Photo: Tony Grover NPCC

PNAMP 2021 Annual Report

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pacific northwest aquatic monitoring partnership

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Executive Summary

In 2021, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) marked seventeen years of supporting collaboration among partners who voluntarily work together to promote best practices for coordinated monitoring and data sharing. The participants of PNAMP represent many perspectives, affiliations, geographic boundaries, and expertise, yet everyone who participates is a willing collaborator. Together with staff, they collectively strive to improve monitoring methods and design, assessments, and reporting across the Pacific Northwest. After 17 years, we are excited to see continued growth in the number and diversity of participants from around the Northwest and beyond.

Each year PNAMP makes progress on specific parts of our big goal of advancing monitoring and data sharing. In 2021, we focused on these specific tasks: improving regional sharing of hatchery fish high level indicators in the HCAX Project; sharing information about new technologies through the Emerging Technologies Information Sessions (ETIS) webinar series and a reboot of the Remote Sensing Forum; understanding how best to apply what we've learned from decades of research from Intensively Monitored Watersheds; and reinvigorating the Fish Monitoring Work Group to better serve that community. We also continued to streamline MonitoringResources.org and improve connections between this tool and other systems, such as StreamNet and Bonneville Power Administration's cbfish.org.

Like everyone, PNAMP was forced to adapt to constraints on in-person interactions due to COVID-19 in 2021. However, because we were already in the habit of supporting remote participation and with improvements in virtual meeting tools, PNAMP was successful in meeting our goals and objectives for the year by hosting all workshops, work sessions, and meetings virtually. Improved virtual meeting tools allowed more participation in some cases, where travel to in-person events might not have been possible for some people. For example, while we were disappointed to cancel our planned 2020 ETIS conference, the replacement 2020/21 ETIS webinar series drew participants from across the US and beyond.

We hope you enjoy this new format for our annual report. Please look for more details in the Accomplishments Appendix (see pages 17-22) and on each project's webpage at www.PNAMP.org. Contact information is provided for each topic in this report; please reach out to PNAMP staff individually or email us at gs-pnamp_contact@usgs.gov if you have any questions or would like to join an activity. We appreciate everyone's contributions to making 2021 a successful year for PNAMP.

Photo: Jen Bayer

About PNAMP – Coordination and Activities

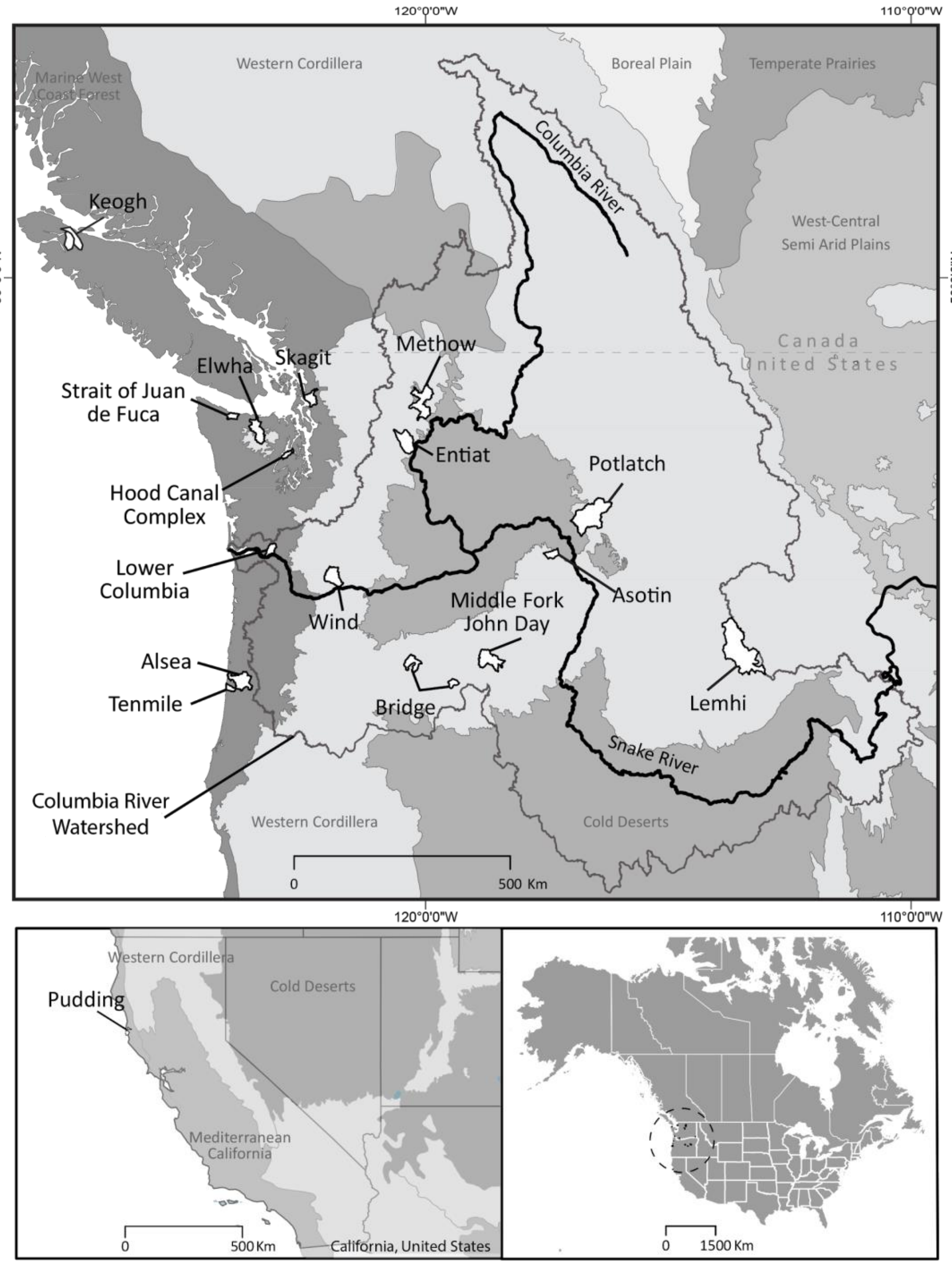
The PNAMP Coordination Team was delighted to collaborate with so many partners and participants invested in the growth of an aquatic monitoring partnership. The Coordination Team's goals are to support relationships between data collectors, data managers, data consumers, project managers, and monitoring professionals through collaboration and facilitation. In their facilitative efforts, the Coordination Team initiates the development, presentation, and distribution of products aimed at enhancing understanding of PNAMP topics, successes, and challenges. Additionally, the Coordination Team manages and organizes the storehouse of PNAMP activities and products.

