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PNAMP 2024 Annual Report

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pacific northwest aquatic
monitoring partnership

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20 Great Things to Celebrate About Being 20 Years Old

1. Satisfaction in communicating news about PNAMP and partners' activities via the [PNAMP newsletter](#); and the [PNAMP website](#)
2. Admiration for efforts towards more effective monitoring: [HLI Coordination](#); [ISTM](#); [Effectiveness Monitoring Coordination](#); [Enabling Integrated Science](#)
3. Data standards that result in data sharing: [CAP](#); [HCAX](#); [StreamNet](#)
4. Striving to help partners share habitat data: [RHIP](#) and [SHMI](#)
5. Respect for the Methods and Protocols documented in [MonitoringResources.org](#)
6. Pleasure of being with you in person in workshops with flip charts and sticky notes
7. Inspiration from the [Emerging Technologies Information Sessions](#)
8. Appreciation of experts contributing to [PNAMP Fish Monitoring Work Group](#) (FMWG) tasks and [technical presentations](#)
9. Success in helping partners use results from [IMWs](#) – [Management Implications from PNW IMWs](#); [Key Findings & Lesson Learned](#)
10. Making new friends and expanding our horizons through the [Research Data Alliance](#) [Salmon Research and Monitoring Interest Group](#)
11. Supporting colleagues to develop new Communities of Practice for related topics such as the [CRBRP Toxics Monitoring Subgroup](#)
12. Aiding partners in using data appropriately: [Data Steward Community of Practice](#), [Data Citation Task](#)
13. Helping partners use data in new ways: [Data Visualization](#)
14. Gratitude for the entities and people that created and sustain PNAMP: [current partners and Steering Committee](#) and [20 years of Steering Committee members](#).
15. Appreciation for the foresight of the group who founded PNAMP – PNAMP retrospective. ([link to retrospective](#))
16. Appreciation for PNAMP participants from near and far – almost 3300 participants from over 450 entities
17. Recognition of the superlative staff through the years: Jen Bayer, Amy Puls, Meg Dethloff, Sam Cimino, Becca Scully, Sheryn Olson, Jacque Schei, Kathryn Thomas, and Katie Pierson
18. Acknowledgment of collaborative efforts within the PNAMP community
19. Valuing the ongoing commitment of participants in advancing science-based monitoring
20. Celebrating the achievements and shared goals of the PNAMP network over time



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.

Sincerely,

Jen Bayer

PNAMP Coordinator, U.S. Geological Survey



PNAMP Coordination Team Supports Partners' Collaboration

Each year, the PNAMP Coordination Team dedicates their time and energy to supporting the collaboration of a multitude of partners and participants. We provide our essential facilitation skills and technical expertise to support relationships between data collectors, data managers, data consumers, project managers, and monitoring professionals. It is our focus to stay mindful of the latest scientific developments related to monitoring and data management from our partners and beyond to bring this information to the PNAMP community.

The Coordination Team is always looking to grow and evolve PNAMP. We work hard to provide an inclusive environment, which means developing and maintaining relationships with entities that contribute a diversity of skills and perspectives. This practice also means being experts in the latest collaboration tools for virtual meetings, such as video conferencing and mastering new web tools to engage and gather participants' input. We strive to make everyone feel welcome and make it easy to collaborate.

The [PNAMP.org](https://www.pnamp.org) website provides an essential platform for the Coordination Team to communicate information about PNAMP events and projects. In addition to [PNAMP.org](https://www.pnamp.org), the Coordination Team also manages the development and upkeep of [MonitoringResources.org](https://www.monitoringresources.org), a metadata documentation tool, that promotes Findable, Accessible, Interoperable, and Reusable (FAIR) data principles.

If you have feedback or questions related to staff support or PNAMP resources, please let us know.

The PNAMP Coordination Team is employed by the U.S. Geological Survey Forest and Rangelands Ecosystem Science Center.

- Jennifer Bayer - PNAMP Coordinator, jbayer@usgs.gov
- Amy Puls - Deputy Coordinator, apuls@usgs.gov
- Sam Cimino - Staff Biologist, scimino@usgs.gov
- Megan Dethloff - Staff Biologist, mdethloff@usgs.gov

Coordinated Assessments Partnership (CAP) and Hatchery Indicators Project (HCAX)

CAP demonstrated continued progress throughout 2024. Key highlights include collaborative workshops focused on enhancing data exchange, particularly for hatchery origin fish and updates to [CAP Data Exchange Standards](#), which govern the sharing of critical fish population data. Specifically, the work included:

- Planning and implementation of the PNAMP, StreamNet, Fisheries and Oceans Canada-hosted symposium at the 2024 WA/BC and Idaho Chapter Annual Meeting (April 29-May 2, 2024)
- Planning and implementation of the [May 2024 HCAX workshop](#)
- Supporting specific issues requiring input from a diversity of experts to advance data display, exchange, and quality in StreamNet/CAP systems
- Providing outreach to potential users of new [HCAX](#) and existing CAP data systems
- Developing products with partners outside the Columbia River Basin, including Canada and European nations

The ongoing maintenance of StreamNet ensured that stakeholders and managers had access to timely and reliable information. In support of these goals, the PNAMP coordination team and StreamNet staff collaborated to expand the ease of data flow and validation to support adaptive management of the Fish High Level Indicators Hatchery origin data exchange.

In 2024, CAP supported informed decision-making processes for the management of valuable and culturally significant fisheries resources in the Pacific Northwest.

Learn More: [PNAMP Project Page](#); [2024 Accomplishments](#). Contacts: Jen Bayer (jbayer@usgs.gov) and Nancy Leonard (nleonard@psmfc.org)



Data Management and Mobilization

Data Management and Mobilization was a core value of the Pacific Northwest Aquatic Monitoring Partnership before it was a well accepted concept and practice. We recognized early on that accessible, high-quality data are fundamental to a successful monitoring program and key to a programs' success in supporting decision making. Effective use of these data requires the application of best management and data sharing practices – whether the data were gathered by direct observation, generated through remote sensing, or derived (as with a calculated metric or indicator). Many of PNAMP's other projects have a focus on data management and mobilization including ETIS, CAP/HCA, MonitoringResources.org, and the FMWG.

In 2024, PNAMP brought data management and mobilization to a larger audience. We played a pivotal role in getting the chapter “Standard Data Management Practices” in the second edition of the American Fisheries Society’s [“Standard Methods for Sampling North American Freshwater Fishes”](#) book across the finish line and published. Additionally, in 2024, we invested time and effort in the Salmon Data Mobilization (SDM) group, a collaborative international effort aimed at enhancing the sharing, integration, and accessibility of salmon research data to inform conservation and management decisions. One of the products this group delivered in 2024 was the [“Salmon Data Mobilization”](#) paper published in the North Pacific Anadromous Fish Commission bulletin. Another essential aspect of SDM is the formation of the [Salmon Research and Monitoring Interest Group](#) within the Research Data Alliance. This group focuses on promoting interoperable methods and data across research, management, and monitoring sectors to deepen the understanding of factors influencing salmon declines.. The group is co-chaired by Graeme Diack, Tom Bird, Lara Erikson, and Alexis Knight, with active participation from global experts.

Learn more: [PNAMP Project Page](#); [2024 Accomplishments](#). Contacts: Jen Bayer (jbayer@usgs.gov) and Sam Cimino (scimino@usgs.gov).



