovery level' metadata record that uses a limited set of ISO metadata standard elements.



Screen shot of a Metadata Builder record.

In 2013, PNAMP continued to support use of the tool as needed and solicit feedback from users. Currently, the tool remains in the prototype phase due to funding constraints. It can be used by anyone, but at this time, those with BPA contracts will see the most benefit. It has seen very little use to date, possibly due to the fact that it is not visible on the Monitoring Resources page until a user is logged in. Like all the tools, PNAMP has promoted the use of the Metadata Builder with its partners and participants and offered training to those interested. In 2014, PNAMP will continue to seek partners that see value in the tool with the hope of bringing it out of the prototype phase. (Metadata Builder project page)

Monitoring Advisor

PNAMP, working in partnership with the State of the Salmon Project, has been hosting and maintaining the Monitoring Advisor, formerly the Salmon Monitoring Advisor (SMA), website since 2011. The SMA site was developed by a working group of scientists through a series of workshops in 2008 to 2010, funded by a grant from the Gordon and Betty Moore Foundation.

In 2013, PNAMP staff continued with basic maintenance of the site. We also linked up terms in the site to the glossary in Monitoring Resources. This is part of the effort to ensure that the language we're using throughout all of the websites is consistent. Making sure the text is consistent and that links are updated is quite time consuming and there are still a few things left to be done.

In the future we hope, with the support of subject matter experts, to expand the content on the site to include information about monitoring watersheds, habitat, and other interests in addition to the current emphasis, which is salmon population monitoring. Currently, this task is on hold until we can allocate an appropriate amount of staff time and identify participants to help move this effort along.

In the future, we recommend integrating the content from the Monitoring Advisor directly

into Monitoring Resources, but for now, there are links in the Learn menus and throughout the applications as appropriate. (Monitoring Advisor project page; Monitoring Advisor website)

Coordinated Assessments Project

The Coordinated Assessments (CA) Project is an effort to develop efficient, consistent, and transparent data-sharing among the co-managers (fish and wildlife agencies and Tribes) and regulatory/funding agencies (BPA & NOAA) of the Columbia River Basin (CRB) for anadromous fish related data. The project has been coordinated by the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) and the Columbia Basin Fish and Wildlife Authority (CBFWA), with support from the Pacific States Marine Fisheries Commission (PSMFC) StreamNet project. Oversight is provided through the Coordinated Assessments Planning Group (CAPG). The project coordinates the development and implementation of the Columbia River Basin Collaborative Data Sharing Strategy for Salmon and Steelhead Population Abundance and Productivity Indicators (Strategy) and is helping initiate data sharing consistent with the initial Data Exchange Standard (DES) for those indicators.

The Coordinated Assessments (CA) project is a response to the Federal Columbia River Power System (FCRPS) Action Agencies and fishery co-managers agreements in the Columbia River Basin Anadromous Salmonid Monitoring Strategy (ASMS, http://www.nwcouncil.org/fw/merr/home/) to provide data related to Viable Salmonid Population (VSP) indicators. Performing assessments and reporting answers to management questions that rely on VSP data are needed to support 1) federal reporting for the Federal Power System Biological Opinion (BiOp), 2) federal recovery group reporting for the Endangered Species Act (ESA), 3) state agency mandated reporting, and 4) tribal Accord reporting needs.

The CA Project has been implemented in a series of phases, each one building on the success of its predecessor. Details of all phases can be found on the PNAMP website: Coordinated Assessments project page.

From April 2013 through December 2013, the CA Phase V Work Plan (link to work plan) focused on incremental internal investment and integration of the DES guidelines into the state and tribal data bases. A workshop was held in the Spring 2013 to discuss progress towards implementation of the existing DES, potential new DES tasks, and to confirm the work plan. Funding was made available from BPA to the tribes for data stewards to assist with their participation in the CA project. An EPA grant was awarded to WDFW for implementation of data flow based on the CA DES and overall vision. With this new influx of funding within the individual participants, the Phase VI CA Work Plan was created.

The Phase VI work plan (link to work plan) consists of three major goals: 1) Continue the phased approach to facilitation and implementation of the Coordinated Assessments Project, 2) Expand the initial DES to include hatchery indicators, and 3) Implement and oversee the EPA Grant to

create the Coordinated Assessments Exchange (CAX) as a node on the EPA exchange network. During 2014, the project will establish an exchange network for four salmon and steelhead indicators which will include Trading Partner Agreements, a Flow Configuration Document, and XML Schema and associated documentation (or other appropriate mechanism) for automated sharing of data among the three states, six tribes, Columbia River Inter-Tribal Fisheries Commission, and NOAA Fisheries.

Spring Chinook alevin at the Carson National Fish Hatchery, Carson, WA. Photo credit: C. Anderson, USFWS.

Habitat Data Sharing

Organizations throughout the region collect habitat condition data for a number of purposes including management and regulation of activities that affect fish habitat, assessment of watershed health, Clean Water Act applications and landscape metrics to support BiOp requirements. One important driver for the sharing of habitat data is the need of tribes and organizations at all levels to report on status and trends of fish and habitat condition and action effectiveness of restoration work at the project and watershed scales.