A primary role of the Coordination Team is to provide administrative support for PNAMP activities. One or more members of the Coordination Team serve as a lead or co-lead for all PNAMP projects to ensure the project progresses in a timely manner. The Coordinator serves as the director of the organization, and is responsible for fiscal, reporting, staffing, and day to day management of activities.

PNAMP.org, remains an essential tool for communicating information about PNAMP events and projects. It also serves to increase the availability of biological and natural resources information at the regional and national level. While staff maintain the content of the website, the US Geological Survey provides technical support and hosts the website. The website has been a valued resource since 2010. In addition to PNAMP.org, the Coordination Team manages the development of MonitoringResources.org.

The PNAMP Coordination Team is employed by the
U.S. Geological Survey (USGS), Northwest- Pacific Islands Region.
Jennifer Bayer - PNAMP Coordinator
Amy Puls - Deputy Coordinator
Rebecca Scully - MonitoringResources.org Project Leader
Sam Cimino - Staff Biologist
Megan Dethloff - Staff Biologist

Photo: NOAA



Locations of intensively monitored watersheds across the Pacific Northwest. Reproduced with permission from Bennett et al. 2016.

Intensively Monitored Watersheds Forum

Intensively monitored watershed (IMW) programs have been active across the Pacific Northwest for over twenty years. These study systems represent one of the few opportunities to understand fish-habitat relationships at watershed scales and across multiple life cycles. This information is essential to salmon and steelhead conservation and recovery programs, which annually invest millions of dollars in habitat projects and population and habitat monitoring. As IMW studies move into post-treatment monitoring phases, preliminary findings and lessons learned can help natural resource managers, policy makers, and practitioners more effectively implement recovery and habitat programs, as well as convey the benefits of long-term monitoring at a time when investments in salmon recovery are being reassessed at local, state and federal levels.

In 2021, a small team of staff from the Pacific Northwest Aquatic Monitoring Partnership, Snake River Salmon Recovery Board, Lower Columbia Fish Recovery Board, and the Washington Governor's Salmon Recovery Office worked with IMW program leads from 13 IMWs across the Pacific Northwest to identify lessons learned to date, and to recommend applications from the IMW programs to conservation and restoration work. Survey questions on targeted fish population responses, restoration action types and watershed responses, and management and policy outcomes were distributed in summer 2021 to individual IMW program leads. The survey responses laid the groundwork for a series of three workshops held in November and December 2021. The survey responses and workshop discussions, augmented by reports and publications that have been generated by the IMWs, allowed for collaboratively developing a set of core messages capturing the management implications of the IMW results to date. The final synthesis report and factsheet summarizing this collaborative effort will be shared in spring 2022.

Learn more: PNAMP Project Page; 2021 Accomplishments

Contact: Amy Puls (apuls@usgs.gov)

CAP Hatchery Indicators
HCAX Project

The Coordinated Assessments Partnership (CAP) dove into regional sharing of hatchery fish high level indicators (HLIs), starting in March 2021 with the Hatchery Coordinated Assessments Exchange (HCAX) Workshop 1. Over 50 participants representing 20 organizations provided input on the information to be considered for sharing through the CAP data system. Results of this workshop were the basis of the work of the HCAX Biologist Work Group over the summer and fall, ultimately completing the challenging task of agreeing to common terms and definitions in December (Controlled Vocabulary_v1.0).

The hatchery fish metrics and HLIs in development consist of four groups:

- Program Information — such as program name, facility name, hatchery stock name, run and agency contact (9 total metrics/indicators)
- Adult Return Information — such as brood year, return location, proportions of natural origin and hatchery origin used as broodstock (13 total)
- Juvenile Release Information — such as year, location, date, number released (15 total)
- Hatchery Indicator Information — including hatchery broodstock demographics and age at return (12 included now; 6 additional for future review).

In 2022, we will engage the data stewards participating in the HCAX (i.e., HCAX Data Manager Work Group) to develop data sharing rules and procedures and test implementation. The project is expected to be completed no later than early 2023.

To learn more, access HCAX meeting documents on the Hatchery Data Sharing (HCAX) project page.

Learn more PNAMP Project Page; 2021 Accomplishments

Contacts: Nancy Leonard (nleonard@psmfc.org) and
Jen Bayer (jbayer@usgs.gov)

Photo: Rebecca Scully

Stream Habitat Metric Integration Project

Data integration is critical to informing decisions that cross boundaries, whether these involve multiple organizations, jurisdictions, or different disciplinary silos. In 2021 PNAMP, with the support of the USGS, continued to facilitate a working group of experts from four stream tributary habitat monitoring programs:

- Bureau of Land Management Aquatic Assessment, Inventory, and Monitoring (AIM) program,
- US Environmental Protection Agency National Aquatic Resources Surveys (NARS) National Rivers & Streams Assessment (NRSA),
- US Forest Service (USFS) Aquatic and Riparian Effectiveness Monitoring Program (AREMP), and
- USFS PACFISH/INFISH Biological Opinion (PIBO) Effectiveness Monitoring Program.