Fish Monitoring Work Group

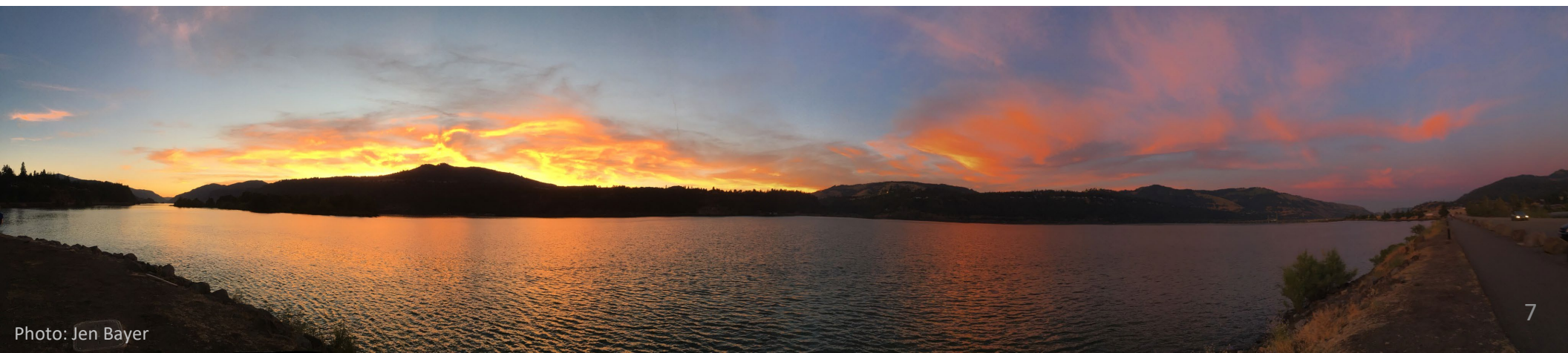
In 2024, the FMWG held meetings in [January](#), [April](#), and [October](#). These sessions featured updates from FMWG task teams, along with a series of “tech talks” that highlighted the efforts of regional experts. The topics of the tech talks encompassed a range of interests, including lamprey projects conducted by the Yakama Nation Fisheries, the introduction of a new methodology for temperature data collection, and the presentation of the summary report for the Intensively Monitored Watershed in the Middle Fork John Day River. Task Team Leads, supported by PNAMP staff, continued to advance these initiatives:

- [Carrying Capacity Standards](#) led by Morgan Bond (NOAA), Tim Copeland (IDFG), and Russ Scranton (BPA) focuses on describing current approaches, and how to better document and share carrying capacity products. A peer-reviewed carrying capacity review paper is in development.
- [Rotary Screw Trap \(RST\) Data Collection](#) led by Kasey Bliesner (ODFW), Marika Dobos (IDFG), and Russ Scranton develops data collection recommendations for rotary screw trapping efforts to support a variety of analyses. StreamNet's Technical Team implemented recommendations from the PNAMP and StreamNet Steering and Executive Committees for the Rotary Screw Trap Dashboard.
- [PIT Tag Array Data and Related Data Analyses](#) led by Marika Dobos and Russ Scranton focuses on identifying needs for data management and analytical methods for PIT tag array data. Marika presented at the 2024 PTAGIS Workshop and helped identify highest priorities to support the PIT tag data community. Planning for a webinar series to address these issues began and will debut in early 2025.
- [Update Terms and Definitions Used in CAP Data Standards Task](#) led by Mari Williams and Jen Bayer is reviewing and updating terms and definitions in [StreamNet Data Standards](#) that support CAP data (CAX HLI DES, HCAX DES and SN Fish Monitoring Trends DES) to effectively convey the terms’ intent.

Task teams will maintain their progress into 2025 to achieve the proposed products, while future tasks will commence as priorities are determined.

Learn more: [PNAMP Project Page](#); [2024 Accomplishments](#)

Contact: Meg Dethloff (mdethloff@usgs.gov)





Intensively Monitored Watersheds

Intensively monitored watershed (IMW) programs in the Pacific Northwest have studied fish-habitat relationships for over 20 years, informing salmon and steelhead conservation efforts. As studies shift to post-treatment monitoring, their findings can help improve recovery programs and highlight the value of long-term monitoring amid reassessments of salmon recovery investments.

In 2024, PNAMP staff worked with IMW leads to organize a session at the River Restoration Northwest Symposium entitled “Key Results from Intensively Monitored Watersheds: Incorporating Lessons Learned into Restoration Programs and Project Design”. The session included four presentations followed by a panel discussion. PNAMP also worked with staff from Fisheries and Oceans Canada to organize a virtual workshop entitled “[Lessons Learned in Salmon Habitat Restoration from Intensively Monitored Watersheds of the Pacific Northwest](#).” The workshop featured two sessions each consisting of three presentations and a panel discussion. Both events were well attended and generated thought-provoking questions and discussions.

In late 2024, PNAMP formed a planning group to shape a visioning workshop aimed at refining effectiveness monitoring approaches to better inform decision-making and track progress toward ecological goals. The group is still in the early stages of planning but has discussed using the workshop to explore ways to optimize restoration efforts by prioritizing key watersheds, species, and limiting factors, as well as identifying essential monitoring metrics, methods, and technologies to efficiently assess restoration impacts. Planning will continue in 2025.

Learn more: [PNAMP Project Page](#); [2024 Accomplishments](#)

Contact: Amy Puls (apuls@usgs.gov)

MonitoringResources.org Outreach

The Monitoring Resources team aims to provide thorough guidance and timely assistance to those documenting metadata in [MonitoringResources.org](https://www.monitoringresources.org). As more agencies and organizations realize the benefit of metadata documentation, the Monitoring Resources team must adapt to this growing community and balance novel documentation needs while maintaining FAIR (Findable, Accessible, Interoperable, and Reusable) data principles and fulfilling any contracting requirements. The Monitoring Resources outreach team addressed the needs of project sponsors through:

- A presentation at the Idaho/WA-BC joint AFS conference on the process of connecting MonitoringResources.org to published data using large language models to preserve the data lifecycle
- One-to-one project reviews with project sponsors
- Providing a one-hour [MonitoringResources.org Orientation for BPA CORs](#) in an effort to help them assist project sponsors
- Creating and updating training modules and guidance documents including the [Validating Data Collection Events](#) tutorial, [Protocols Training Module](#), and [BPA Workflow Navigation and Guidance](#) document
- Participating in discussions with other PNAMP work groups and projects like the Coordinated Assessments Partnership, the Fish Monitoring Work Group, and the Salmon Data Management and Mobilization group
- Collaborating with PSMFC StreamNet and Canada DFO to support PNAMP's ongoing work for refining MonitoringResources.org to facilitate connecting methods, protocols, study plans to data sets in StreamNet systems and other systems
- Reaching out to project sponsors to finalize products within MonitoringResources.org and assisting with questions and concerns

The continued success of MonitoringResources.org relies on the support of our partners who share our vision for better documentation and information sharing.

Learn more: [PNAMP Project Page; 2024 Accomplishments](#)

Contact: Sam Cimino (scimino@usgs.gov)



Photo: Sam Cimino



Photo: Sam Cimino

MonitoringResources.org Development

The objective for the [MonitoringResources.org](https://www.monitoringresources.org) development team is to streamline, simplify, and improve the documentation and discovery of monitoring metadata. Updates and the addition of new features to the suite of tools in MonitoringResources.org are the primary response to user feedback from contract managers, subject matter experts, policy advisors, review panels, and data consumers.

This past year, the development team investigated “pain points” in MonitoringResources.org and determined areas in which updates and new tools making the documentation of metadata simpler, easier to find, and more accessible to reuse. The development team identified metadata discovery as an area of focus. We made efforts to finalize development on making metadata in the Explorer Map more findable and accessible by producing a more user-friendly map interface and providing access to more metadata within the map discovery tool.

