PNAMP 2022 Annual Report

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pacific northwest aquatic monitoring partnership

Table of Contents

Executive Summary

2022 was a year that demanded flexibility from most of us as individuals and in our collaborations. For PNAMP, that meant the excitement of returning to in-person meetings and conferences and the challenge of supporting hybrid events so that participation was inclusive regardless of how participants engaged. PNAMP strives to have equal experiences for those in person and participating remotely, but this can be difficult -- we are essentially running two simultaneous meetings! However, we are confident the effort is worthwhile to create an equitable model of engagement and encourage a variety of viewpoints, not constrained by travel expenses or schedules.

That said, we do want to make a pitch for in-person interactions! We heard from several participants in the 2022 Emerging Technologies Information Sessions (co-hosted by PNAMP and StreamNet in November 2022) that new collaborations were initiated due to spontaneous conversation following presentations. We hope there was a lot of that happening among the people who attended the event (101 in person and 82 virtually). We thank all the presenters and participants who made this a successful experience.

Other highlights from 2022 include the Fish Monitoring Work Group's progress on a number of tasks, many of which are related to more efficient sharing of data and information. This work is possible in part due to our growing collaboration with StreamNet. We believe we have landed on efficient ways for partners to engage in the right task at the right time, as we bring in biologists and data managers on to tasks as needed. Another great example of collaboration with StreamNet is the HCAX Project to develop hatchery high level indicators, where we have developed a data exchange standard for hatchery information that will allow data to flow to the CAP HLI Data Portal in 2023.

Another highlight for PNAMP in 2022 is the IMW Forum's synthesis report "Management Implications from Pacific Northwest Intensively Monitored Watersheds," which compiled information from 13 IMWs to provide quantifiable evidence of how restoration efforts such as the placement of large woody debris, riparian restoration, barrier removal, and beaver dam analogs have led to improvements in watershed health, aquatic habitat, and the viability of salmon and steelhead. These findings help inform future restoration research, management, and practices and we are excited to help IMW practitioners develop and share core messages that reflect collective findings across the IMWs.

I thank everyone for their contributions that allow PNAMP to continue to grow and address partners' needs. This report represents the work of hundreds of individuals contributing thousands of hours to activities facilitated by PNAMP staff. You can find more details about each project in this report (pages 5-12) 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.

Sincerely,

Jen Bayer

PNAMP Coordinator, U.S. Geological Survey

Photo: Jen Bayer

About PNAMP – Coordination Team and Activities

The PNAMP Coordination Team dedicates their time and energy to supporting the collaboration of many partners and participants each year. 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 2022, PNAMP appreciated additional staff support from Rachael Paul-Wilson (USGS), who assisted with our work to better integrate content from MonitoringResources.org with PSMFC's StreamNet data systems. The Stream Habitat Metric Integration Project greatly benefited from Erin Dlabola (PSMFC), who was integral in the development of multiple products from this project.

Also in 2022, we said farewell to and thanked Rebecca Scully for eight years of dedication and service to PNAMP. In addition to being a "jill of all trades", Becca helped refine, maintain, and lead work to evolve MonitoringResources.org. We wish Becca well in her new position as the Pacific Seabird Program Data Manager for the US Fish and Wildlife Service.

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. In addition to PNAMP.org, the Coordination Team manages the development of MonitoringResources.org.

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

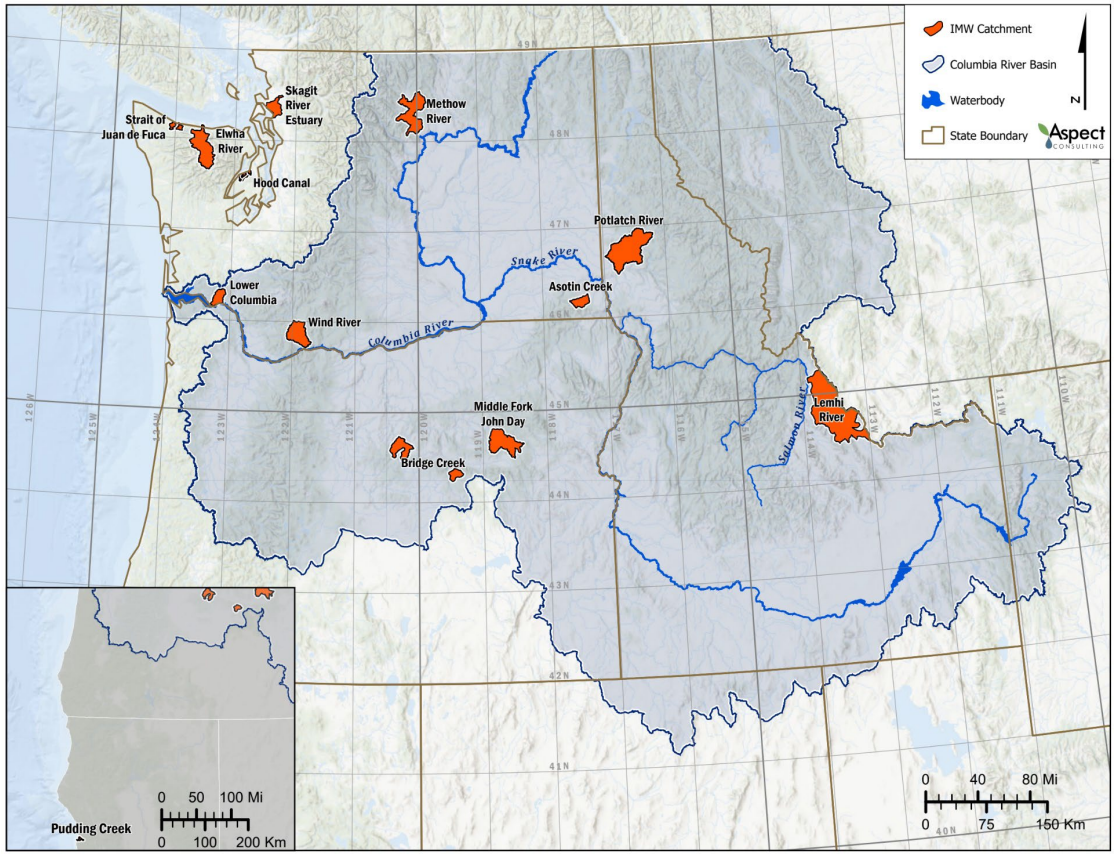
The PNAMP Coordination Team is employed by the
U.S. Geological Survey (USGS), Northwest- Pacific Islands Region.
Jennifer Bayer - PNAMP Coordinator
Amy Puls - Deputy Coordinator
Sam Cimino - Staff Biologist
Megan Dethloff - Staff Biologist