This year, PNAMP continued to coordinate the working group to draft a USGS Method and Techniques manuscript describing the data exchange specifications. The working group agreed on a stream habitat metric-controlled vocabulary to include in the data exchange specifications. We described the structure and fields in the exchange standard. The working group completed the cross-walk from the original datasets to the metric-controlled vocabulary and exchange standard. PNAMP improved the code to download and integrate the individual datasets into one dataset and produced a draft of the analysis-ready dataset and a relational database.

Additionally, PNAMP hired and trained new staff to support documenting metadata, the USGS data publishing process, and produce XML metadata. To continue sharing this work, the working group are writing a manuscript assessing the original and final integrated dataset's findability, accessibility, interoperability, and reusability (FAIR). In 2022, the working group will complete and publish the documentation of all the data exchange specifications, relation database, and analysis ready dataset.

Learn more PNAMP Project Page; 2021 Accomplishments

Contact: Rebecca Scully (rscully@usgs.gov)

Fish Monitoring Work Group

The purpose of the PNAMP Fish Monitoring Work Group is to:

- Support collaboration, communication, and coordination among fish monitoring practitioners in the Pacific Northwest for effective monitoring and assessment methods and efficient data sharing
- Host Fish Monitoring Workshops to address specific topics identified by PNAMP partners with respect to fish monitoring
- Support the Coordinated Assessments Partnership (and CAX data exchange processes) and StreamNet by facilitating discussions among data providers and reporting/decision makers related to fish monitoring data sharing and reporting needs.
- Support Fish & Wildlife Program Project Sponsors work to complete required metadata documentation in MonitoringResources.org

In 2021, the core team formalized the purpose and structure of the larger work group and convened the first meeting in February and then again in July and October. Each quarterly meeting includes updates from active tasks and a "tech talk" showcasing new work from regional biologists. The charter and the work plan were established, and task teams began convening in May. Task Team Leads in coordination with PNAMP support initiated these tasks:

- StreamNet High Level Indicators Display (completed in July)
- CAP DES Juvenile Outmigrant Refinement: Define Smolt Equivalent (completed in December)
- Fish Population Names and GIS Boundaries
- Carrying Capacity Data Standard
- Juvenile Density Data Standards (Snorkel & Electrofishing)
- Rotary Screw Trap (RST) Data Collection Data Standards

Current task teams will continue to gather in 2022 with the goal of accomplishing proposed products and future tasks will begin as priorities are established.

Learn more PNAMP Project Page; 2021 Accomplishments

Contact: Meg Dethloff (mdethloff@usgs.gov)


Photo: John R. McMillan NOAA/NWFSC

Image: Morgan Bond NOAA

Remote Sensing Forum

After hearing PNAMP participants voice a need for open discussion and sharing of learned experiences and methodologies as they relate to the rapidly evolving field of remote sensing, we decided to reboot the PNAMP Remote Sensing Forum in 2021. We established an organizing committee of six remote sensing experts from around the Pacific Northwest and agreed on the following forum goals:

- Provide equitable opportunities for professional development or advancement of programmatic needs as it relates to remote sensing in the fields of fisheries and water resources in the Pacific Northwest.
- Collaborate on the creation of regionally specific standardized methods for collecting and analyzing remotely sensed data.
- Reduce the barrier to entry/adoption of implementing remote sensing practices by providing technical expertise and feedback in an online forum setting.

The forum is open to everyone, and we strive for a diverse mix of minds, backgrounds and experience, and we are committed to cultivating an inclusive environment. In 2021, the forum met quarterly to share announcements and relevant news, and each meeting featured two presentations from subject matter experts on remote sensing topics of interest. Recordings of past presentations can be found on PNAMP's YouTube channel. Over 90 people from at least 52 organizations participated in the Remote Sensing Forum in 2021, with membership growing over the course of the year.

To disseminate information about Remote Sensing Forum meetings we developed a listserv. We also created a Remote Sensing Forum Microsoft Team with discussion boards for Q&A, sharing resources, and meeting others in the community. See the bottom of the Remote Sensing Forum project page for details on how to join.

Learn more PNAMP Project Page; 2021 Accomplishments

Contacts: Amy Puls (apuls@usgs.gov) and Lauren Burns (burl@critfc.org).

MonitoringResources.org Outreach

In 2021, the Monitoring Resources team focused on assisting and preparing MonitoringResources.org project sponsors for NPCC's 2021 Anadromous Fish Habitat and Hatchery Independent Scientific Review Panel (ISRP) review. Our outreach included:

- Updated training modules and training videos
- Held six different one-hour MonitoringResources.org Orientation presentations throughout the year
- Conducted one-to-one webinar project reviews with project sponsors within the Pacific Northwest
- Reached out to project sponsors to finalize products within MonitoringResources.org and assisted with questions and concerns

In addition to preparations for the ISRP review, we continued our broader MonitoringResources.org outreach via:

- Discussions of progress and planned work with PNAMP's Steering Committee
- Conversations with current and potential users within and outside the Columbia River Basin
- Promoting well documented and innovative methods each month through the PNAMP Newsletter in the section titled "Tool Time"
- Participating in discussions with other PNAMP work groups and projects like the Fish Monitoring Work Group and HCAX
- Coordinated with CA Department of Water Resources to support integration of MonitoringResources.org into their data management tool