In 2024, we scoped the future of Monitoring Resources, and we collaborated with partners to investigate the possibilities of better connectivity and interoperability of data and metadata. We worked with Fisheries and Oceans Canada to investigate novel approaches for metadata documentation and sharing via artificial intelligence and machine learning. We teamed up with Pacific States Marine Fisheries Commission (PSMFC) to improve connections between Monitoring Resources metadata and the StreamNet data repository. Environmental Science Associates (ESA) produced a report with technical recommendations and a proposed roadmap based on these collaborative discussions.

Other key developments to MonitoringResources.org in 2024:

- Configuration and library updates to the Monitoring Resources Site and the Monitoring Explorer API
- Added a new feature giving users the ability to add Collaborators on all documentation pages
- Improved the Validation of Data Collection Events progress charts
- Added Data Repositories to the Study Plan Summary

PNAMP believes the success of this toolset relies on the input and participation of users. In 2025, we will continue to gather feedback from users to help prioritize future development.

Learn more: [PNAMP Project Page](#); [2024 Accomplishments](#)

Contact: Sam Cimino (scimino@usgs.gov)

Columbia River Basin Restoration Program Toxics Monitoring Subgroup

Established in 2023 by the Environmental Protection Agency (EPA) and the U.S. Geological Survey (USGS), the Columbia River Basin Restoration Program Toxics Monitoring Subgroup (TMS) provides a forum to exchange toxics monitoring information, discuss challenges, coordinate monitoring activities, and support collaborative projects to benefit the community. PNAMP staff provide facilitation support similar to our other communities of practice.

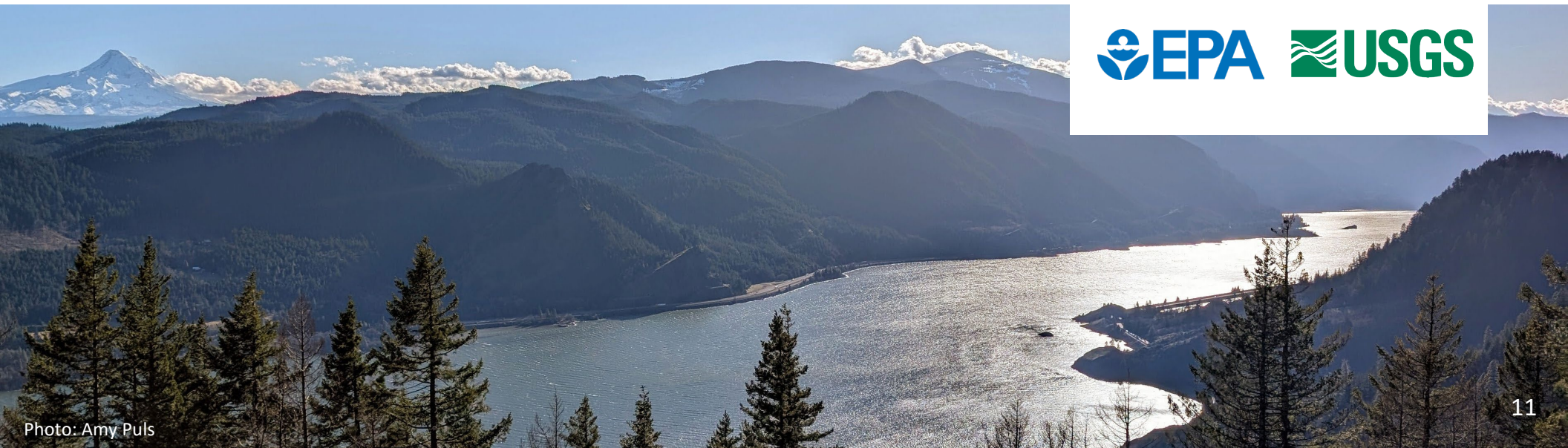
The TMS convened three times in 2024, engaging 88 participants representing 38 entities that included Tribes; federal, state, and local governments; universities; NGOs; and the private sector. The February meeting proposed a process to select Columbia Basin-wide screening values for contaminants, featured three lightning talks from subgroup members, and highlighted valuable online resources for current and future EPA grantees for help with QAPPs, WQX, and more. The June meeting included a brief progress update on the screening values task but mainly focused on three presentations from large-scale monitoring programs intended to stimulate discussion of ways to collaborate, coordinate, and share information and move towards a more integrated monitoring approach in the Columbia River Basin. The October meeting included five lightning talks on current toxics monitoring projects from subgroup members, updates on ongoing TMS tasks, and continued the discussion on ways to integrate toxics monitoring efforts across the basin.

Meeting summaries and slide decks can be found on [EPA Region 10 file sharing site](#), and meeting recordings are available upon request by emailing us at gs-crbtoxmon@usgs.gov.

Learn more: [PNAMP Project Page](#); [2024 Accomplishments](#). Contacts: Jen Bayer (jbayer@usgs.gov) and Amy Puls (apuls@usgs.gov).



COLUMBIA RIVER BASIN
RESTORATION PROGRAM



Emerging Technologies Information Sessions

The Emerging Technologies Information Sessions (ETIS) project brings together aquatic monitoring professionals, project managers, data collectors, data managers, and data consumers to showcase how they implement the latest technologies or how they use old technologies in new ways. Over the last fourteen years, PNAMP and StreamNet have collaborated to host bi-annual ETIS meetings and webinar series. In 2024, we assembled an ETIS Planning Committee that met monthly to plan and organize the webinar series in early 2025.

The ETIS Planning Committee consisted of thirteen members from six different organizations: USGS, PSMFC, IDFG, ODFW, CRITFC, and BPA. The monthly planning sessions helped determine the structure and schedule for the 2025 ETIS Webinar Series, and it assisted with developing a timeline and project benchmarks. The planning committee agreed upon five different session topics: Remote Sensing, Genetics, Data QA/QC, Artificial Intelligence and Machine Learning, and Modeling and Analysis. Additionally, for each session, the planning committee identified and secured three to four presenters. A program with each presenter's title and abstract and is available here and on the PNAMP website.

Near the end of 2024, promotion for the event ramped up. PNAMP promoted the 2025 ETIS webinar series through multiple announcements in the PNAMP newsletter, by spreading the word at regional meetings and conferences, and through the production of the [ETIS project page on PNAMP.org](#). The project page included links to each session's event page where participants could RSVP for a webinar session.

In 2025, PNAMP will co-host the Emerging Technologies Information Sessions Webinar Series with our partners at StreamNet. The series will span five weeks with 16 different presentations. The presentations will also be available on the [PNAMP YouTube channel](#) after each session. PNAMP and StreamNet will gather feedback from participants and continue to grow and adapt this project to fit their needs.

Learn more: [PNAMP Project Page](#); [2024 Accomplishments](#)
Contact: Sam Cimino (scimino@usgs.gov)





Outreach & Communication

Coordination staff have used the PNAMP website to communicate with the wider monitoring community for the last 20 years. However, [PNAMP.org](https://pnamp.org) had a major facelift in 2024 as we transitioned the website to a new platform, WordPress, under a new host, PSMFC. Although the website looks a bit different, all the valuable content we've been providing over the years is all still there.

PNAMP activities are conducted by working groups and teams as endorsed by a partner-based steering committee. These activities are detailed on PNAMP.org as past and present projects. Additionally, PNAMP.org houses thousands of [documents](#) related to PNAMP projects and events to promote participation by providing background information, meeting materials, and notes. The PNAMP team coordinates and hosts many events, but we also provide a platform for our partners and other regional organizations to promote their own activities and accomplishments. A list of [Upcoming Events](#) and a list of recent [Announcements](#) from PNAMP and its partners are prominently displayed on PNAMP.org and updated regularly.