Photo: Amy Puls

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 2022, we completed a collaborative effort with IMW program leads from 13 IMWs across the Pacific Northwest to identify lessons learned to date and provide an initial indication of the management implications of these studies. The resulting synthesis report identifies a set of 26 core messages that reflect collective findings across the IMWs. The core messages are grouped into three categories: Habitat and Fish Responses, Management and Coordination of Restoration Implementation, and Current Research Priorities and Future Opportunities. These messages can be used to help identify future research opportunities and be used to improve the effectiveness of habitat restoration and salmon recovery programs.



The report findings were shared via the follow outlets:

- Presented findings at Salish Sea Ecosystem Conference (April 2022)
- Shared with WA Salmon Recovery Funding Board to inform funding decisions (June 2022)
- Shared with Columbia Basin Partnership while discussing All-H threats (June 2022)
- Summary included in the Columbia Basin Bulletin (July 2022)
- Salish Sea Currents magazine article (August 2022)
- PNAMP IMW Forum meeting Sept 13, 2022 shared findings and discussed recommendations for future collaborative work that builds on the synthesis effort
- WA GSRO State of the Salmon IMW story map (October 2022)

Learn more: PNAMP Project Page; 2022 Accomplishments

Contact: Amy Puls (apuls@usgs.gov)

Left: Location of the 13 IMWs that participated in the development of the synthesis report.

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

The Coordinated Assessments Partnership (CAP) made great strides towards regional sharing of hatchery fish high level indicators (HLIs) in 2022. We are grateful for the excellent work of the core data team, who drafted a data exchange standard (DES) from the Controlled Vocabulary_v1.0 created by the HCAX Biologist Work Group last year. In November, we hosted the HCAX Project Workshop 2 to review and vet the draft DES. StreamNet staff used feedback from this workshop to improve the DES and then initiate pilot testing of the standard. This is the first phase of implementation of this new data flow to the CAP data system. We thank the 60 participants representing 24 organizations from around the region for providing input throughout the project. To learn more, access HCAX meeting documents on the Hatchery Data Sharing (HCAX) project page and see the draft DES on the StreamNet website here.

In order to share our experiences and learn from others, CAP organized a special symposium, titled **"***Bringing it all together: data integration for fisheries research and management success,*" at the annual meeting of the American Fisheries Society in August 2022 emphasizing successful data integration approaches to integrate fisheries and aquatic data across different boundaries and geographic scales. We were thrilled to create an opportunity to learn across projects and programs.

The CAP continues to use the PNAMP Fish Monitoring Work Group to tackle fish-related data sharing needs as identified by CAP and PNAMP partners. We value the collaboration of biologists and data managers from around the region working to devise solutions that yield improved access to data and information necessary for decision making. See the Fish Monitoring Work Group section of this report for more details of progress from 2022.

Learn more PNAMP Project Page; CAP 2022 Winter Newsletter; CAP 2022 Summer Newsletter; 2022 Accomplishments

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

Photo: USFWS

Stream Habitat Metric Integration Project

Sharing of "habitat data" has been of interest to PNAMP partners since PNAMP was formed in 2004. Our latest effort – the Stream Habitat Metric Integration Project – has focused on integration of data resulting from four large scale monitoring programs (see partners below). In this work, we have helped partners evaluate their data management strategies against the FAIR (**F**indable, **A**ccessible, **I**nteroperable, and **R**eusable) principles to inform recommendations for improvements in these and other programs that collect similar types of data.

In 2022, the Stream Habitat Metric Integration Project built upon the previously completed controlled vocabulary for a subset of metrics that yield interoperable data across the four participating programs. Using this controlled vocabulary, data exchange specifications were devised, and code was written to access the source datasets and create a new integrated dataset. A report is currently under development that will describe the structure and fields in the exchange specifications; document the code used to create the integration; and describe the methods used to cross-walk terms and definitions across the four programs.

In 2023, we anticipate publication of a manuscript describing lessons learned in the project and making recommendations for partners to consider. We will also publish the methods report, integrated dataset, and code. The project team is currently working on publications using the new integrated dataset and PNAMP will host outreach with other partners later in 2023.