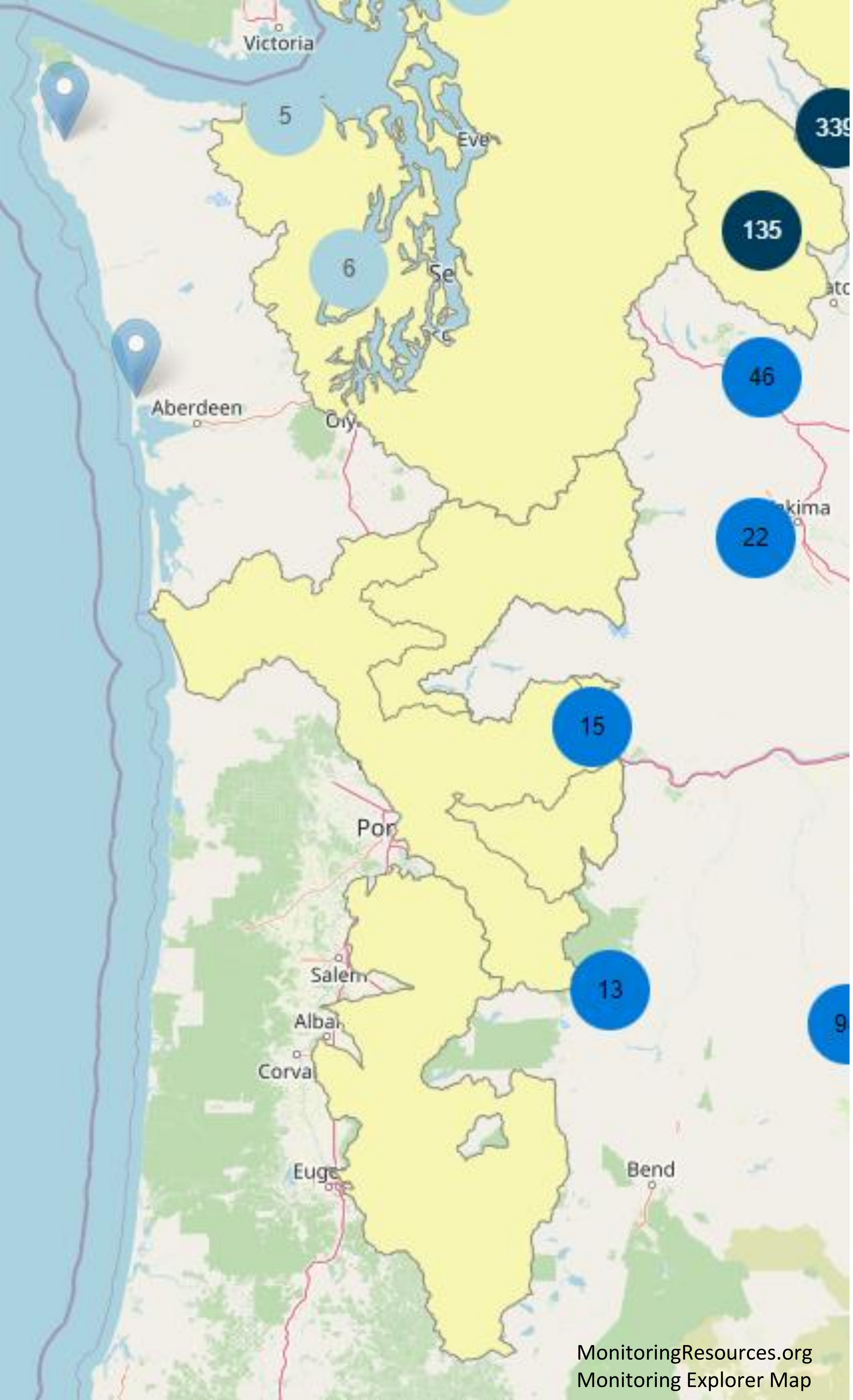
The success of MonitoringResources.org is contingent on our partners who share our vision for better documentation and information sharing and encourage the use of MonitoringResources.org to their staff and colleagues.

In 2022, PNAMP will continue to reach out to monitoring practitioners, look for opportunities to promote the MonitoringResources.org toolset, support project sponsors, and conduct user testing.

Learn more PNAMP Project Page; 2021 Accomplishments

Contact: Sam Cimino (scimino@usgs.gov)

Photo: Sam Cimino



MonitoringResources.org
Monitoring Explorer Map

MonitoringResources.org Development

In 2021, the Monitoring Resources team focused on streamlining and improving MonitoringResources.org for both documenting and discovering monitoring metadata. Changes to the tools are based on feedback from regional partners and users of the tool.

In 2021 we focused on the Study Plan Summary. The Study Plan Summary rolls up monitoring information from the study plan, protocol, methods, and sample design onto one view. Sharing this view with StreamNet prompted us to compile Study Plan Summaries by Bonneville Power Administration (BPA) project numbers, then served this information out via an API in MonitoringResources.org. This summary supports linking StreamNet data to MonitoringResources.org metadata documentation. In 2022, we will explore these connections and outline improvements to link regional data systems and data sets to metadata documentation.

Additionally, we:

- Coordinated with usability experts to design improvements to the navigation to help users in MonitoringResources.org enter data into the Study Plan Summary and understand where to start documenting and discovering monitoring information. In 2022 we will release changes to the navigation and roll out the Study Plan Summary view.
- Modified the data input in the Study Plan tool to import documentation from the linked protocol, eliminating duplication of work for users entering data and a way to
- Updated the backend of the tool to improve security, communication protocols between BPA and StreamNet tools, aligned mapping technologies across the tools

PNAMP believes the success of the tool relies on the participation of users. The 2021 updates were in response to specific use cases and issues outlined in the MonitoringResources.org 2019 Feedback and Recommendation Report. In 2022, we will continue to engage with users and seek opportunities to support regional by supporting findable, accessible, interoperable, and reusable monitoring metadata.