Along with PNAMP.org, the PNAMP team provides outreach through a [monthly newsletter](#) that reaches over 3,000 subscribers. Much like PNAMP.org, the newsletter delivers details on upcoming events and regional announcements, but it also highlights the latest products from the PNAMP community and puts a spotlight on our eclectic monitoring activities. We regularly hear from readers about how the newsletter helps them stay informed on events and news from around the Pacific Northwest.

The PNAMP team also participated in more active outreach and communication in 2024. The coordination staff gave presentations to interested groups and organizations including specific audiences at the StreamNet Executive and Steering Committee meetings; and, to more general audiences at a regional American Fisheries Society (AFS) conference in Spokane, WA and the national AFS conference in Honolulu, HI. In addition, we sit on panels and decision-making committees concerned with aquatic monitoring throughout the region and continue to build and grow our community.

We understand that not everyone can attend our various meetings and workshops in-person; thus, PNAMP staff have been diligent in posting content on [PNAMP's YouTube channel](#). Our 2024 recordings have been viewed over 550 times on YouTube. These videos have helped us reach new community members and reengage old ones.

Learn more: [PNAMP Leadership](#); [2024 Accomplishments](#)

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

Steering Committee

The PNAMP Steering Committee (SC) consists of representatives from both signatory and courtesy partners. The SC serves as a critical science-policy interface between the executives of signatory partners and project work teams. Its responsibilities include conveying the work and needs of their respective organizations to PNAMP, as well as relaying PNAMP's progress and challenges back to their organizations.

PNAMP would like to express its gratitude for all the contributions from our partners throughout 2024. We welcomed new collaborators to our team and commemorated the successful conclusion of several chapters. Happy retirement to Steve Waste (U.S. Geological Survey) and Dan Rawding (Washington Department of Fish and Wildlife)! We thank you for your many years of service. Steve will remain on our Steering Committee as an emeritus participant. We welcome Phil Sandstrom (Washington Department of Fish and Wildlife); Ed Krynak (Washington Department of Ecology) and look forward to their input and participation in the committee.

In 2024, the SC met virtually in May to discuss PNAMP project progress and listen to the Middle Fork John Day River Intensively Monitored Watershed Report. In [November](#), building on the successes of the PNAMP and StreamNet two-day hybrid joint sessions, we again teamed up with Pacific States Marine Fisheries Commission. We gathered both the PNAMP SC and the StreamNet Executive Committee to coordinate efforts for our overlapping projects. Working in this collaborative style, both committees can maximize work for more efficient results.

Learn more: [PNAMP Steering Committee](#)

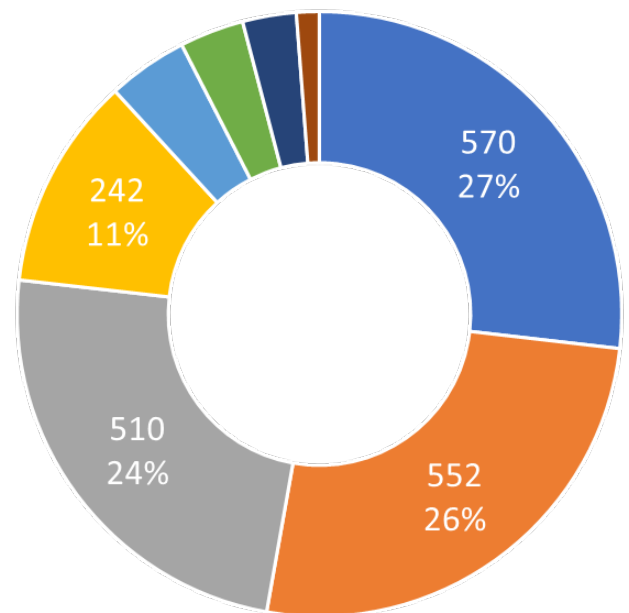
Contact: Meg Dethloff (mdethloff@usgs.gov)



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 the USGS staff that serve as the PNAMP Coordination Team, PNAMP participants 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 2024, we calculated 2125 hours of meeting participation from 293 people representing at least 85 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.



- Other or unknown
- Federal government
- State government
- Tribe
- University
- Private Sector
- NGO
- Local government



Photo: Meg Dethloff

Above: Idaho WA/BC joint AFS Session "Data Longevity Achieved" Hosted by PNAMP and StreamNet

Left: Estimated hours contributed to PNAMP meetings for 2024 grouped by entity type. Graph labels represent number of hours and percent of total.

Acknowledgements

Thank you to our 2024 funding partners: Bonneville Power Administration, U.S. Environmental Protection Agency, U.S. Geological Survey, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, and Pacific States Marine Fisheries Commission. Your generous support helps 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*, Jonathan McCloud*

California Department of Fish and Wildlife: Vacant

Columbia River Inter-Tribal Fisheries Commission: Denise Kelsey, Sheryn Olson*

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, John Cassinelli*

Idaho Governor's Office of Species Conservation: Mike Edmondson+

Natural Resources Conservation Service: Timmie Mandish+

NOAA- NW Fisheries Science Center: Chris Jordan, Katie Barnas*

NOAA-West Coast Region: Greg Sieglitz

Northwest Indian Fisheries Commission: Bruce Jones

Northwest Power and Conservation Council: Patty O'Toole

Oregon Department of Environmental Quality: Vacant

Oregon Department of Fish and Wildlife: Jamie Anthony+

Oregon Watershed Enhancement Board: Courtney Shaff, Ken Fetcho*

Pacific States Marine Fisheries Commission: Nancy Leonard, Mari Williams+, Lara Erikson*

U.S. Army Corps of Engineers: Vacant

U.S. Bureau of Land Management: Mike Brown

U.S. Bureau of Reclamation: Jeff McLaughlin

U.S. Environmental Protection Agency: Lisa Kusnierz

USDA Forest Service: Christine Hirsch

U.S. Geological Survey: Steve Waste

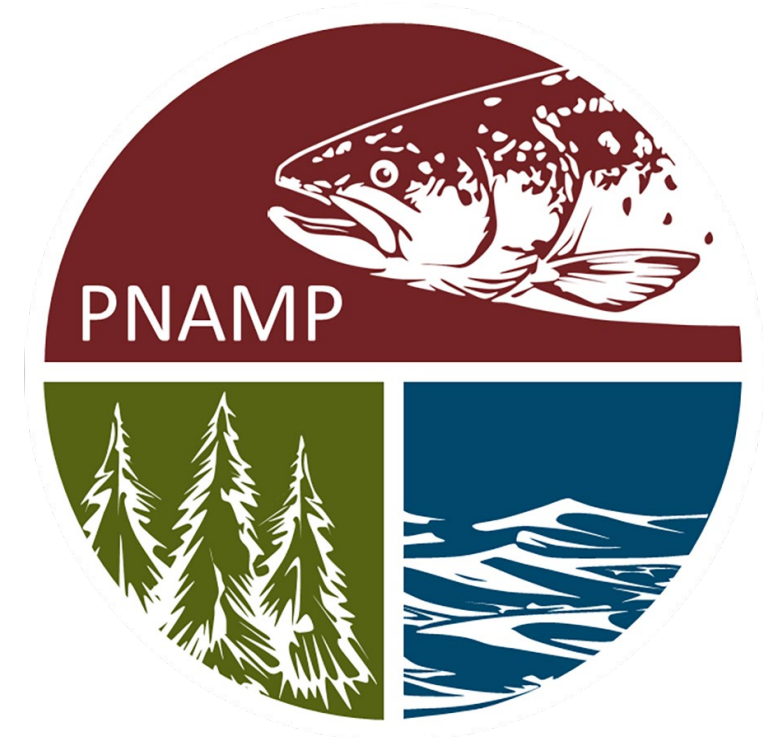
Washington Department of Fish and Wildlife: Phil Sandstrom, Brodie Cox*