PNAMP initiated the Habitat Data Sharing (HDS) project in mid-2011 to improve the collective ability of the region to exchange aquatic-related habitat data in the Pacific Northwest. In 2013, the continuing activities of 2012 were consolidated into two topic areas. The first topic, stream habitat data sharing, was intended to look broadly at regional sharing of stream habitat data, and pursue activities intended to develop a better understanding of the needs, issues, and opportunities for sharing and to develop solutions to facilitate desired data exchanges. Unfortunately due to shortages of staff time, the planned stream habitat data sharing activities (link to 2013 HDS work plan) were put on hold. The second topic focused on macroinvertebrate data sharing, and activities for 2013 included facilitating the development of Pacific Northwest standard taxonomic effort agreements and exploring the relationships between macroinvertebrate indicators and fish habitat quality.

During 2013, significant progress was made on drafting a standard taxonomic effort (STE) agreement for the Pacific Northwest. The idea to develop the STE was proposed by members of the Macroinvertebrate Planning Group (MIPG) at the Northwest Biological Assessment Workgroup (NBAW) meeting in the fall of 2012 in a special session hosted by PNAMP. During 2013, taxonomists Bob Wisseman (ABA), Sean Sullivan (Rithron), and John Pfeiffer (EcoAnalysts) have focused on developing the taxa lists that provide standardized nomenclature and 3 levels of taxonomic resolution to use when identifying macroinvertebrate samples. Nine lists have been drafted (Bivalvia, Crustacea, Elmidae, Ephemeroptera, Gastropoda, Megaloptera, Neuroptera, Plecoptera and Trichoptera), and most are currently in review by regional

taxonomists, biologists, and database managers. Progress on the draft STE agreement was presented at the 2013 NBAW meeting in November. The first version of the STE is planned to be finalized by September 2014. (NWSTE project page)

Macroinvertebrate sampling on the Klickitat River, WA. Photo credit: G. Holmberg, USGS.

The MIPG also helped develop a briefing paper to describe the conceptual framework for investigating the relationship of macroinvertebrates to fish habitat quality. The briefing paper lead to a PNAMP hosted symposium at the 2013 Oregon American Fisheries Society meeting focused on this topic. Seven speakers presented to a packed room of over 100 attendees, and the session wrapped up with an hour long panel discussion (link to symposium summary). Most of the next steps identified during the panel discussion and subsequent MIPG meetings focused on research tasks that are outside PNAMP's purview; however, there is a desire for PNAMP to continue to act as a hub for practitioners interested in the topic and facilitate information sharing and future conference sessions. In 2014 we plan to begin organizing a follow-up session at the 2015 national AFS meeting in Portland, OR.

Data Best Practices

In recent years, there has been increasing attention on advancing data management in the region, with focus on improving practices within individual entities and interest in the ability to share data across entities. PNAMP recognizes the importance of data management to regional monitoring activities and the highly technical nature of data management discussions. To facilitate dialog between PNAMP work teams, regional information management groups, and regional application development teams, PNAMP has dedicated a member of the Coordination Team to help guide and move these projects along. Unfortunately this position, the PNAMP Information Management Liaison, was vacated in early 2013. Although tasks were distributed among remaining PNAMP staff members, this did result in slower progress on some tasks than expected. Emphasis was placed on reviewing existing tasks and considering partners' needs with respect to data management. The Coordinated Assessments project remained the highest priority and continues to be a very active task (see Coordinated Assessments Summary above). (PNAMP Data Management project page)

The Data Best Practices project is an ongoing activity of the PNAMP community to advocate and promote data management and communication worthy of our aquatic monitoring. In 2012 and 2013, the project consisted of three activities (listed below) that were conducted on an 'as-needed' basis rather than with targeted deliverables. Going forward

in 2014, we anticipate these topics to continue to be important, but recommend restructuring the tasks and how they are facilitated.

Data Management Leadership Team Meeting Series

The Data Management Leadership Team (DMLT) is a long standing open-membership group of PNAMP partners and participants that are interested in promoting best practices for aquatic data management and sharing.
In 2013, we proposed to transition the DMLT meetings from a general "information-sharing" focus to a more directed series of workshops that will address specific data management needs and interests. Due to staffing shortages, this concept has advanced slowly. We have a draft proposal in review currently by a core team and are seeking additional involvement of other partners to help plan the workshops. (Data Management Leadership Team page)

Data Steward Community of Practice

PNAMP coordination staff has identified the need to provide ongoing support to data professionals affiliated with PNAMP partners, either directly or indirectly. In 2012, an online library was created where documents that can be of value to the PNAMP data steward community are posted and can be queried using a proscribed set of filters. The Data Steward Resources online library currently contains 20 documents that have been tagged by one or more of six keywords: best practices, data dictionary, data exchange, data life cycle planning, GIS, and metadata. In 2013, we did not see a lot of use of the online library; however, we did not have much time to promote its availability or develop new content. Therefore we recommend that the future of this resource, as well as other ways PNAMP might support the Data Steward Community of Practice, be a topic of the 2014 Data Management Workshop series. (Data Steward Resources Online Library page; Data Steward Community of Practice project page)