Learn more: PNAMP Project Page; 2021 Accomplishments

Contact: Rebecca Scully (rscully@usgs.gov)

Emerging Technologies Information Sessions

The highly successful Emerging Technology Information Sessions (ETIS) Webinar Series wrapped up in February of 2021. Originally planned as an in-person event for November 2020, it was reworked into a webinar series because of restrictions on in-person gatherings due to the COVID-19 pandemic. Co-lead with StreamNet and assisted by the 13-person, multi-entity planning group, we organized and hosted 13 webinars that featured 27 presenters. Held October 2020 through February 2021, each month focused on a different topic related to emerging technologies for aquatic monitoring and data management. Over 600 people participated in the ETIS webinar series, with attendance at each webinar ranging from 30 to 150 people from across the USA and beyond. The speaker lineup and links to the recordings can be found on our website.

In fall of 2021, we again partnered with StreamNet to begin planning the 2022 Emerging Technologies Information Sessions Hybrid Event. The ETIS Logistics Team met monthly and made progress on event planning. As of December 2021, our intent is to bring together monitoring professionals, project managers, field data collectors, data managers, and data consumers for a three-day event focused on emerging technologies in aquatic monitoring, data management, and data visualization. The event will be held November 14-16, 2022, in Hood River, Oregon, with both in-person and virtual options being offered. See the event page for the latest information.

Learn more: PNAMP Project Page; 2021 Accomplishments

Contacts: Amy Puls (apuls@usgs.gov) and Nancy Leonard (nleonard@psmfc.org).

Photo: Benjamin Sandford NOAA

Outreach & Communication


Photo: Amy Puls

A significant slice of PNAMP's mission includes informing the aquatic monitoring community of relevant announcements and upcoming events. Additionally, we showcase new tools and techniques, share pertinent documents and publications, and build our community by reaching out to potential participants. The outreach and communications efforts of PNAMP take many forms including; maintaining our website, posting content to social media, producing and disseminating monthly news and meeting summaries, producing fact sheets which describe PNAMP and individual projects, and providing presentations to interested groups and organizations.

PNAMP.org is one of the best outlets for our coordination staff to communicate with the aquatic monitoring community. The website, which includes information on projects, events from around the region, and relevant announcements among other things, is regularly updated to reflect the latest news and resources. PNAMP.org supports participation in projects by hosting meeting materials and background information for all PNAMP projects and events.

For the last few years, staff have also posted content on PNAMP's YouTube channel. In 2021, COVID-19 continued to limit travel and in-person meetings, and thus, recording meetings, workshops, and events became essential and greatly appreciated by our participants. In the past year, PNAMP recorded and posted 25 videos to our YouTube channel that have been viewed over 2,800 times.

PNAMP's monthly newsletter shares information including upcoming meetings, short stories highlighting the latest news from PNAMP and our partners (we greatly appreciate contributions from our partners), recapping past events, and spotlighting novel monitoring methods and updates in MonitoringResources.org. We regularly hear from readers about how the newsletter helps them stay aware of events and news.

We recently extended our toolkit to include Twitter to reach new community members. Help us grow our small Twitter community by following us @PNAMPmonitoring.

Our work was not only communicated through online resources, we also gave overview presentations to the following audiences: BPA executives and senior staff, NPCC Fish and Wildlife Committee, and USGS Northwest-Pacific Islands Regional Office.

Learn more: PNAMP Contact Us; 2021 Accomplishments

Contact: Sam Cimino (scimino@usgs.gov) and Jen Bayer (jbayer@usgs.gov)

Steering Committee

The PNAMP Steering Committee (SC) comprises representatives from the signatory partners. The SC provides the science-policy interface between the signatory partner's executives and project work teams and is responsible for communicating their respective organizations' work and needs to PNAMP, as well as communicating PNAMP progress and challenges to their organizations. The SC directs the activities of the Coordination Team and helps obtain resources to accomplish projects. The SC assists 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. By promoting communication among organizations, the SC strives to support coordination of monitoring plans and information across the Pacific Northwest.

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 2021 included: Idaho Governor's Office of Species Conservation, Natural Resources Conservation Service, Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, and Puget Sound Ecosystem Monitoring Program.

In 2021, the SC met virtually in January, May, and September. These meetings tracked the progress of activities, discussed how new tasks or projects align with PNAMP's goals, and offered guidance when necessary. The meetings also provided an opportunity for SC members to connect and communicate with their regional colleagues about monitoring activities in their respective agencies and tribes.

Learn more: PNAMP Project Page

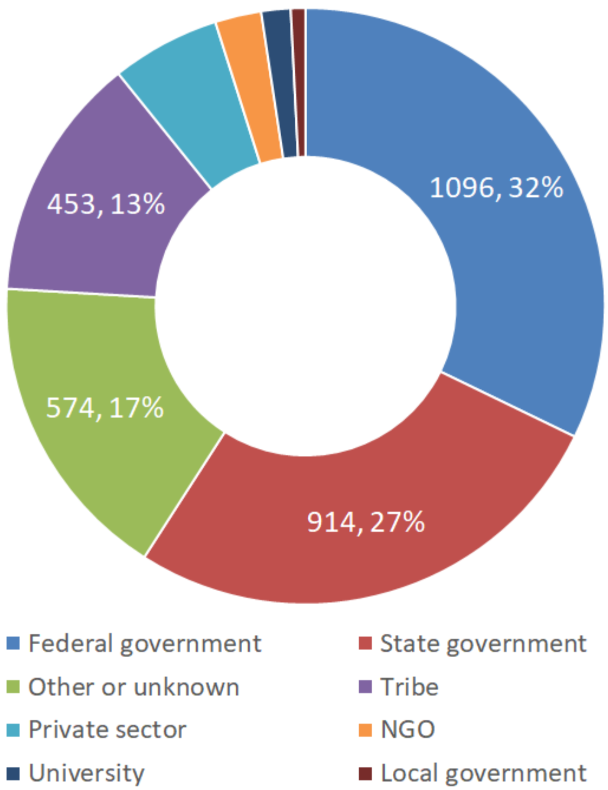
Contact: Meg Dethloff (mdethloff@usgs.gov)

Logos of PNAMP Steering Committee signatory partners.