Learn more PNAMP Project Page; 2022 Accomplishments

Contact: Jen Bayer (jbayer@usgs.gov)

Stream Habitat Metric Integration Project Partners

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

Photo: Jen Bayer

Fish Monitoring Work Group

The purpose of the PNAMP Fish Monitoring Work Group (FMWG) is to support collaboration, communication, and coordination among fish monitoring practitioners for effective monitoring and assessment methods and efficient data sharing.

In 2022, the FMWG convened in January, April, and October. These meetings included updates from FMWG task teams and a "tech talk" showcasing work from regional experts. The October meeting highlighted the completed tasks and products of 2022 as well as active tasks. Task Team Leads, with support from PNAMP staff, continued these tasks:

- Fish Population Names and GIS Boundaries led by Van Hare (PSMFC) and Evan Brown (IDFG) will develop a standard for spatial boundaries and naming conventions referring to regional fish units.
- Carrying Capacity Standards led by Morgan Bond (NOAA), Tim Copeland (IDFG), and Russ Scranton (BPA) are focusing on how to better document and share carrying capacity products. A best practices document is expected in 2023.
- Juvenile Density (Snorkel & Electrofishing) led by Kasey Bliesner (ODFW) and Russ Scranton (BPA) are creating a data crosswalk between existing fish density data collection efforts and will propose a standard vocabulary for consistent documentation.
- Rotary Screw Trap (RST) Data Collection led by Polly Gibson (ODFW), Kasey Bliesner (ODFW), Marika Dobos (IDFG), and Russ Scranton (BPA) are developing data collection recommendations for rotary screw trapping efforts to support a variety of analyses.
- PIT Array and Related PIT Tag Analysis led by Marika Dobos (IDFG) and Russ Scranton (BPA) was introduced during the October FMWG meeting to gather interest and obtain focus area priorities. The task is in development and will continue to evolve during 2023.

Tasks Completed in 2022

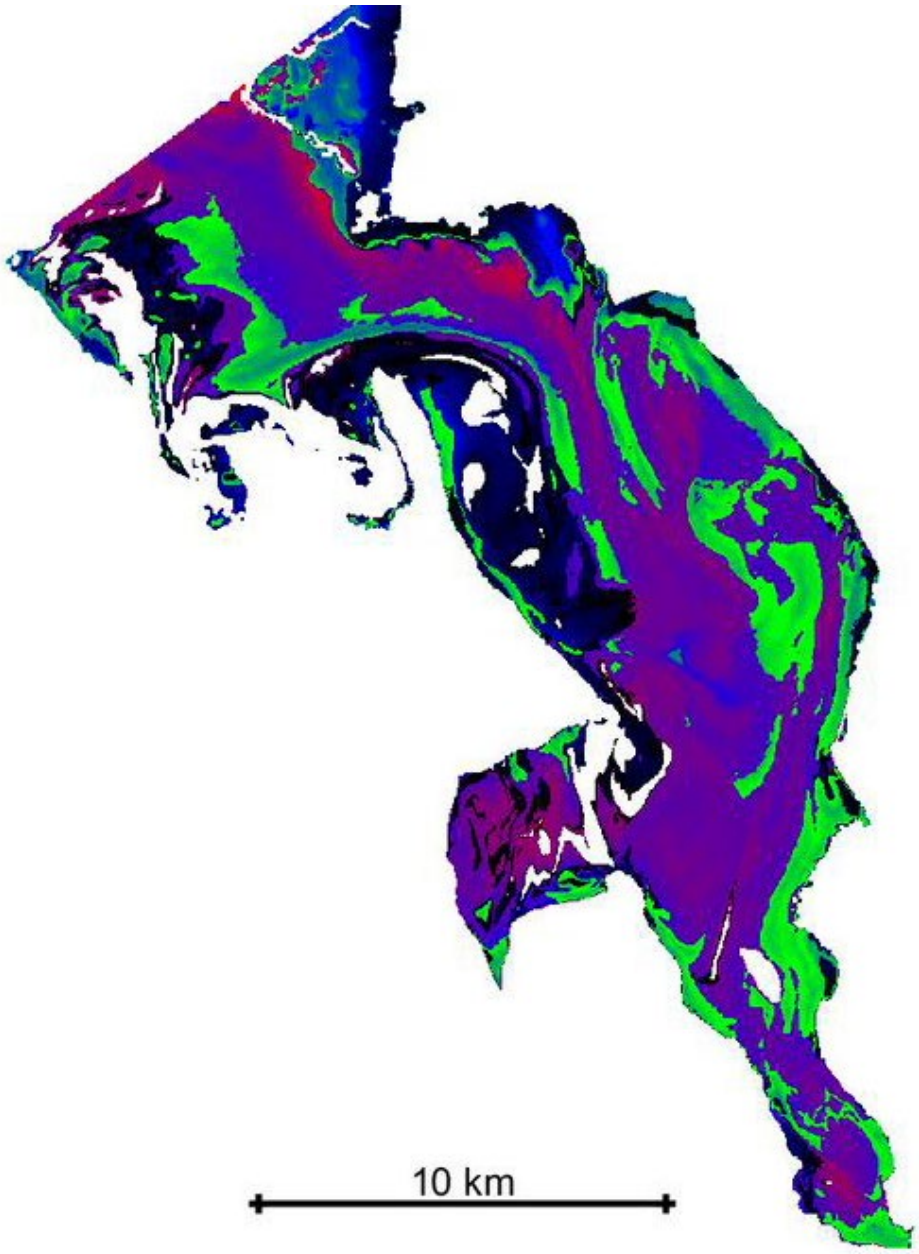
- Data Display Implementation led by Nancy Leonard (PSMFC) and Lara Erikson (PSMFC) refined previous recommendations to StreamNet from the FMWG 2021 Data Display task, which focused on what content and how to display it to implement the recommendations pertaining to Populations without HLIs and Superpopulations and other groupings. The task was completed in September.
- MAFAC and NPCC SPI led by Kris Homel (NPCC) and Lara Erikson (PSMFC) drafted a summary describing data accessible from StreamNet, CAP Fish HLIs, and other sources that may inform NPCC's SPI reporting tool. A summary of progress to date was completed in October.