Regional Metadata Guidance

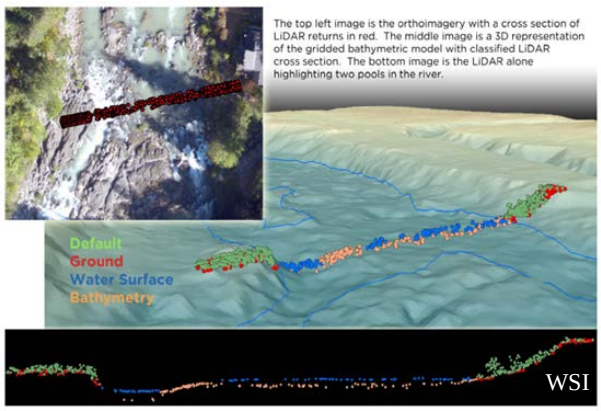
Metadata describe the content, quality, condition, and other characteristics of data. A standard metadata report can be used to enhance searching and discovery of data sets and to facilitate understanding of the meaning and proper use of datasets. For organizations that collect data, metadata help enhance 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.

The Metadata Work Group was not convened in 2013. In 2014, PNAMP recommends seeking additional partners interested in using the Metadata Builder (see Metadata Builder summary above), and including discussion of partner needs with respect to metadata tools in the 2014 Data Management Workshop series. (Regional Metadata Guidance project page)

Remote Sensing Forum

Remotely sensed data are of increasing interest to resource managers. Both data availability and advances in interpretation methodologies and technology continue to evolve rapidly. Previously PNAMP hosted a special session on remote sensing applications at the 2008 American Society of Photogrammetry and Remote Sensing (ASPRS) annual conference. PNAMP published a compilation of papers

from that session in 2009 (link to Remote Sensing special publication).



Slide from the Small Footprint Topo-Bathymetric LiDAR presentation.

In 2012, PNAMP, with guidance from a planning group consisting of two GSRO and one WDFW representatives, convened the Remote Sensing Forum (RS Forum). The structure of the RS Forum was quarterly informational online presentations on topics related to remote sensing acquisition and application/analysis in aquatic habitats. In 2013 the Forum sponsored one webinar presentation:

- Small Footprint Topo-Bathymetric LiDAR, presented by Russ Faux, (Watershed Sciences, Inc) & Amar Nayegandhi (Dewberry) 05/08/2013 (link to presentation)

PNAMP plans to continue the Remote Sensing Forum in 2014.

Methods Review

One of PNAMP's objectives is to understand Partners' needs with respect to monitoring methodology and to facilitate collaboration, coordination, discussion, and evaluation of implementation of monitoring methodology. If you've had the chance to browse through the list of methods on MonitoringMethods.org, you may have noticed that measurements may be collected using different methods. Methods may be different because of different study objectives, locations, equipment used, or differing opinions of practitioners about what is the best practice. For collaborative projects or programs that share data, it can be difficult to appropriately combine datasets if there is a lack of understanding of the details of the methods used to collect the data.

With the development of the Monitoring Methods Community Forum tool, PNAMP hopes to provide more consistency in documentation and therefore a better understanding between practitioners about what everyone is doing. Further, we anticipate discussions on the community forum about implementation of monitoring methods, study design details, etc. It is expected that these discussions will help point out agreements and inconsistencies related to methods, but may not always have a clear resolution. With the Methods Review effort, we will use the community forum discussions, as well as previous PNAMP discussions, as a basis to plan for technical discussions focused on the current state of affairs for a particular protocol or method, inconsistencies and disagreements, and how to move forward. All discussions and final outcomes, whether it be agreement to use a particular method or agreement that different methods are necessary, will be documented and available online for future reference.

After conducting a pilot effort to review fish length measurement methods in June of 2012,

PNAMP hosted two half-day methods review workshops in 2013 to discuss best practices. At the Oregon AFS meeting in February of 2013, PNAMP and Sitka Technology Group cohosted a workshop discussing large wood survey methods, and also gave a demonstration of the PNAMP web tools found at MonitoringResources.org. In April of 2013, PNAMP, Jennifer O'Neal (Tetra Tech), and Brett Roper (USFS) hosted a methods review workshop focused on snorkel survey methods and measuring pool characteristics. The workshops were intended to generate discussion of how monitoring practitioners use different methods to generate the same metric, determine if the different methods are really describing the same methodology, and discuss if consensus about best practices is possible. Because we expected workshop attendance to be limited due to travel restrictions and budgets, the intent was to then use the monitoringmethods.org community forum to post the workshop findings and expand the discussion to a wider audience. Although there was good engagement of participants in the workshop discussions, online follow-up participation has been lacking. We recommend a concerted effort by staff and interested parties to reinvigorate this task in 2014 and develop a strategy to move forward that builds on the progress that has already been made. (Methods Review project page)

Integrated Status and Trends Monitoring Demonstration Project

The Integrated Status and Trends Monitoring Demonstration Project (ISTM demo project) began in 2007 as a 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 in the LCR recovery area (Figure 2). 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.