Participation

PNAMP's success depends on the voluntary participation of hundreds of people. The participants of PNAMP represent many perspectives, affiliations, geographic boundaries, and expertise. Together with staff, they collectively strive to improve monitoring methods and design, assessments, and reporting across the Pacific Northwest. Although managing projects in this volunteer-based environment is challenging, the results are very rewarding.

We feel it is important to acknowledge the generous contributions of time from participants. Keeping track of the time participants spend on PNAMP tasks sounds easy enough, but in practice has proven to be difficult, so for ease and consistency we report meeting participation. For 2021, we calculated 3,376 hours of meeting participation from over 650 people representing at least 118 organizations. Time contributions grouped by entity type are shown below. While tracking meeting participation is an imperfect measure of actual participation time, it remains our best option.



Above: Virtual meeting tools helped keep us connected and smiling in 2021.
Left: Estimated hours contributed to PNAMP meetings for 2021 grouped by entity type. Graph labels represent number of hours and percent of total.

Acknowledgements

Thank you to our 2021 funding partners: Bonneville Power Administration, US Geological Survey, US Bureau of Reclamation, US Bureau of Land Management, Pacific States Marine Fisheries Commission, and the Washington Governor's Salmon Recovery Office. Your generous support is helping advance monitoring and improve data sharing in the region.

We also thank all the task leaders, work group participants, meeting presenters, newsletter contributors, and steering committee representatives; we couldn't do it without you!

PNAMP Steering Committee Representatives

Bonneville Power Administration: Jody Lando, Russell Scranton*, Scott Donahue*
California Department of Fish and Wildlife: Vacant
Columbia River Inter-Tribal Fisheries Commission: Denise Kelsey
Columbia River Inter-Tribal Fisheries Commission – Columbia Basin Fish & Wildlife Library: Tami Wilkerson+
Confederated Tribes of the Colville Reservation: John Arterburn
Idaho Department of Fish and Game: Tim Copeland, Lance Hebdon*
Idaho Governor's Office of Species Conservation: Mike Edmondson+
Natural Resources Conservation Service: Timmie Mandish+
NOAA- NW Fisheries Science Center: Chris Jordan, Mari Williams+
NOAA-West Coast Region: Greg Sieglitz
Northwest Indian Fisheries Commission: Bruce Jones
Northwest Power and Conservation Council: Leslie Bach
Oregon Department of Environmental Quality: Aaron Borisenko+
Oregon Department of Fish and Wildlife: Jamie Anthony+
Oregon Watershed Enhancement Board: Ken Fetcho (acting)
Pacific States Marine Fisheries Commission: Nancy Leonard
Puget Sound Ecosystem Monitoring Program: Jenna Judge+
US Army Corps of Engineers: Vacant
US Bureau of Land Management: Mike Brown, Scott Lightcap*
US Bureau of Reclamation: Mitch Mumma
US Environmental Protection Agency: Vacant
USDA Forest Service: Christine Hirsch, Kimberly Conley+
US Geological Survey: Steve Waste
Washington Department of Fish and Wildlife: Dan Rawding, Brodie Cox*
Washington State Department of Ecology: Glenn Merritt
Washington Governor's Salmon Recovery Office: Keith Dublanica
Yakama Nation Fisheries Program: Tom Iverson+

* Alternate Representatives , + Courtesy Representatives

Appendix: PNAMP 2021 Accomplishments

pacific northwest aquatic monitoring partnership

Coordinated Assessments Partnership & HCAX

- Formally invite participation in HCAX Project via outreach to agencies and tribes engaged in salmon and steelhead hatchery programs. Nominations were received for representative biologists and data management subject matter experts.
- HCAX Workshop 1 held March 11th (HCAX 1 Workshop materials) to identify list of indicators that represent the first phase of sharing hatchery indicators.
- HCAX Workshop Summary Report
- HCAX ad hoc workgroup meeting (April 20, 2021) to prepare for Biologist meeting Recommendations for Moving Ahead
- HCAX Biologist Work Group Meeting 1 (June 2, 2021) to confirm list of indicators that represent the first phase of sharing hatchery indicators and begin work on definitions, supporting metrics, and data sources. Meeting 1 materials
- HCAX Biologist Work Group Meeting 2 (September 15, 2021) Event page with materials
- Briefing for StreamNet Steering Committee September 2, 2021
- Briefing for StreamNet Executive Committee September 9, 2021
- Presentation to NPCC Strategic Performance Indicators Work Group September 13, 2021; CAP and HCAX indicators represent a significant portion of data of interest to NPCC
- HCAX Biologist Work Group Meeting 3, which completed the controlled vocabulary exercise (December 9, 2021) Event page with materials
- Two CAP Newsletters: CAP Newsletter Issue 2 June 2021, CAP Newsletter Issue 3

Coordination and Communication

- Completed Monthly Newsletters; see Newsletters on PNAMP.org
- 2020 Annual Report
- Delivered PNAMP overview briefing for USGS Regional Executive and senior staff of Interior Regions 9 (Columbia- Pacific Northwest) Region 12 (Pacific Islands)
- Represented PNAMP in the Columbia River Restoration Program Long Term Monitoring Strategy meeting
- Met with the Northwest Power and Conservation Council (NPCC) staff to support NPCC indicators process (for NPCC Fish and Wildlife Program Tracker)
- Provided overviews of PNAMP and StreamNet (jointly with Nancy Leonard, StreamNet) to Northwest Power and Conservation Council staff Cathy Kellon (Oregon Fish and Wildlife Policy Analyst) and Steve West (Idaho Fish and Wildlife Policy Analyst)
- Jen Bayer was an invited panelist for the International Year of the Salmon's *Salmon and People in a Changing World* Seminar 5: Open Ocean to Open Source: the Power of Data in a Rapidly Changing World
- Ongoing updates to content on PNAMP.org