Washington State Department of Ecology: Ed Krynak

Washington Governor's Salmon Recovery Office: Greer Maier

Yakama Nation Fisheries Program: Tom Iverson+

* Alternate Representatives , + Courtesy Representatives



Appendix A: PNAMP 2024 Accomplishments



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Coordinated Assessments Partnership & HCAX Project

- PNAMP hosted the third and final Hatchery Coordinated Assessments (HCAX) workshop May 21, 2024, under the EPA Exchange Network grant funding. We had nearly 50 attendees participate in the virtual workshop, where we reviewed the progress of the project, what is left to complete to meet the grant requirements, and our plans for HCAX rolling into the general Coordinated Assessments Partnership (CAP)
- Assisted with HCAX project to ensure that data can flow from partners to StreamNet CAX
- Collaborated with StreamNet staff in follow up tasks stemming from the 2023 CAP Workshop, such as preparing for the review of terms and definitions for CAP data standards and updates to StreamNet websites
- Increased collaboration with the international Salmon Data Mobilization Workgroup, including creating a Research Data Alliance Interest Group to increase data access: [Groups Salmon Research and Monitoring IG](#)
- Developed two workshops to be held at the 2025 WA/BC AFS Chapter Meeting in Vancouver British Columbia (March 10, 2025). One workshop will focus on mobilization of salmon data via standards and ontologies. One will focus on use of the HCAX data via Coordinated Assessments at StreamNet
- Led monthly CAP Core Team meetings, resulting in progress on coordination for data sharing across partners, with emphasis on BPA funded projects
- Supported StreamNet Steering Committee meeting

Coordination and Communication

- Completed and distributed PNAMP monthly newsletters for January – December 2024
- Published the 2023 PNAMP Annual Report
- Coordinated and presented at the “Data Longevity Achieved! Reproducibility throughout the lifecycle and beyond” symposium in collaboration between PNAMP, StreamNet, Fisheries and Oceans Canada at the 2024 WA/BC and Idaho Chapter Annual Meeting (April 29-May 2, 2024)
- Coordinated and presented in the “Building Fisheries Science Partnerships” symposium at the 2024 National American Fisheries Society meeting on collaborative management of regional fish and habitat data between the USGS and regional Fisheries Commissions
- Presented projects at various StreamNet Steering and Executive Committees
- Created a new PNAMP.org website and transferred over the content from the old website to the new website
- Provided review and feedback to the National Fish Habitat Partnership Science and Data Committee
- Uploaded dozens of recorded meetings with transcripts to the PNAMP YouTube channel
- Uploaded guidance videos and tutorials concerning PNAMP tools to the PNAMP YouTube channel
- Updated outdated training videos, training modules, and project fact sheets

CRBRP Toxics Monitoring Subgroup (TMS)

- [February 29, 2024 Toxics Monitoring Subgroup Meeting](#); Link to [materials on EPA website](#).
 - 51 participants from state, tribal, federal, and other organizations
 - We discussed a process to select Columbia Basin wide screening values for contaminants, featured three lightning talks from subgroup members, and shared online resources that are available for EPA grantees for help with QAPPs, WQX, and more.
- [June 18, 2024 Toxics Monitoring Subgroup Meeting](#); Link to [materials on EPA website](#)
 - 61 participants from state, tribal, federal, and other organizations
 - Patrick Moran gave a short update on the screening values task. The meeting focused on presentations from large-scale monitoring programs intended to stimulate discussion of strategies to link toxics monitoring in Columbia River Basin tributaries to mainstem and estuary monitoring
- [October 1, 2024 Toxics Monitoring Subgroup Meeting](#); Links to [materials on EPA website](#).
 - 59 participants from state, tribal, federal, and other organizations
 - Meeting included: 5 lightning talks from current toxics monitoring projects; a brief update by Patrick Moran (USGS) on progress and next steps for identifying screening values for the CRBRP; a brief update by Bryson Finch (WA Ecology) on Washington State Department of Ecology's recently adopted revised aquatic life criteria for 16 toxic parameters. And a discussion to follow up on the June 2024 TMS meeting, which featured three talks intended to stimulate discussion of ways to collaborate, coordinate, and share information and move towards a more integrated monitoring approach in the Columbia River Basin
- The Core Team met every other week to plan and prepare for quarterly TMS meetings and make progress on tasks

Data Management and Mobilization

- Published the chapter “Standard Data Management Practices” in the 2nd edition of AFS’s [Standard Methods for Sampling North American Freshwater Fishes](#)
- Published the Salmon Data Mobilization paper in the North Pacific Anadromous Fish Commission bulletin
- Held fortnightly meetings with the Salmon Data Mobilization Group
 - Started preparing for the “Fishing for Clarity: Knowledge Modeling to Support Cross-Organizational Collaboration and Data Sharing About Salmon Escapement” Workshop at the WA-BC AFS Annual Meeting
- Formed the [Salmon Research and Monitoring Interest Group](#) within the Research Data Alliance (RDA)

Emerging Technologies Information Sessions

- Put together a collaborative ETIS Planning Team with tribal, federal, and state members from 7 different organizations (BPA, CRITFC, IDFG, ODFW, PSMFC, USGS, and WDFW) to help coordinate, organize, and moderate the 2025 Emerging Technologies Information Sessions Webinar Series
 - The ETIS Planning Team met eleven times: January – November 2024
- Created an ETIS project page on PNAMP.org
- Developed a distribution list for outreach and feedback
- Sent out a survey to past ETIS participants and received feedback from 24 individuals
 - Identified: ETIS topics of most interest, The best timing and structure for the webinar series
- Identified and secured a list of presenters for the webinar series
- Determined the number of presentations, the presentation lengths, and put together a draft schedule

Emerging Technologies Information Sessions (continued)

- Created a program with all the presentation titles and abstracts and updated the ETIS logo
- Sent a “Save the Date” to all past ETIS participants
- Created ETIS Events in PNAMP.org and opened up “Registration”
- Assigned Event Roles to ETIS Planning Committee members
- Sent out an Announcement in the November and December PNAMP Newsletters
- Developed and sent out speaker guidance to all presenters