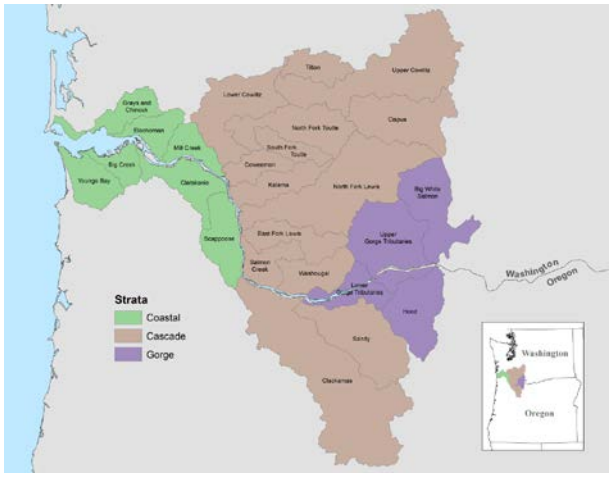


Figure 2. Lower Columbia River recovery area selected for the Integrated Status and Trends Monitoring Demonstration Project.

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 (ODFW), the U.S. Forest Service (USFS), NOAA Fisheries (NOAA), the Lower Columbia Fish Recovery Board (LCFRB), the

Washington Department of Fish and Wildlife (WDFW), and the Washington Department of Ecology (WDOE)) for salmon, steelhead, and potentially bull trout populations listed under the 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 all sub-components are:

1) Identify and prioritize management decisions, questions, and objectives;
2) Evaluate the extent to which existing programs align with these management decisions, questions, and objectives;
3) Identify the most appropriate monitoring design(s) to inform priority management decisions, questions, and objectives;
4) Use trade-off analysis to develop specific recommendations for monitoring based on outcomes of objectives 1-3; and
5) Recommend implementation and reporting mechanisms.

The PNAMP Coordination Team has facilitated development of the ISTM project as part of PNAMP activities in conjunction with other PNAMP tasks in order to fully capitalize on partners' in-kind contributions of staff time. In-kind contributions have largely been the primary mechanism to advance this work to date, but in 2012, several specific tasks continued on funding from Bonneville Power Administration (BPA) in order to complete the work in the absence of a technical lead.

Progress on the project has been broken out into components and detailed below. Each component is in a different state of maturity, but the Coordination Team facilitated progress to ensure that all were linked as necessary to benefit the project as a whole. (ISTM Demonstration project page)

Fish Monitoring Component

The overall goal of the ISTM Fish Monitoring Component is to facilitate development of a strong reliable network of VSP monitoring efforts for salmon and steelhead that meet regional VSP data requirements. The ISTM Fish Workgroup has completed Objectives 1 and 2. Final reports are available, including a third report which focuses on data management aspects of the project. (ISTM Fish project page)

Spawned Chinook Salmon, Lower Elwha River, WA. Photo credit: L. Kannapell, NOAA Fisheries.

In 2013 we explored opportunities to share the approach developed by the ISTM Fish Workgroup for prioritization and evaluation of monitoring (and the resulting new tools) with interested fisheries organizations and collaborative partnerships throughout the

PNW. Towards this goal, we have presented to various potential participants, including the Snake River Salmon Recovery Board, the 2013 Salmon Recovery Conference, and hosted a session at the 2013 Salmon Recovery Conference.

Completion of Objectives 3-5 for the Lower Columbia River ESU demonstration is dependent on partner participation. Additional application or development of the tools resulting from Objectives 1 and 2 is dependent on partner participation and funding.

Accomplishments to date:

- ISTM Fish Component Objective 1 Report: "Identification and Prioritization of Management Decisions, Questions, and Objectives for Lower Columbia River Integrated Status and Trend Salmon and Steelhead Monitoring". Rawding, D., Rodgers, J., Graham Hudson, B. PNAMP 2010-004.
- ISTM Fish Component Objective 2 Report: "Evaluation of the Alignment of Lower Columbia River Salmon and Steelhead Monitoring Program with Management Decisions, Questions, and Objectives" Rawding, D., and Rodgers, J. PNAMP 2012-001.
- ISTM Fish Data Management Report: "Evaluation of the Data Collection, Storage, and Management for the Lower Columbia River Salmon and Steelhead Monitoring Program". Rawding, D., Rodgers, J., Cox, B., Cooney, C., Karnowski, M., Woodard, R. and Warren, D. PNAMP 2012-002.
- Presentation by Sally Sauter to the Snake River Salmon Recovery Board, fall 2012
- Presentation by Dan Rawding at the 2013 Salmon Recovery Conference
- Hosted a session at 2013 Salmon Recovery Conference

Tributary Habitat Monitoring Component

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 status and long-term trends of the habitat conditions (physical, chemical, and biological conditions) of these aquatic resources. The goal of this component is to develop a coordinated habitat monitoring program for the LCR ESU 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?"