Data Management and Sharing Best Practices – Data Visualization

- Participated on the CDI Data Visualization Collaboration Area organizing team to implement quarterly webinar series.
- The March 18, 2021 webinar was attended by at least XX people. Webinar recording here. Featured presentation by Alvin Chang (The Guardian US) *How Data Journalists Think About Data.*
- The July 8, 2021 webinar was attended by at least XX people. Webinar recording here. Featured presentation by Mike Freeman (Observable HQ) *Using Observable for Data Visualization*.
- The September 16, 2021 webinar was attended by at least XX people. Webinar recording here. Featured presentation by Cedric Scherer (IZW) *How to Create and Style Charts with ggplot2*.
- The December 2, 2021 webinar was attended by at least 52 people. Webinar recording here. Featured presentation by Africa Flores-Anderson (NASA) *Earth Observations for a Sustainable Future.*
- Coordinated with organizing team to implement a session at the USGS CDI 2021 Workshop on May 28th entitled "The fundamentals of design for scientific data visualization".

Emerging Technologies Information Sessions

- Organized and hosted four Fish Monitoring and Assessments webinars and three Data Management webinars, see project page for details. Over 600 people participated in the ETIS webinar series, with attendance at each webinar ranging from 30 to 150 people from across the USA and other countries.
- All webinars are posted on PNAMP YouTube channel here. At the time this was written, the ETIS recordings had over 1,800 views on YouTube.
- Sent follow-up surveys to participants to gauge satisfaction with ETIS webinar series and how we might improve
- In the fall, the ETIS Logistics Team met monthly and made progress on event planning for the 2022 hybrid event including: compiled distribution list of potential participants; sent survey to potential participants to gauge interest, feedback on dates, in person vs virtual, etc. (received 104 responses); conducted venue cost comparison; conducted venue site visit; selected dates and location; created a webpage for the event at pnamp.org; and drafted the save-the-date.

Fish Monitoring Work Group

- Established FMWG Core Team: Marika Dobos (IDFG), Russell Scranton (BPA), Kasey Bliesner (ODFW); Nancy Leonard (PSMFC/StreamNet); conducted outreach survey to inform restart of the FMWG, the Core Team met monthly at a minimum
- FMWG Core Team completed the Charter and Work Plan
- Fish Monitoring Work Group (FMWG) Meetings
  - February 11, 2021 engaged 60+ participants from around the region, explored priorities for tasks and clarified how the FMWG supports and collaborates with PSMFC StreamNet Program (meeting materials here)
  - July 15, 2021 event materials can be found here. Tech Talk: Using temperature-sensing radio transmitters to evaluate water temperature use and migration success of adult sockeye salmon in the Yakima River, Washington presented by Toby Kock (USGS)
  - October 21, 2021 event materials can be found here. Tech Talk: An overview of WDFW's State of Salmon (SoS) analysis 2020 presented by Neala Kendall (WDFW) and Thomas Buhrens (WDFW)

Fish Monitoring Work Group Continued

Task Teams:

- HLI Display Tasks are complete, the group met in May, June, and July; following the last meeting recommendations were endorsed by StreamNet Steering and Executive Committees
- CAP DES Juvenile Outmigrant Refinement: Define Smolt Equivalent is complete, the group met in October and November
    - On November 23rd leads presented the task description and worked with the task team to identify and adjust issues, event page
- Population Names & GIS Boundaries met in July and October to initiate task leads, draft task description
- Carrying Capacity Data Standard met in July, August, September, October, and November to coordinate leads and work on task description
    - On November 29th leads presented their draft task description, justification, and predicted outcomes to the task team, event page
- Rotary Screw Trap (RST) Operation Data Standards task leads met in October and November to work on task description; draft task description is finished; full task team will convene in 2022
- Juvenile Density (Snorkel and Electrofishing) task leads met in October and November to work on task description; draft task description is finished; full task team will convene in 2022

Intensively Monitored Watersheds

- Sent survey to IMW principal investigators to gauge interest in PNAMP IMW Forum activities for 2021
- Worked with the core team to finalize IMW Management Applications Synthesis questionnaire that informed the fall 2021 virtual workshop series discussions and synthesis report.
- Pre-populated the questionnaire response table for questions that overlapped with 2017 PNAMP questionnaire and 2021 GSRO survey.
- Compiled IMW Management Applications Synthesis questionnaire responses from 13 PNW IMWs
- Worked as part of the Core Team to organize and host three virtual workshops (November 16, November 30, December 7) aimed at identifying IMW lessons learned to date and recommended applications from the IMW programs to conservation and restoration work. At least 50 people from 21 organizations representing 13 IMWs participated in the workshops.

MonitoringResources.org

- Organized and presented the MonitoringResources.org project sponsor orientation in January, February, March, April, November and December.
- Recorded and posted the MonitoringResources.org Orientation webinar to YouTube and MonitoringResources.org
- Recorded and posted new training videos to MonitoringResources.org: Training Video Library
    - Search For or Create: Methods, Protocols, Study Plans, or Sample Designs