Current task teams will continue progress in 2023 with the goal of accomplishing proposed products and future tasks will begin as priorities are established.

Learn more PNAMP Project Page; 2022 Accomplishments

Contact: Meg Dethloff (mdethloff@usgs.gov)

Photo: Meg Dethloff



Algal distribution in Upper Klamath Lake, OR from hyperspectral data collected by the DESIS camera on the International Space Station.
Presented by K. Carpenter (USGS) at the March 2022 RSF meeting.

Remote Sensing Forum

The PNAMP Remote Sensing Forum continued to meet in 2022 with the following goals in mind:

- 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 typically meets quarterly to share announcements and relevant news, and each meeting features two presentations from subject matter experts on remote sensing topics of interest. Recordings of past presentations can be found in the Remote Sensing Forum playlist on PNAMP's YouTube channel.

In 2022, Remote Sensing Forum leads also organized and hosted "Fisheries Science from the Sky", a session focused on remote sensing techniques and applications at the 2022 annual Oregon AFS meeting, as well as 11 remote sensing presentations across three sessions at the Emerging Technologies Information Sessions Hybrid Event (see below in this report for additional details on ETIS).

Learn more PNAMP Project Page; 2022 Accomplishments

Contacts: Amy Puls (apuls@usgs.gov) and Lauren Burns (lburns@ecofishresearch.com).

MonitoringResources.org Outreach

The Monitoring Resources team provided extensive outreach to project sponsors documenting and editing content in MonitoringResources.org. The documentation of metadata in MonitoringResources.org aims to promote FAIR (Findable, Accessible, Interoperable, and Reusable) data principles and helps fulfill BPA contracting needs. The Monitoring Resources team provided outreach via:

- One-to-one webinar project reviews with project sponsors within the Pacific Northwest
- Updating training modules and training videos
- A one-hour MonitoringResources.org Orientation presentation that has since been recorded and made available on multiple platforms
- Reaching out to project sponsors to finalize products within MonitoringResources.org and assisting with questions and concerns
- Participating in discussions with other PNAMP work groups and projects like the Stream Habitat Metric Integration project
- Coordinating with StreamNet to scope improvements on linking coordinated assessment project numbers and Monitoring Resources Study Plan URLs to the DES for the Data Store

In addition to our broader MonitoringResources.org outreach, we provided more specific outreach to California Department of Water Resource's (CA DWR) subject matter experts using the DELVE data repository. Specific support in this new collaboration included:

- Creating a terminology cross-walk
- Providing a tailored MonitoringResources.org Orientation for DELVE Subject Matter Experts and CA DWR
- Coordinated Bi-weekly meetings with CA DWR subject matter experts to help document their metadata in Monitoring Resources

The support of our partners who share our vision for better documentation and information sharing is the bedrock for the ongoing success of MonitoringResources.org

Learn more PNAMP Project Page; 2022 Accomplishments

Contact: Sam Cimino (scimino@usgs.gov)

Photo: Ken Tiffan USGS


Photo: Sam Cimino

MonitoringResources.org Development

The Monitoring Resources development team continually focuses on streamlining and improving MonitoringResources.org for both documenting and discovering monitoring metadata. Changes to the tools are based on feedback from contract managers, research and monitoring subject matter experts, policy advisors, review panels, and data consumers.

In 2022, the Study Plan Summary, a metadata discovery and organizational tool, was completed. The Study Plan Summary rolls up monitoring information from the study plan, protocol, methods, and sample design(s) onto one easy to read webpage. The implementation of the Study Plan Summary prompted the MonitoringResources.org development team to focus efforts on creating more continuous metadata documentation. The product of our efforts is a new user interface called the *BPA Workflow*, which will allow users to create all the documentation needed to fulfill BPA contracting requirements (a study plan, its associated protocol, and the associated sample designs) all in one seamless workflow. The BPA Workflow is expected to be completed in early 2023.

Additionally, we:

- Updated the MonitoringResources.org homepage design and aesthetics which included updating and simplifying the Home menu
- Automated the archival of unfinished and expired content (methods, protocols, study plans, sample designs) in MonitoringResources.org with “Active” tabs on content grids to declutter metadata discovery and promote finalized products
- Updated the search functionality and speed and updated the Data Collection Event pop-up box on the MonitoringExplorer.org map
- Uploaded thousands of data collection events from programs within the Stream Habitat Metric Integration project (AREMP, PIBO, and AIM Lotic) to the MonitoringExplorer.org beta map

PNAMP believes the success of this toolset relies on the input and participation of users. In 2023, we will continue to gather feedback from users to help prioritize future development.