Fish Monitoring Work Group

- On January 18, 2024, the full work group convened for updates on tasks and a Tech Talk from Ralph Lampman, the Lamprey Project Lead for Yakama Nation Fisheries. Ralph highlighted the extensive work of his lamprey research and restoration in his talk titled "Passage, Predation, Contamination and Supplementation: The Importance of Collaborative and Creative Research in Restoring Pacific Lamprey." ([meeting recording](#))
- Marika Dobos, Anadromous Staff Biologist at Idaho Department of Fish and Game, gave a presentation on the PNAMP Fish Monitoring Working Group's PIT Tag Array Data and Related Data Analyses task during the PTAGIS Workshop, held from January 30-February 1 in Stevenson, WA ([workshop presentations and posters here](#))
- Presented at the StreamNet Steering Committee meeting on February 20-21, 2024 and contributed updates on FMWG collaborative tasks PNAMP and StreamNet manage together ([meeting deck](#))
- The FMWG Core Team met monthly to plan and coordinate future work, discuss task progress, and develop agendas for full work group meetings
- On April 18, 2024, the full work group convened for updates on tasks and a Tech Talk from Andy Tranmer, a research professor for the Center for Ecohydraulics Research, Department of Civil and Environmental Engineering, at University of Idaho. He presented a new method for gathering temperature data, "A new approach to spatially characterize water temperature in wadable streams" ([Meeting recording](#))
- The Juvenile Density (Snorkel and Electrofishing) task was completed in April. Task Leads wrote a [task summary](#), and the [recommendations for standard field names](#) including the challenges in the development of the recommendations
- The annual FMWG survey was distributed. The feedback was positive with helpful suggestions on improving engagement and presentations that would be of interest to the community
- Presented Fish Monitoring Work Group updates at the September 16-17 meeting of the StreamNet Steering Committee in Montana ([meeting notes, deck](#))
- On October 17, 2024, the full work group convened for updates on tasks and a Tech Talk from Kasey Bliesner, Melody Feden, and Ian Tattam (ODFW and members of the [Middle Fork IMW Working Group](#)), "Flowing Forward: Key Insights from the Middle Fork John Day River Intensively Monitored Watershed 2024 Summary Report". Here is a [link to the summary](#). ([Meeting recording](#))
- In late 2024, the PNAMP Fish Monitoring Work Group began planning the PIT Tag Data and Analysis 2025 Webinar Series and convened meetings with interested presenters; series expected to begin in spring of 2025

Intensively Monitored Watershed Forum

- The 2024 River Restoration Northwest Symposium session entitled “Key Results from Intensively Monitored Watersheds: Incorporating Lessons Learned into Restoration Programs and Project Design” was held February 7 in Stevenson, WA. The session, co-organized by PNAMP, featured a poster by Kasey Bliesner (ODFW) and oral presentations by Robert Bilby (Science Advisory Panel, SRFB), Eli Asher (WA GSRO), and Stephen Bennett (Utah State University)
- Assisted Laura Weatherly (Fisheries and Oceans Canada) in organizing a virtual workshop entitled “Lessons Learned in Salmon Habitat Restoration from Intensively Monitored Watersheds of the Pacific Northwest.” The workshop, held March 26, focused on Washington state IMWs and featured presentations by Robert Bilby (Science Advisory Panel, SRFB), Correigh Greene (NOAA Fisheries) and Mike LeMoine (Skagit River System Cooperative), Joseph Anderson (WDFW), Stephen Bennett (Utah State University), Jamie Lamperth (WDFW) and Eli Asher (WA GSRO), and George Pess (NOAA Fisheries) and included two panel discussions
 - Workshop details and recoding here: <https://psf.ca/knowledge-exchange-workshop-intensively-monitored-watersheds/>
- Held seven planning group meetings between August and December. Three meetings focused on a 2025 Salmon Recovery Conference session proposal development. The session was accepted, but the conference was later canceled due to Washington State budget shortfall. Five meetings focused on goals and desired outcomes for an effectiveness monitoring visioning workshop

MonitoringResources.org

- Reviewed, provided feedback, and finalized 10 methods from January 1st – December 31st, 2024
- Reviewed, provided feedback, and finalized 14 protocols from January 1st – December 31st, 2024
- Updated metric and indicator categories and subcategories and added new metrics to the Monitoring Resources metric library per the request of CA DWR
 - New metrics - "Cyanobacteria: ABUNDANCE", "Cyanobacteria: PRESENCE/ABSENCE", "Cyanobacteria: TAXON", "Contaminants/Toxics/Pollutants: MICROCYSTIN", "Contaminants/Toxics/Pollutants: CYLINDROSPERMOPSIN", "Contaminants/Toxics/Pollutants: ANATOXIN", "Contaminants/Toxics/Pollutants: SAXITOXIN"
- Provided a one-hour [MonitoringResources.org Orientation for BPA CORs](#)
- Met with BPA staff to discuss MonitoringResources.org development progress in FY24 and prioritize future development
- Coordinated fortnightly meetings with ESA Sitka to discuss current and future development
- Coordinated meetings with BPA to ensure development was on schedule and appropriate fixes were being addressed
- Provided one-to-one guidance and assistance to MonitoringResources.org users at CA DWR, USGS, ODFW, Canada DFO, PSMFC, Nez Perce Tribe, Spokane Tribe, and NOAA
- Presented at the Idaho WA/BC AFS conference on connecting MonitoringResources.org to published data using large language models to preserve the data lifecycle
- Presented a MonitoringResources.org Tutorial for BPA CORs and [provided a recording](#) of the presentation
- Collaborated with PSMFC StreamNet and Canada DFO to support PNAMP’s ongoing work for refining Monitoring Resources to facilitate connecting methods/protocols/study plans to data sets in StreamNet systems and other systems
 - ESA delivered a report on this work with accomplishments, next steps, and suggestions
- Created and updated training modules and guidance documents including: the [Validating Data Collection Events](#) tutorial, [Protocols Training Module](#), and the [BPA Workflow Navigation and Guidance](#) document

MonitoringResources.org List of Development Released

- Finalized the development work on the MonitoringResources.org and MonitoringExplorer.org tune-up
 - Monitoring Explorer API – Configuration and Library Update
 - Monitoring Resources Site – Configuration and Library Update
- Finalized the development work reducing the duplication of effort in the BPA Workflow
 - Provided the ability to add existing protocols to the top of the Study Plan documentation in the BPA Workflow and give the option to autofill background and objectives
- Finalized development work on making metadata in MonitoringExplorer.org more findable and accessible
 - Updated Data Collection Event upload to allow selecting multiple data repositories
 - Updated Data Collection Event upload to allow selecting Study Plan Summary
 - Update automatic email sent replacing Monitoring Methods with Monitoring Resources
 - Hid organizations with no associated Monitoring Resources projects to eliminate unnecessary clutter
- Finalized the development work cleaning up the user interface (UI) and providing more seamless navigation
 - Add ability to see and add Collaborators on all entity pages
 - Add "My Collaborations" page under Portfolio
 - Add MathJax plugin to CKEditor4 for saving TeX and displaying mathematical symbols on Method detail
 - Add Data Repositories to Sample Design section of Study Plan Summary
 - Method to Metric Associations should be made via the Protocol instead of on the Method directly
 - Improved the look and function of the charts on the Validation of Actuals page
 - Updated the UI for Validating Data Collection Events
 - Allowed for the deletion of uploaded data collection events
 - Created additional help text and a guide to validate Data Collection Events
 - Removed the rich text editor "CKEditor" and replaced it with "Tiny MCE"
 - Rearranged nav menu in Protocol editor and provide help text
 - Updated Protocol editor to be more like BPA Workflow editor menu
 - Updated Rich Text Editor Bulleted Lists
- Finalized development work on creating a new map interface for Monitoring Explorer "[Explorer Map](#)"
 - Updated the filtering of the map with a Data Collection Event (DCE) table
 - Created a more dynamic metadata pop-up when selecting an individual DCE
 - Added shapefile download option
 - Added Layer Information pop-up to map layer shapes
 - Cutover from Mon. Explorer to Monitoring Resources Map

Stream Habitat Metric Integration

- Completed the data standard: *A Data Exchange Standard for Wadeable Stream Habitat Monitoring Data*. Techniques and Methods 16-B2. Prepared in cooperation with the U.S. Environmental Protection Agency, Bureau of Land Management, and the U.S. Forest Service. [Report \(3.3 MB pdf\)](#), [HTML](#), [XML](#)