In early 2012, the tributary habitat monitoring working group, comprised of representatives from the seven participating habitat monitoring programs in the LCR ESU, finished their review of tributary attributes measured by 3 or more of the programs. The programs being analyzed were Clark County Washington Stormwater Needs Assessment Program, Columbia Habitat Monitoring Program (CHaMP), Oregon Department of Environmental Quality (ODEQ) National Rivers and Streams Assessment, Oregon Department of Fish and Wildlife (ODFW) Aquatic Inventory, Washington State's Salmon

Recovery Funding Board (SRFB) Action Effectiveness Monitoring, US Forest Service (USFS) Aquatic and Riparian Effectiveness Monitoring Plan, and Washington Department of Ecology (WADOE) Monitoring for Watershed Health and Salmon Recovery. Program representatives considered information on the scope and scale of each program, as well as detailed descriptions of the collection and analysis methods to determine what data could potentially be shared. After reviewing the collection and analysis methods for a given measurement or metric, each program identified which of the other programs' data they could use, as well as differences in methods that prohibited data consolidation. These online work sessions allowed for documentation of current program similarities, as well as areas that need to be addressed to increase compatibility. In 2013, this work was summarized in a report that is currently going through the USGS peer review process; a draft of the report can be found at the PNAMP website (link to report).

In October of 2012, the Lower Columbia Fish Recovery Board (LCFRB) together with the City of Longview was awarded a Grant of Regional or Statewide Significance (GRSS Grant) from Washington Ecology to build on progress made in the Habitat ISTM project and combine efforts with municipal stormwater managers in Southwest Washington to develop an integrated status and trends monitoring design for the Lower Columbia region. Tetra Tech, Sitka Technology Group, and Don Stevens were subcontracted to provide technical and statistical assistance. Contractors worked with the stormwater permittees in SW Washington to identify priority management questions and metrics, merged that information together with that of the ISTM Habitat partners, and used the combined information to develop several monitoring scenarios for a trade-off analysis. The scenarios were reviewed with participants and preliminary recommendations were developed for the spatial design and strata, temporal design, metrics to measure, data collection methods, and data evaluation, among others. Throughout the project, feedback was gathered from monitoring managers, practitioners, and stakeholders during four workshops and two teleconference work sessions. Three reports summarize the work. The extensive list of recommendations and next steps can be found in the final report (link to final report). All of the reports, as well as the materials from the workshops can be found at the LCFRB website (link to materials).

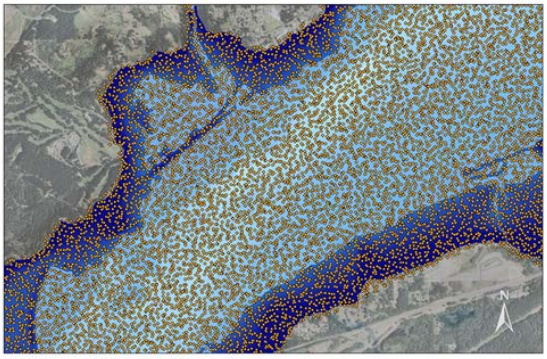
In the fall of 2013, PNAMP again partnered with the LCFRB and the City of Longview to submit a WA Ecology GRSS grant proposal to continue the work to develop an integrated status and trends monitoring design for the Lower Columbia region. The short timeline of the last grant left little time to vet the recommendations widely. There were also many unresolved questions that need further discussion before the recommended design could be implemented. The proposal was awarded funding at the end of 2013, and work will begin in early 2014. (ISTM Habitat project page)

Mainstem Monitoring 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 to the ISTM demonstration project.

Beginning in 2011, PNAMP partnered with USGS to begin working on a framework for integrated monitoring of the mainstem Columbia and Snake Rivers and their associated floodplains. In 2013, USGS produced a report that describes their efforts (Counihan et al. 2013). In this report, they present progress towards a stepwise process that will facilitate the development of an ISTM program for the mainstem Columbia River. They identify, present, and discuss planning and regulatory documents to help identify decisions and questions that can be informed by integrated status and trends monitoring. They identify and discuss existing monitoring and research that could help inform aspects of a Columbia River ISTM program. They also report progress towards the development of sample frames for the Columbia and Snake Rivers and their flood plains. The sample frames were formulated using Digital Elevation Models (DEM's) of the river channel and upland areas, and a Generalized Random-Tessellation Stratified (GRTS) algorithm for an area based resource to generate "master sample(s)."



Columbia River Master Sample
Rock Creek, Stevenson
Bonneville Reservoir

J. Hardiman, USGS

Working with PNAMP they facilitated the transfer of the sample frames to the PNAMP "Monitoring Sample Designer" tool. They then discuss aspects of response and survey designs as they pertain to the formulation of a mainstem Columbia River ISTM program.

As efforts to formulate an ISTM framework for the mainstem Columbia River proceed, practitioners should utilize the extensive literature describing the planning and implementation of fish and wildlife mitigation and recovery efforts in the Columbia River Basin. Despite current progress, considerable work still needs to be done to formulate an ISTM program for the mainstem Columbia River. Long-term monitoring programs have been established for other large rivers systems; we recommend scientists that have experience planning, implementing, and maintaining large river monitoring efforts such as those in the Colorado, Illinois, and Mississippi Rivers be consulted and involved as efforts proceed.