Learn more: PNAMP Project Page; 2022 Accomplishments

Contact: Sam Cimino (scimino@usgs.gov)

Emerging Technologies Information Sessions

In 2022, the Emerging Technologies Information Sessions hybrid event brought 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. The event, held November 14-16, 2022, in Hood River, Oregon, was organized and implemented by StreamNet and PNAMP staff. Over 180 people from 69 organizations attended the event; 101 attended in person and 82 attended virtually. Attendees mainly came from Pacific Northwest locations, but just over 15% came from more far-flung places including Canada, Belgium, and Taiwan.

The event featured three interesting and inspiring keynote addresses. Mark Saunders from the North Pacific Anadromous Fish Commission opened the event with his presentation *The High-Tech Future of Salmon Resource Management: Marvel or Muddle?*. Samantha Chisholm-Hatfield from Oregon State University kicked off the second day with her presentation on *Traditional Ecological Knowledge (TEK)*. Leila Kaneda from SightLine Applications gave the final keynote entitled *Machine Learning - Your New Best Friend.*

The event featured an additional 49 presentations covering a variety of science advancing compelling topics like genetics, remote sensing, electronic reporting, data management, data visualization, AI/machine learning, and predictive modeling. You can view the full list of presentations here.

Post-event feedback was very positive with the vast majority of respondents saying that the event lived up to expectations and provided valuable information applicable to their work. Comments included “Lots of great presentations and others with shared interests. Well done!” and “As a recent grad and fisheries biologist this was great for expanding my knowledge on some game changing tech! It would be awesome to see ETIS make it to the east coast.” And we’ve heard from multiple people that attended in person that hallway conversations and networking during breaks yielded several new collaborations!

Generous donations from sponsors helped keep the cost of attendance very reasonable. Thank you again to the Emerging Technologies Information Sessions 2022 sponsors: BioAnalysts, eDNA Collaborative, Environmental Science Associates (ESA), Foresight Drone Services, Merck, Northwest Power and Conservation Council, Oregon AFS, Oregon Watershed Enhancement Board, and Vericatch.

Learn more: PNAMP Project Page; 2022 Accomplishments

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


Photo: Sam Cimino

Outreach & Communication

The **Announcements** and upcoming **Events** lists are two of the most frequented pages on PNAMP.org. And in recent years, we've made these lists even more accessible by displaying their most recent content on the PNAMP.org homepage. However, our outreach and communication efforts go far beyond just announcements and upcoming events. We also provide a monthly newsletter that reaches over 1,200 subscribers, we post content to social media, we produce fact sheets which describe PNAMP and individual projects, and we provide presentations to interested groups and organizations. In addition, we're continuously trying to grow and build our community by showcasing new tools and techniques, sharing pertinent documents and publications, and reaching out to potential participants.

PNAMP.org is the primary outlet for our coordination staff to communicate with the aquatic monitoring community. The website is regularly updated to provide information on projects, events from around the region, and relevant announcements to reflect the latest news and resources. PNAMP.org promotes project participation by hosting meeting materials and background information for all PNAMP projects and events.

It's not always easy or feasible to attend meetings, workshops, and other events in-person; that's why PNAMP staff has been diligent in posting content on PNAMP's YouTube channel. In the past year, PNAMP recorded and posted 64 videos to our YouTube channel that have been viewed over 1,900 times. These videos along with our growing twitter presence @PNAMPmonitoring has helped us reach out to new community members.

PNAMP also provides outreach and communication through our monthly newsletter. The PNAMP newsletter provides a list of upcoming events, highlights the latest news from PNAMP and our partners (we greatly appreciate contributions from our partners), recaps past PNAMP and regional events, and provides updates on MonitoringResources.org. We regularly hear from readers about how the newsletter helps them stay informed on events and news from around the Pacific Northwest.

Learn more: PNAMP Contact Us; 2022 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 Steering Committee gained some new faces and wished fellow collaborators best wishes into their future pursuits during 2022. We would like to thank Mitch Mumma (US Bureau of Reclamation), Scott Lightcap (US Bureau of Land Management), Stephanie Page (Oregon Watershed Enhancement Board), and Aaron Borisenko (Oregon Department of Environmental Quality) for their participation in PNAMP over the years. With loss comes gain, as we welcomed Jeff McLaughlin (US Bureau of Reclamation), Lisa Kusnierz (US Enviromental Protection Agency), and John Cassinelli (Idaho Department of Fish and Game) to the team.

In 2022, the SC met virtually in February; in March we held a virtual climate change work planning meeting with a presentation from Nicole DeCrappeo, director for Northwest and North Central Climate Change Adaptation Science Centers (CASC), on her work with the CASCs. In May, we convened virtually to plan 2023 activities. We capped off the 2022 SC series in September, by holding a two-day hybrid joint session with the StreamNet Executive Committee. We planned these two meetings together to facilitate collaboration for our overlapping participants and other interested parties. Mike Edmondson, Idaho Governor's Office of Species Conservation administrator, presented information about the Columbia Basin Collaborative.