Steering Committee Meeting Series_

- Set a date for the collaborative StreamNet Executive Committee and PNAMP Steering Committee meetings to be held November 6-7, 2024
- Organized and facilitated the May 28, 2024 PNAMP Steering Committee Meeting. The 2.5-hour virtual meeting agenda included: a partner spotlight on the Middle Fork John Day IMW Report from ODFW & OWEB, task updates, and the Work Plan for FY25
- Highly successful collaborative hybrid StreamNet Executive Committee and PNAMP Steering Committee Joint Sessions were held November 6-7, 2024, in Portland, OR ([event page](#))
 - [November 6th and 7th Notes](#)

Appendix B: Acronym Key

AFS	American Fisheries Society
AFS FITS	American Fisheries Society – Fisheries Information & Technology Section
AI	Artificial Intelligence
AIM	Assessment, Inventory, and Monitoring Strategy
AREMP	Aquatic and Riparian Effectiveness Monitoring Program
BLM	United States Bureau of Land Management
BPA	Bonneville Power Administration
CA DWR	California Department of Water Resources
CAP	Coordinated Assessments Partnership
CASC	Climate Change Adaptation Science Centers
CBF&W	Columbia Basin Fish and Wildlife Library
CDFW	California Department of Fish and Wildlife
CDI	USGS Community for Data Integration
CCT	Confederated Tribes of the Colville Reservation
CRITFC	Columbia River Intertribal Fish Commission
CRBRP	Columbia River Basin Restoration Program
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CTWSRO	Confederated Tribes of the Warm Springs Reservation of Oregon
DELVE	Data Explorer for Learning, Visualization, and Export tool
DES	Data Exchange Standard
DFO	Fisheries and Oceans Canada
DOI	United States Department of the Interior
EMA	Environmental Monitoring and Assessment Journal
EPA	United States Environmental Protection Agency
ESA	Environmental Science Associates (ESA Sitka)
ETIS	Emerging Technologies Information Sessions
FAIR	Findable, Accessible, Interoperable, and Reusable
FDAT	Fish Density Analysis Tool
FINS	Fisheries Inventory Systems
FMWG	Fish Monitoring Work Group
FRESC	Forest and Rangeland Ecosystem Science Center
GIS	Geographic Information System
HCAx	Hatchery Coordinated Assessments Exchange
HLI	High Level Indicator
Idaho OSC	Idaho Governor’s Office of Species Conservation
IDFG	Idaho Department of Fish and Game
IMW	Intensively Monitored Watershed



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Acronym Key Continued

IPTDS	Instream PIT Tag Detection System
ISRP	Independent Scientific Review Panel
IYS	International Year of the Salmon
MAFAC	Marine Fisheries Advisory Committee
NARS	National Aquatic Resources Surveys
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NOSA	Natural Origin Spawner Abundance
NPCC	Northwest Power and Conservation Council
NPCC SPI	Northwest Power and Conservation Council's Strategy Performance Indicators
NRCS	Natural Resources Conservation Service
NRSA	National Rivers & Streams Assessment
NWIFC	Northwest Indian Fisheries Commission
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OWEB	Oregon Watershed Enhancement Board
PIBO MP	PACFISH/INFISH Biological Opinion Monitoring Program
PNAMP	Pacific Northwest Aquatic Monitoring Partnership
PSMFC	Pacific States Marine Fisheries Commission
PTAGIS	PIT Tag Information System
QA/QC	Quality Assurance / Quality Control
QAPPs	Quality Assurance Project Plans
RSF	Remote Sensing Forum
SC	Steering Committee
SHMI	Stream Habitat Metric Integration
TEK	Traditional Ecological Knowledge
TMS	Toxics Monitoring Subgroup
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
WA ECY	Washington Department of Ecology
WA GSRO	Washington Governor's Salmon Recovery Office
WA SRFB	Washington Governor's Salmon Recovery Funding Board
WDFW	Washington Department of Fish and Wildlife
YN	Confederated Tribes and Bands of the Yakama Nation

Appendix C: Celebrating 20 years of PNAMP Steering Committee Members!

(as of April 2025; F = PNAMP Founder)



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Jamie Anthony	Ken Dzinbal	Ken MacDonald	Dan Rawding
Jessica Archer	Mike Edmondson	Greer Maier	Jeff Rodgers
John Arterburn	Ken Fetcho	Timmie Mandish	Phil Roger (F)
Leslie Bach	Henry Franzoni	Jonathan McCloud	Scott Rumsey
Katie Barnas	Sean Gallagher	Frank McCormick	Phil Sandstrom
Aaron Borinsenko	Jim Geiselman (F)	Jeff McLaughlin	Bruce Schmidt (F)
Mike Brown	Pete Hassemer	Glenn Merritt	Russell Scranton
Dave Busch (F)	Gretchen Hayslip	Stephanie Miller	Kevin Shaffer
Steve Butkus (F)	Lance Hebdon	Mitch Mumma	Greg Sieglitz (F)
John Cassinelli	Chris Hirsch	Erik Neatherlin	John Stein (F)
Dave Clugston	Tom Iverson	Michael Newsom (F)	Stewart Toschach
Scott Collyard	Bruce Jones	Paul Ocker (F)	Jude Trapani
Tim Copeland	Chris Jordan	Sheryn Olson	Linda Ulmer (F)
Brodie Cox	Denise Kelsey	George Onwumere	Steve Waste (F)
Bruce Crawford (F)	Kim Kratz	Patty O'Toole	Chris Wheaton
Bob Cusimano	Ed Krynak	Peter Paquet	Tami Wilkerson
Bruce Davies (F)	Lisa Kusnierz	Zach Penney	Frank Wilshusen
Renee Davis	Jody Lando	Rock Peters	Keith Wolf (F)
Al Doelker (F)	Steve Lanigan (F)	Stacy Polkowske	Dave Woodson
Scott Donahue	Steve Leider (F)	Stephanie Powers	Frank Young (F)
Scott Downie (F)	Nancy Leonard	Dave Powers (F)	Ben Zelinsky
Keith Dublanica	Scott Lightcap	Mark Raggon	Christopher Zell

Appendix D: PNAMP 20 Year Retrospective Report

Authored by: Steve Waste



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Pacific Northwest Aquatic Monitoring Partnership: A Retrospective

Regional Context – In the beginning...there were many regional scale planning documents in the Pacific Northwest that incorporated “adaptive management” as a means for evolving the program and advancing toward long range objectives. Yet few of them made more than a generalized reference to the role of monitoring as the mechanism for gathering data to support evaluation, learning, and re-prioritization. For the adaptive management approach to bear fruit, it must include a monitoring component that:

- Provides the data necessary for evaluating and re-directing restoration and management priorities at a programmatic scale
- Functions as a sentinel that provides early warning signals of unanticipated changes in the environment

Origins of PNAMP – I first met Jim Geiselman when I joined BPA in March of 2001. We both worked on developing the Implementation Plan for the Biological Opinion for the FCRPS that landed in December of 2000. After reviewing the RPAs from NMFS for the sections of the plan for each of the Four-Hs (hydropower, harvest, hatcheries, and habitat) I noticed that each of them called for a separate monitoring plan to be developed as stand-alone components. We discussed this and agreed that this approach would preclude any opportunity to quantify cumulative impacts. We brought this concern forward to F&W Program Director Sarah McNary and she agreed that a unified approach to monitoring made more sense and then tasked Jim with developing such an approach. In 2003, I joined the Northwest Power and Conservation Council and was shown a short paragraph in an Appendix to the F&W Plan that called for the Council to initiate the development of a regional monitoring forum, and I was charged with this task. I called Jim and said that we had the opportunity to work together again, and we proceeded to shop around for any ongoing monitoring efforts that could provide a foundation for our joint venture.