Effectiveness Monitoring Coordination & Assessment

This project is an effort to integrate and align existing and new regional effectiveness monitoring efforts, provide more scientifically

robust data for use in management decisions, and improve cost efficiency in the implementation of monitoring programs. The focus of this effort is on coordinating approaches, monitoring design, and data management systems to allow alignment and reporting of results; informing a regional network of effectiveness monitoring coverage; and encouraging programmatic-level planning consistency across the region for Intensively Monitored Watersheds (IMW) and effectiveness monitoring projects and programs. Efforts are focused on supporting partner efforts to move away from "one-at-a-time", project-by-project decision making and moving toward coordinated efforts.

In 2012, we focused on restarting the coordination tasks we initiated in in 2010. What emerged first was interest in Intensively Monitored Watersheds (IMWs), and ultimately PNAMP hosted a 2 day workshop specifically on IMWs in March of 2013. This workshop convened more than 80 IMW practitioners. Presentations included details of current IMWs with an emphasis on lessons learned and recommendations for current and future IMW projects. Fifteen IMW studies were presented from across the Northwest including the Columbia River Basin, Puget Sound, and the Oregon, Washington, and northern California coasts. In-depth discussion sessions moderated by leading IMW scientists and other experts in communication and data management followed the presentations on Day 2 of the workshop. Discussion sessions focused on key aspects of designing and implementing IMWs, including experimental design, data analysis, data management, coordination of restoration activities with monitoring efforts, and communication.

IMW practitioners shared their successes, failures, and insights on the challenges of this coordinated experimental approach that integrates watershed-level restoration activities with carefully designed and intensive monitoring efforts. This workshop was an opportunity for IMW practitioners to document and integrate their experiences to strengthen current and future IMW efforts and to identify the next steps PNAMP could take to assist practitioners in the planning and implementing IMWs. The summary information of current IMWs, notes from the workshop and presentations are available on the PNAMP website (link to materials).

IMW workshop participants discuss strategies for better communication of IMW results during one of the break-out sessions on Day 2 of the workshop. Photo credit: J. Bayer, USGS/PNAMP.

Also, as a follow-up to our 2010 efforts to coordinate across large effectiveness monitoring programs in the region, PNAMP helped facilitate a workshop in November of 2013 to roll out BPA's programmatic approach to Habitat Action Effectiveness Monitoring. The workshop convened over 60 participants working in the field of habitat restoration.

BPA presented an overview of the programmatic approach to Habitat Action Effectiveness monitoring including the rationale for this approach, protocols, implementation timelines and training opportunities. Documentation of BPA's Programmatic Approach to Action Effectiveness Monitoring, as well as presentations and notes from the workshop are available on the PNAMP website (link below). PNAMP will continue to assist with partner collaborations with BPA's new program and across other programs in the region. **(**Effectiveness Monitoring project page)

Outreach and Communication

A large part of PNAMP's work focuses on reaching out to potential participants and informing the aquatic monitoring community of upcoming events and announcements, showcasing new tools, and posting relevant documents. PNAMP's outreach and communications efforts can be categorized into four areas: maintaining the PNAMP website, producing and disseminating the monthly news and meeting summary email, producing fact sheets which describe PNAMP and individual projects, and presentations to interested groups and organizations.

Throughout 2013, PNAMP Coordination Staff updated content on the PNAMP website. Most updates included tracking PNAMP and other meeting details (dates, locations, and online conference and phone information) and posting documents related to meetings and other PNAMP projects. Announcements and jobs openings of interest to the aquatic monitoring community were also posted on a regular basis.

For the past four years, PNAMP has distributed a monthly email to all participants that included a summary of upcoming meetings. In 2013, this monthly communication also included one or two short summaries highlighting the latest PNAMP news. The list of participants whom receive the news and meeting summary currently contains 785 recipients and continues to grow.

Beyond communicating PNAMP's work via online resources, the Coordination Team participated in several outreach activities in addition to regular PNAMP activities. In 2013, the PNAMP Coordinator gave overview presentations to the follow audiences: BPA executives and staff, Northwest Power and Conservation Council executives and staff, the Columbia River Basin Federal Caucus, the Great Northern Landscape Conservation Cooperative Steering Committee, Max Ethridge (USGS Northwest Regional Director), and the Columbia Gorge National Scenic Area Vital Signs Indicators forum. The PNAMP Assistant Coordinator presented a series of training talks on MonitoringMethods.org and also gave several presentations describing PNAMP's newest online tools suite, MonitoringResources.org (see the above MonitoringResources.org summary for more details).

Steering Committee Activities

The PNAMP Steering Committee (SC) provides the science-policy interface between the Executive partners and project work teams, reviews work team progress, obtains resources needed to accomplish projects, and directs the activities of the Coordination Team. The SC provides assistance to PNAMP initiatives by

participating in the formulation, development, and review of recommendations for activities of PNAMP work teams and integrating these activities with their own organizational activities. The SC facilitates the transfer of information between PNAMP and their respective organizations. By promoting communication among organizations, the SC strives to assure that monitoring plans and information are coordinated across the Pacific Northwest.