Learn more: PNAMP Steering Committee

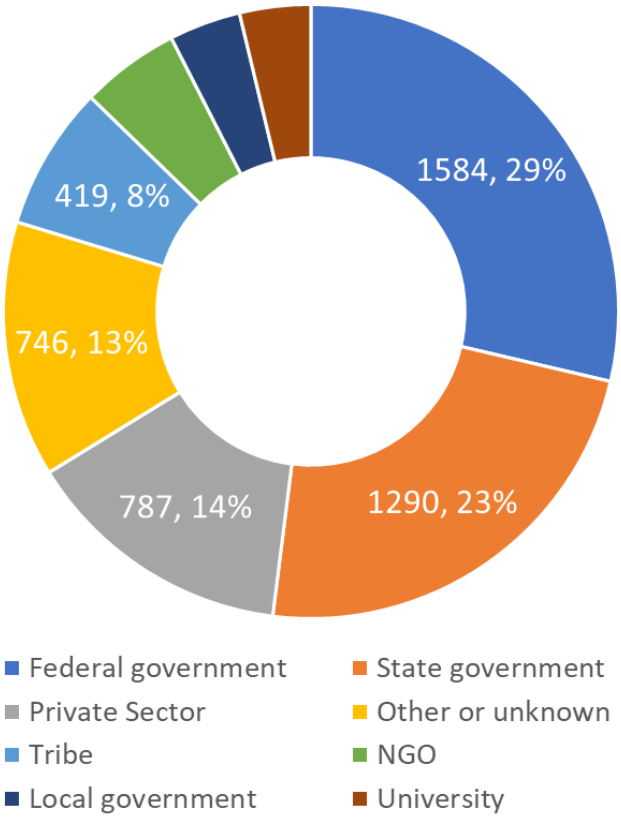
Contact: Meg Dethloff (mdethloff@usgs.gov)

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 2022, we calculated 5,528 hours of meeting participation from over 620 people representing at least 119 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: Hybrid meeting tools helped keep us connected in 2022.
Left: Estimated hours contributed to PNAMP meetings for 2022 grouped by entity type. Graph labels represent number of hours and percent of total.

Acknowledgements

Thank you to our 2022 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, John Cassinelli*
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: Stephanie Powers, Ken Fetcho*
Pacific States Marine Fisheries Commission: Nancy Leonard
US Army Corps of Engineers: Vacant
US Bureau of Land Management: Mike Brown, Scott Lightcap*
US Bureau of Reclamation: Mitch Mumma, Jeff McLaughlin
US Environmental Protection Agency: Lisa Kusnierz
USDA Forest Service: Christine Hirsch
US Geological Survey: Steve Waste
Washington Department of Fish and Wildlife: Dan Rawding, Brodie Cox*
Washington State Department of Ecology: Scott Collyard
Washington Governor's Salmon Recovery Office: Keith Dublanica
Yakama Nation Fisheries Program: Tom Iverson+

* Alternate Representatives , + Courtesy Representatives

Appendix A: PNAMP 2022 Accomplishments

pacific northwest aquatic monitoring partnership

Coordinated Assessments Partnership & HCAX Project

- HCAX Project Workshop 2 November 10, 2022. This workshop accomplished our objective to review the draft HCAX Data Exchange Standard (DES) with all interested parties. This step in the project enables the pilot testing phase of implementation data exchange for hatchery indicators with the Coordinated Assessments data system Link to Workshop Materials
    - HCAX ad hoc Core Data Team has met multiple times and presented questions to the Biologist Workgroup necessary to clarify the Controlled Vocabulary
    - Outreach presentations to NOAA to share update on HCAX project and learn more about NOAA's hatchery information needs. Two events: May 26, 2022 with Rob Markle and July 8, 2022 with Allyson Purcell and staff
- Outreach presentation to Salish Sea/Southern British Columbia PIT Tag data management framework meeting 23 June 2022, invited by Department of Fisheries and Oceans Canada

Coordination and Communication

- Completed Monthly Newsletters; see Newsletters on PNAMP.org
- 2021 Annual Report
- Coordinated with StreamNet to sponsor the 2022 Emerging Technologies Information Sessions
- Participated in the FINS Steering Committee meeting
- Provided briefing for Mark Saunders, Director of the International Year of the Salmon
- Coordinated with StreamNet and AFS FITS to line up speakers and sponsor a highly successful symposium focused on data integration at the 2022 American Fisheries Society Annual Meeting
- Introduction to PNAMP Briefing for new SC members from OWEB (Stephanie Page June 2022), EPA (Lisa Kusnierz Aug 16, 2022), and USBR (Jeff McLaughlin August 18, 2022)
- Transitioned from MailMan ListServ to GovDelivery listserv for the PNAMP monthly newsletter
- Co-led "Fisheries Science from the Sky", a session focused on remote sensing techniques and applications at the 2022 annual Oregon AFS meeting
- Jen Bayer is supporting a new effort from EPA to develop a strategy for long term monitoring of toxics in the Columbia River Basin and sharing of toxics monitoring data. A new working group composed of states, tribes, and federal agencies and co-chaired by Jen and Mary Lou Soscia (EPA Columbia River Coordinator), had their first meeting in March and has had regular meetings throughout 2022
- Ongoing updates to content on PNAMP.org, including major reorganization of Fish Monitoring Work Group Task Team content to make this information more accessible

Data Management and Sharing Best Practices – Data Visualization

- Participated on the CDI Data Visualization Collaboration Area organizing team to implement quarterly webinar series.
  - The August 25, 2022, webinar was attended by at least 131 people. Webinar recording here. Featured presentation by Lauren Tierney (The Washington Post) Mapping and data visualizations at The Washington Post.
  - The May 31, 2022 webinar was attended by at least 91 people. Webinar recording here. Featured presentation by Connie Jin (NPR) *Data viz, illustration and Comics: visual storytelling for news*.