Finding Kindred Spirits – Soon after, we stumbled upon the Aquatic and Riparian Effectiveness Monitoring Program (AREMP) of the US Forest Service (Steve Lanigan), which the US Forest Service that was launched as an outcome of the Presidents’ Forest Plan to implement long-range monitoring to inform the management of the national forests of the Pacific Northwest. The AREMP Plan was developed by collaborators from EPA (Phil Larsen), USGS (Dave Busch), NOAA (Mike Tehan, Kim Kratz) under the purview of the Regional Ecosystem Office (REO). Jen Bayer happened to be doing a detail to the REO in Dave Busch’s position and was tasked with exploring partnerships as part of a yearlong leadership program. Turns out Jen was in the right place at the right time to help bring Steve Lanigan’s NW Forest Plan focused work to Steve, Jim, and others with Columbia basin interests. Consequently, the AREMP approach became the model for our broader effort both in terms of “how” to collect data, and with “whom” to collaborate. We then convened some start-up meetings with representatives from these same entities and invited representatives from the tribes e.g., Phil Roger (Columbia River Inter-Tribal Fish Commission), and Frank Young (Columbia Basin Fish and Wildlife Authority) and the states e.g., Steve Leider and Bruce Crawford (Washington Governors Salmon Recovery Office aka GSRO), and Greg Sieglitz (Oregon Watershed Enhancement Board aka OWEB). Jen met with every executive of these and other prospective partners, they worked together and developed a Charter, and away we went.

An Idea Whose Time Had Come – At the time, many other monitoring efforts of tribal, federal, and state entities were also ongoing, but compartmentalized from one another with a narrow focus of collecting a particular type of data, or multiple types of data within a particular geographical area. The best early example of such efforts was the GSRO’s “State of the Salmon in Watersheds,” a biennial evaluation of biological, physical, and socioeconomic data gathered to inform the recovery of listed salmonids in Washington State.

Many of the practitioners managing these monitoring efforts recognized the value that could be gained from developing the capacity to associate the different types of data on the numbers and attributes of fish, the characteristics of fish habitat and aspects of water quality. However, the region lacked a forum for brokering collaboration across a broad set of partners that could address the inefficiencies resulting from the existing fragmentation of these programs. In sum, there was a lot of discrete monitoring efforts, and mandates for a regional forum, but no one entity designated or funded to convene such a forum. Several individuals involved with these programs and initiatives recognized that they shared mutual interests in developing:

- Common protocols for data collection to foster comparability and support the “scaling-up” of geographic data
- Tools for managing and archiving data in a form accessible for analytical manipulationA common lexicon and naming conventions
- A durable administrative structure to support collaboration into the future since the value of monitoring data increases as the time series lengthens

So it was out of necessity, that those who would become the “Pioneers of PNAMP” found each other, converged, and developed a shared vision of how valuable it would be to accomplish even the simple sharing of data across jurisdictional and programmatic boundaries. Although this clear and compelling goal brought the participants together, during the first few years of PNAMP, the early members grappled with several fracture lines that slowed early progress. These divides included: State/federal; Tribal/various governmental entities; ESA/non-ESA listed species; and proprietary data/publicly available data. Many spirited discussions led to the resolution of these issues over time and helped forge the diverse members into an active and engaged community of practice.

This was very significant, considering the decades of litigation over salmonid allocation issues in the Pacific Northwest that arose from the Boldt Decision in 1975. While many entities have competed for a bigger slice of the allocation pie, PNAMP has fostered collaborative efforts to learn how to better grow the pie itself, by sharing information and improving the effectiveness of restoration and recovery actions within the Pacific Northwest.

During this phase, PNAMP was much like a support group for monitoring practitioners who facing common technical challenges, emerged from the shadows, and gathered around the light and warmth of shared goals. The spirit of collaboration has in part been sustained by the fact that the group holds no organic authority or control over its members. While signatories to the PNAMP Charter agree to abide by the guidance and precepts that PNAMP develops collectively, they are only bound to do so within the constraints of their own parent entity. In fact, the lack of clear authority and the lack of control by a single entity have given all the members an equal voice and stake in the outcomes.

At the time, the Columbia Basin Fish and Wildlife Authority had a similar collaboration effort among the Federal, state, tribal fisheries managers. The Collaborative Systemwide Monitoring and Evaluation Project (CSMEP) was developing common evaluation frameworks for each of the H's impacting salmon. The NPCC's adoption of their 2009 F&W Program identified the need for an Anadromous Salmonid Monitoring Strategy (ASMS) as part of their Monitoring Evaluation Research and Reporting Plan (MERR). A regional workshop was convened by Bonneville, CBFWA, NOAA and NPCC during October 20-21, 2009 and November 3-5, 2009 in Skamania Washington to develop a Basin Coordinated Anadromous Salmon Monitoring Strategy. The purpose of the Regional Workshop was to reach agreement among participants on an efficient and effective framework and project specific implementation strategy for anadromous salmon and steelhead monitoring to assess (1) Viable Salmonid Population (VSP) criteria, (2) habitat effectiveness and (3) hatchery effectiveness in the Columbia Basin. The agreed-upon framework and strategy was to address the needs of the NPCC's Fish and Wildlife Program, meet the needs of the Federal Columbia River Power System (FCRPS) BiOp (at a minimum), and contribute to the monitoring needs of ESA recovery planning and other regional fisheries management needs.

This ASMS became the impetus for many spinoff programs including the Coordinated Assessments Partnership project coordinated with StreamNet, coordinating Intensively Monitored Watersheds across the Pacific Northwest through NOAA and many individual states and tribes, Monitoring Resources, and many others.

Today – Now, 20 years later, PNAMP is a well-established community of practice that provides an example of how scientists, managers, and policy makers can solve their own problems from the ground up. During these decades, many former members of the PNAMP Steering Committee have moved on and up within their parent entities and have continued to advance the collaborative spirit at the heart of PNAMP. PNAMP has provided many resource managers with the opportunity to grow their professional network while working to achieve the shared objectives of monitoring to inform and guide future restoration and recovery actions.

Today PNAMP is the most sophisticated and durable multi-entity collaboration within the Columbia River Basin, as reflected in the many tools, products, and services available on the PNAMP website. The success of the collaborative approach by which PNAMP operates has attracted interest from other large scale ecological initiatives in need of technical support for developing monitoring infrastructure including the North American Bat Monitoring Program (USFS), the Monarch Butterflies Joint Venture (USFS). The success of PNAMP arises directly from the vision, leadership, and diligence of the intrepid Jen Bayer and her creative, dedicated, and loyal team members.

Threshold of a New Frontier – When PNAMP began, there was a strong interest in developing practical ways to quantify increases in salmonid life stage productivity in locations hosting habitat restoration projects. As time has passed, we came to learn that quantifying benefits to fish conferred by on-the-ground habitat restoration projects may be masked or confounded by the effects of what we called “out of basin impacts” arising from climate change, toxics, and invasive species, impacts that we now call “landscape-scale stressors.”

PNAMP has recognized the value of harnessing the capacities that new technologies can bring to bear on monitoring these landscape scale challenges to salmonid habitats. In response, PNAMP has sponsored several workshops to help its members adopt new tools to improve their monitoring programs. The new technologies that have become available have increased our capacity to collect data in terms of economic efficiency as well as precision and scale e.g. smaller cheaper fish tags, the use of Unmanned Aerial Vehicles, remote sensing information from satellite images, and advances in data sharing technology like AI, Machine Learning. Thus, we find ourselves poised on the threshold of developing the “Next Generation” of effectiveness monitoring.