MonitoringResources.org Continued

  - Method Customization in MonitoringResources.org
  - Metric Method Mapping in MonitoringResources.org
- Finalized 40 protocols and 92 methods since January 1, 2021
- Coordinated biweekly meetings with Sitka, BPA COR and BPA subject matter experts
- Created and distributed the MonitoringResources.org 2021 Survey to influence future development
- Oversaw the development of the Study Plan “Overview”(one-stop-shop)
- Facilitated a meeting with BPA and StreamNet to discuss coordination of GIS work
- Organize and facilitate 2022 work planning meeting and agreed on end of 2021 and start of 2022 MonitoringResources.org ideas
- Drafted outreach for the PNAMP newsletter on MonitoringResources.org
- Verified and updated the list of data repositories in MonitoringResources.org
- Summarized documentation to the project level and working with Sitka to troubleshoot/updated the new Study Plan Overview
- Completed overview and development for the FY2021 BPA contract, coordinated with Sitka and BPA to approve and release all development ideas
- Facilitated October 7, 2021 meeting with BPA, Sitka and PNAMP staff to review 2021 work and 2022 workplan
- Coordinated with BPA staff to understand proprietaries for 2022 development
- Presented MonitoringResources.org Orientation for Users in November and December
- Met virtually one-to-one with Confederated Tribes of Colville Reservation and Idaho Fish and Game MonitoringResources.org users for specific user support guidance.
- Facilitated meetings with CA WDR on integrating Delve data system and MonitoringResources.org documentation

List of MonitoringResources.org Development Released

- Hot Fix: Fixed the bug where users can’t delete photos from methods and protocols. Moved all MonitoringResources.org to Hawk Moth Servers (our new development team servers)
- Completed development of Study Plan “Overview” (one-stop-shop), rolling up Study Plans based on BPA Project Numbers, and an API for Study Plans connection to a BPA Project
  - Navigation to the Study Plan “Overview” (one-stop-shop) object is still not implemented.
- Updated Program page to only show finalized and draft Protocols and Study Plans.
- Bug fix: Improved rich text editor focus
- Updated PNAMP contact info with USGS email address
- Updated Study Plan Edit Page:
  - Added a way to create a Sample Design
  - Imported Rationale and Objectives from the Protocol into the Study Plan
  - Allowed users to create a protocol and link it to the study plan

MonitoringResources.org - List of Development Released Continued

- Fixed broken create function in Programs
- MonitoringResources.org fileserver consolidation
- Add Nagios monitoring to MoitoringResources.org QA Geoserver
- In the Sample Design review map:
    - Removed panels from the review map when the sample design did not indicate any user defined panels
- Transitioned release process/permissions to Hawk Moth (Hawk Moth = the new development team)
- Monitoring Explorer
    - Updated from .NET Core 2.2 to a supported version
- Scoped Naming and navigating UI/UX updates with support of a UI/UX expert
- Updated security in MonitoringResources.org to allow communication with Pisces Web tools

Remote Sensing Forum

- Established Remote Sensing Forum (RSF) Organizing Committee: Amy Puls (USGS/PNAMP), Lauren Burns (CRITFC), Jane Atha (WDFW), Richie Carmichael (Biomark), Narayan Elasmar (CREST), Connar Stone (GRMW), and Sean Welch (BPA)
- Created RSF project page on pnamp.org
- Established RSF charter
- Created RSF listserv for future email communications – currently 65 members
- Launched RSF MS Team on June 15th to serve as an online discussion board for the forum. At time of writing the team had 34 members.
- With Lauren Burns (CRITFC), co-led the organization and implementation of the RSF quarterly meeting.
- The March 16, 2021 kick-off meeting was attended by at least 51 people. Meeting recording here. Shared our vision and goals for the group, introduced the organizing committee members, solicited feedback on topics for future meetings.
- The June 15, 2021 meeting was attended by at least 33 people. Meeting recording here. Featured presentations by: Kai Ross (Cramer Fish Sciences) *Automated Feature Extraction: The Trials and Tribulations of Extracting LWD* and Rikeem Sholes (USFW) *Burgeoning Technology in Fish Population Monitoring.*
- The October 8, 2021 meeting was attended by at least 28 people. Meeting recording here. Featured presentations by: Matt Barker (OSU) *Estimating 2-dimensional area of coarse woody material from UAS imagery* and Wyatt McCurdy (USFS Contractor) *Remote sensing methods for monitoring Stage 0 restoration metrics on Whychus Creek using high-resolution imagery.*
- The December 14, 2021, meeting was attended by at least 33 people. Meeting recording here. Featured presentations by: Morgan Bond, Ph.D. (NOAA Fisheries) *Using Satellite Imagery to Inform Models of Instream Flow and Fish Habitat* and Nick Wagner (Foresight Drone Services) *Marine Debris Detection with Amphibious Fixed-wing UAVs: Stories from the Great Pacific Garbage Patch.*

Stream Habitat Metric Integration

- Organized and implement project team meeting on March 2nd, April 15th and Sep29th, November 22nd - Stakeholders from USGS, BLM AIM, EPA NRSA and USFS PIBO and AREMP, 9 people in attendance
- Shared first draft of Data Exchange Specifications and Controlled Vocabulary for exchanging and sharing Stream Habitat Metrics with the project team for review
- Completed one on one call with project leaders
- Draft, share and compile a questioneer for project leaders to understand the specifics issues with programs' data
- Present Stream Habitat Metric work at 2021 CDI Workshop
- Draft and shared lessons learned and FAIR assessment tables
- First draft of dataset, reviewed with project team
- Draft code and Git Hub documentation to integrate stream habitat metric data from multiple monitoring programs
- Worked with USGS and PSMFC to hire a data specialist to support publishing of the integrated data set, methods and manuscripts
- Added PIBO data to the data set to integrated data set
- Drafted 2022 work plan
- Coordinated with USGS partners to start planning on integrating the dataset into USGS resources
- Initiated work with a metadata specialist to support publishing of the integrated data set, methods and manuscripts
- Drafted summary tables of lessons learned, recommendations, and FAIR assessment of each program and shared for review by the project team
- Continued improvements to code and Git Hub documentation to integrate stream habitat metric data from multiple monitoring programs
- Documented program methods in MonitoringResources.org and worked with partners to gather feedback

Steering Committee Meeting Series

- January 27, 2021 Meeting: meeting materials here
- May 6, 2021 Meeting: meeting materials here
- September 28, 2021 Meeting: meeting materials here