Emerging Technologies Information Sessions

- Hosted the Emerging Technologies Information Sessions Hybrid Event in Hood River, OR November 14-16, 2022
  - The event was attended by 183 people from 69 organizations
  - About 84% of attendees were from the Pacific Northwest, the remaining 16% came from AK, CA, NH, NV, NY, MI, Canada, Belgium, and Taiwan
  - 101 people attended in person and 82 attended virtually
  - 52 of the 183 participants gave presentations
- Worked with PSMFC staff to set up the ETIS Hybrid Event
  - Set up the online registration in Cvent
  - Communicated with event speakers, sponsors, and attendees leading up to the event as needed and answered questions that arose.
  - Updated the event page on PNAMP.org as needed
  - Developed a conference program
  - Created the call for abstracts, distributed the event announcement through various outlets, and reviewed and accepted 52 abstracts
  - Secured 3 keynote speakers – Mark Saunders (North Pacific Anadromous Fish Commission), Samantha Chisholm-Hatfield (Oregon State University), and Leila Kaneda (SightLine Applications)
- Uploaded recordings of all presentations to YouTube and made them available to conference attendees through the Sched platform
- Sent event evaluation survey to attendees

Fish Monitoring Work Group

- The FMWG Core Team met twice in January and April and once in February, March, May, July, August, September, October, November, and December to do progress updates, plan, and coordinate future work
- Full Work Group met in January, April, and October
  - January Meeting Tech Talk: Migration Patterns of John Day River Adult Steelhead – Ian Tattam (ODFW) (recording)
  - April Meeting Tech Talk: Common Metrics Used in the PNW Salmonid "Viability Report" - Eli Holmes (NOAA) (recording)
  - October Meeting Tech Talk replaced with 2021 project summary and PIT Array and Related PIT Tag Analysis introduction with a short presentation on PITAGIS Instream PIT Tag Detection System Subcommittee from Gabriel Brooks (NOAA) (recording)

Fish Monitoring Work Group Continued

- Task Teams Updates:
  - Carrying Capacity Standards
    - Task Leads completed the outline of the best practices document and gathered sections from other authors
    - Task leads met in January, March, April, May, June, and July to refine outcomes and work on best practices
    - On May 31, Kevin See (video) and Brian Maschhoff (video) presented to the task team on Carrying Capacity models and integrating output for display and comparison
  - Fish Population Names and GIS Boundaries
    - Task leads met in April, May, June, and September to complete task description and prepare for the kick-off meeting as well as the follow-up meetings
    - Task Team Kick-off Meeting was held on April 27th
    - A follow-up meeting was held June 15th
    - Task Leads have completed a proof of concept for bull trout and are working on integrating other species
  - Juvenile Density (Snorkeling and Electrofishing)
    - Task Leads met in January, February, July, September, November, and December to complete task description and prepare for the kick-off meeting as well as the follow-up meeting
    - Task Team Kick-off Meeting was held on February 17
    - On December 6, the task team met for an update on the data standards guidance document and for a presentation from Dan Isaak (US Forest Service) on "The Fish Density Analysis Tool (FDAT): Applying Spatial Stream Network Models to Juvenile Chinook & Steelhead Datasets"
  - Rotary Screw Trap Data Collection
    - Task leads met in January, February, and July to finalize task description, plan kick-off meeting, and identify issues
    - Task Team Kick-off Meeting was held on February 10
    - Renewed interest, task follow-up will occur in early 2023
  - Data Display Implementation
    - Task team met in April, May, July, and August. This task was completed in October.
    - Nancy Leonard presented products and outcomes from the task team to the StreamNet Executive and Steering Committees in September
  - MAFAC and NPCC SPI
    - Met with leads, in January, March, April, three times in September
    - Task Summary finalized in October (link)
  - PIT Array and Related PIT Tag Analysis
    - Task had been flagged for interest in 2021, leads presented an overview of potential task at the October full FMWG meeting
    - Coordinated with Gabriel Brooks (NOAA) to collaborate with the PTAGIS IPTDS; Gabriel presented a brief overview of the Instream PIT Tag Detection System (IPTDS) Steering Subcommittee at the October 20th meeting
    - Survey was also distributed on October 20th to determine focus areas

Intensively Monitored Watersheds

- Completed peer review and published the PNAMP IMW synthesis report Management Implications from Pacific Northwest Intensively Monitored Watersheds
- Hosted a virtual meeting of the PNAMP IMW Forum on September 13, 2022 with broad IMW stakeholder group to 1) share results from the synthesis report Management Implications from Pacific Northwest Intensively Monitored Watersheds, 2) discuss priorities for future research opportunities, identify who can help advance topics, and 3) discuss priorities for recommended actions, select one recommendation to focus on for winter workshop. Meeting recording here.
- Met with the IMW core team in October and November to discuss survey results and feedback from the September 2022 PNAMP IMW Forum. The core team discussed goals and objectives for next IMW workshop and identified potential people to help with workshop planning and execution.
- Worked with WA GSRO staff to develop a storymap for the 2022 State of the Salmon report highlighting findings from the IMW Management Applications Synthesis.