The steering committee is made up of representatives from the signatory partners (Appendix A). In 2013, we gained one new signatory partner, the Idaho Department of Fish and Game, but also lost one partner due to the disbanding of the Columbia Basin Fish and Wildlife Authority. There are also several "courtesy members" that are invited to participate in steering committee meetings. Courtesy members are entities that are considering becoming a formal partner; their participation helps them understand the opportunities, responsibilities, and benefits of signatory membership. Courtesy members in 2013 included: Oregon Department of Fish and Wildlife, Kootenai Tribe of Idaho, Nez Perce Tribe, Shoshone-Bannock Tribes, Nisqually Tribe, Puget Sound Partnership and the Great Northern Landscape Conservation Cooperative. Several signatory partners have been less engaged in recent years at the Steering Committee level (California Department of Fish and Game, NOAA Fisheries, Oregon Watershed Enhancement Board, U.S. Army Corps of Engineers, U.S. Bureau of Land Management, and U.S. Forest Service). Better engagement from these partners would be beneficial to the leadership of the SC and PNAMP staff are formulating a plan to try and get better engagement from these partners. However, many of these entities do have staff engaged in projects or tasks; therefore, we believe PNAMP work is important to these entities.

The SC met five times in 2013. During the first half of the year, two regular SC meetings were held to track the progress of activities, discuss how new tasks or projects align with PNAMP's goals, and offer guidance when necessary. These meetings also facilitated information exchange between SC members and work team leads. The PNAMP Coordinator facilitated these meetings and the Coordination Team prepared materials before the meetings and notes following the meetings. The SC also continued to discuss priorities for current and new projects, both for PNAMP staff to lead as well as ideas that could be developed as proposals to partner funding sources.

The other three SC meetings of 2013 revolved around the biennial strategic planning exercise. The SC convened for a teleconference the week before the meeting to hear updates on all current tasks (event link), attended a two day face-to-face strategic planning meeting on September 16-17, 2013 (event link), and then followed up after the meeting with a teleconference in December to talk about progress and next steps (event link).

For the 2013 strategic planning meeting, an outside facilitator, Robin Gumpert of DS consulting, was brought in to conduct an assessment, then design and facilitate a process that would be most responsive to the needs

expressed by leadership and staff for a robust and meaningful session that would contribute to PNAMP's continuing success and sustainability. To that end, an interview process was conducted by Gumpert, to ascertain the value and needs of the organization as seen through the lens of (primarily) Steering Committee members. This process served two purposes: 1) It prompted thinking to prepare participants for the retreat; and 2) It clarified the needs of the group which were then used to design the retreat agenda. An Interviews Summary report was prepared and shared with staff and SC members in advance of the meeting to reflect back what was learned in the assessment process. In addition to the interviews, PNAMP staff convened a conference call to update members on the status of project tasks and tie the work efforts back to the broader objectives identified in the 2005 Strategy.

PNAMP SC members engaged in a very robust and forward-looking conversation at the strategic planning meeting and made good progress identifying priorities for the next five year horizon which will inform the revision of the original 2005 Strategic Plan. They reaffirmed the value of this organization to the region, and clarified the commitments needed from the SC to provide leadership to guide PNAMP and the region to the next level of success in coordinating aquatic monitoring programs in the Pacific Northwest. They also agreed that through active participation and collaboration via a shared vision; strong leadership; and focused expertise and resources, a shared framework for aquatic monitoring across the region is possible.

Based on feedback from the strategic planning meeting, a post-meeting online survey, and the December follow-up meeting, the PNAMP Coordination Staff drafted a new five-year strategic plan. The plan uses the adaptive management monitoring wheel as the basis for the new conceptual framework. The draft five-year plan has been shared with the SC, and after incorporating feedback will be finalized in early 2014. Another result of the strategic planning meeting was a new approach for SC members to engage and guide PNAMP projects in 2014. Four leadership teams will be formed; each of which will focus on a subset of the PNAMP annual work plan project tasks. The teams will meet quarterly to set priorities, make recommendations for process, identify resources, review progress, and resolve issues of both short and long term importance. Further details regarding the leadership teams will be shared in the PNAMP 2014 Annual Work Plan.

The adaptive management monitoring wheel now forms the framework of the new five-year strategic plan.

Appendices

Appendix A. Entities signatory to the PNAMP Charter in 2013.

PNAMP Partners	PNAMP Steering Committee Rep	PNAMP Executive Network Representative
Bonneville Power Administration	Jim Geiselman	Lorri Bodi VP Environment, Fish and Wildlife
California Department of Fish and Game	Scott Downie	Neil Manji Northern Regional Manager
Columbia Basin Fish and Wildlife Authority	Tom Iverson	Nathan Small Chair
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 Dept.
Environmental Protection Agency	Gretchen Hayslip	Dennis McLerran Regional Administrator
Idaho Department of Fish and Game	Lance Hebdon	Ed Schriever Chief of Fisheries
NOAA Fisheries	Vacant	William Stelle, Jr. 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	Vacant	Colonel Steven R. Miles, P.E. U.S. Army Commander and Division Engineer
U.S. Bureau of Land Management	Vacant	Jerome Perez State Director, Oregon/Washington
U.S. Bureau of Reclamation	Michael Newsom	Lorri Gray Regional Director
U.S. Forest Service	Linda Ulmer	Kent Connaughton Regional Forester PNW Region
U.S. Geological Survey	Steve Waste	Max Ethridge Northwest Regional Director
Washington Department of Ecology	Bob Cusimano	Rob Duff Environmental Assessment Program Manager
Washington Department of Fish and Wildlife	Dan Rawding	Phil Anderson Director
Washington Governor's Salmon Recovery Office & Recreation and Conservation Office	Keith Dublanica	Kaleen Cottingham Director

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

Page 3:

- PNAMP Charter: http://www.pnamp.org/charter

Page 6:

- PNAMP website: http://www.pnamp.org/

Page 12:

- Monitoring Resources PNAMP project page: http://www.pnamp.org/project/3875
- Monitoring Resources Application: https://www.monitoringresources.org/Resources/Home/Index

Page 14:

- Monitoring Methods PNAMP project page: http://www.pnamp.org/project/3134
- Monitoring Methods Application: http://www.monitoringmethods.org/

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- Sample Designer PNAMP project page: http://www.pnamp.org/project/3263
- Sample Designer application: https://www.monitoringresources.org/Designer/Home/Index
- Site Manager PNAMP project page: http://www.pnamp.org/project/3876
- Site Manager application: https://www.monitoringresources.org/Sites/Home/Index
- Monitoring Explorer application: https://www.monitoringresources.org/Sites/Explorer/Index
- 2011 Regional Metadata Tool Recommendations Report: http://www.pnamp.org/document/3296

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- Metadata Builder PNAMP project page: http://www.pnamp.org/project/3877

Page 19:

- Monitoring Advisor PNAMP project page: http://www.pnamp.org/project/3878
- Monitoring Advisor website: http://www.monitoringadvisor.org/
- Coordinated Assessments PNAMP project page: http://www.pnamp.org/project/3129
- Phase V CA work plan: http://www.pnamp.org/document/4144
- Phase VI CA work plan: http://www.pnamp.org/document/4463

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- Habitat Data Sharing 2013 work plan: http://www.pnamp.org/document/4088

Page 21:

- Northwest Standard Taxonomic Effort (NWSTE) PNAMP project page: http://www.pnamp.org/project/4210
- Habitat Data Sharing Macroinvertebrate, Habitat, and Fish Relationships Briefing Paper: http://www.pnamp.org/document/4000
- Oregon AFS Symposium Summary: http://www.pnamp.org/document/4208
- PNAMP Data Management project page: http://www.pnamp.org/topics/2

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- PNAMP Data Management Leadership Team page: http://www.pnamp.org/project/3265
- PNAMP Data Steward Resources Online Library page: http://www.pnamp.org/data-steward-resources
- PNAMP Data Steward Community of Practice project page: http://www.pnamp.org/project/3136
- Regional Metadata Guidance PNAMP project page: http://www.pnamp.org/project/3139

Page 23:

- PNAMP compilation of papers from ASPRS 2009 session: http://www.pnamp.org/document/2546
- Russ Faux, Watershed Sciences and Amar Nayegandhi, Dewberry; Presentation on Small Footprint Topo-Bathymetric LiDAR: http://www.pnamp.org/document/4271

Page 24:

- Methods Review PNAMP project page: http://www.pnamp.org/project/3131

Page 25:

- PNAMP ISTM Demonstration project page: http://www.pnamp.org/project/3132
- PNAMP ISTM Fish project: http://www.pnamp.org/project/3151

Page 26:

- PNAPM ISTM Objective 1 Report: http://www.pnamp.org/document/3169
- PNAMP ISTM Objective 2 Report: http://www.pnamp.org/document/4143
- PNAMP ISTM Fish Data Management Report: http://www.pnamp.org/document/3715

Page 27:

- PNAMP ISTM Habitat Objectives 1&2 Draft Report: http://www.pnamp.org/document/4266
- Final report for the Lower Columbia Habitat Status and Trends monitoring Project:

http://www.lcfrb.gen.wa.us/pdf/HSTM/final%20technical%20report%203_june_2013.pdf

- LCFRB Lower Columbia Habitat Status and Trends Monitoring project page: http://www.lcfrb.gen.wa.us/HSTM%20page.htm
- PNAMP ISTM Habitat project page: http://www.pnamp.org/project/3152

Page 28:

- Counihan, T., Hardiman, J., Waste, S, 2013, Status and Trends Monitoring of the mainstem Columbia River – Sample frame development and review of programs relevant to the development of an integrated approach to monitoring, PNAMP 2013-003.

Page 29:

- PNAMP IMW Workshop materials: http://www.pnamp.org/event/4367

Page 30:

- Effectiveness Monitoring PNAMP project page: http://www.pnamp.org/project/3137

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- PNAMP Steering Committee Meeting (task updates): http://www.pnamp.org/event/4332
- PNAMP Steering Committee Meeting (strategic planning): http://www.pnamp.org/event/4306
- PNAMP Steering Committee Meeting (strategic planning follow-up): http://www.pnamp.org/event/4468