MonitoringResources.org

- Organized and presented the MonitoringResources.org project sponsor orientation in January 2022
- Presented the MonitoringResources.org Orientation for DELVE Subject Matter Experts and CA DWR in June 2022
- Recorded and posted new training videos to MonitoringResources.org: Training Video Library
    - Creating an account in MonitoringResources.org
    - Adding a colleague in MonitoringResources.org
    - Cloning a protocol in MonitoringResources.org
    - Creating a method in MonitoringResources.org
- Finalized 20 protocols and 104 methods in 2022
- Coordinated biweekly meetings with ESA and BPA to organize and implement future development priorities
- Updated MonitoringResources.org charter based on BPA's feedback to include a section on outreach
- Completed work order with CA DWR to integrate Delve data system and MonitoringResources.org documentation
    - Coordinated Bi-weekly meetings with CA DWR subject matter experts to help document their metadata in MonitoringResources.org
- Surveyed project sponsors involved in the last ISRP review cycle to help identify future development
- Coordinated multiple project meetings with StreamNet staff to coordinate adding fields for BPA Project Number and Study Plan URL in StreamNet Data Store and the related trends data schemas
    - Presented to the StreamNet technical team to request improvements to Project Number and Study Plan URL in the StreamNet Data Store DES, technical team approved, and StreamNet Steering committee approved.
    - Created guidance detailing how to find MonitoringResources.org Study Plan IDs by searching in MonitoringResources.org using the BPA project number
    - Coordinated with StreamNet to do a kick-off presentation for the StreamNet technical team (ODFW and IDFG subject matter experts) to scope improvements to linking coordinated assessment project numbers and MonitoringResources.org Study Plan URLs to the DES for the Data Store

MonitoringResources.org Continued

- Worked with ESA Sitka to update the data repositories listed in CBFish.org with those projects in MonitoringResources.org
- Updated training modules specific to documenting methods, protocols, sample designs, and study plans
- Met virtually one-to-one with MonitoringResources.org users from Oregon Department of Fish and Wildlife, Confederated Tribes of the Warm Springs Reservation, Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, Confederated Tribes of the Colville Reservation, and California Department of Water Resources for specific user support guidance

MonitoringResources.org – List of Development Released

- Automated the archival of content (methods, protocols, study plans, sample designs) in MonitoringResources.org with "Active" content tabs on content lists. Active content is all finalized content as well as non-finalized content that has been created or modified in the last 12 months
- Finalized the Study Plan Summary page allowing users to review their entire monitoring project (Study Plan, associated Protocol and Methods, associated Sample Designs) all on one screen
- Created a "Back to Study Plan" button on the Study Plan Summary page
- Released updated navigation including renaming the Home menu navigation dropdowns, simplifying the menu bar, and adding Study Plan Summary to the Home menu
- Updated the MonitoringResources.org homepage design and aesthetics
- Updated the Area of Inference help text in the Sample Design
- Collaborated with ESA to link directly to Study Plan Summaries from Data Collection Events in MonitoringExplorer.org and ensured each data collection event was associated with the correct data repository
- Collaborated with ESA to update the MonitoringExplorer.org Data Collection event pop-up box to provide the best and most relevant information
- Updated MonitoringExplorer.org search functionality and speed
- Fixed the Data Repository link in MonitoringExplorer.org
- Added a link to the Program URL in MonitoringExplorer.org Data Collection Event pop-up
- Created a new user interface that allows users to document and relate Study Plans, Protocols and Methods, and Sample Designs in one seamless workflow "BPA Workflow" – still in development and testing

Remote Sensing Forum

- Co-led, with Lauren Burns (CRITFC), the organization and implementation of the RSF quarterly meeting
    - The March 16, 2022 meeting was attended by at least 31 people. Meeting recording here. Featured presentations by: Kurt D. Carpenter (USGS), Use of remote sensing to detect algae in rivers, lakes, and reservoirs and Dr. Emily Fairfax (CSUCI) Smokey the Beaver: how beaver dams keep riparian corridors green during droughts and wildfires
- RSF listserv has grown to 72 members
- The RSF Organizing Committee continues to work on drafting an entry level remote sensing best practices document

Stream Habitat Metric Integration

- Submitted manuscript to EMA – lessons learned and recommendations to large long term monitoring programs for improving data access
- First draft of the report to document methods, controlled vocabulary, and data exchange specifications in review by project partners
- First draft of documentation of code used to generate the integrated dataset and metadata published in MonitoringResources.org n review by project partners
- Presented results and recommendations at the 2022 American Fisheries Society Annual Meeting
- Organized and implemented the project team meeting March 8th - Stakeholders from USGS, BLM AIM, EPA NRSA and USFS PIBO, and AREMP, ten people in attendance
- Shared the draft ScienceBase page, including:
    - USGS Techniques and Methods Report
    - Dataset of integrated data from the four partners as an Access Database, .CSV files, and an analysis ready dataset
    - XML metadata
    - Git Repository with
        - Data Exchange Standard for Stream Habitat Data
        - R code to integrate data from the four partners
- Documented program methods and protocols in MonitoringResources.org and worked with partners to gather feedback
- Updated R code to add BLM 2021 data

Steering Committee Meeting Series

- February 2, 2022 Steering Committee meeting, event page
- March 30, 2022 Steering Committee Climate Change Work Plan FY23 meeting, event page
- May 10, 2022 Steering Committee meeting, event page
- Highly successful collaborative in-person StreamNet Executive Committee and PNAMP Steering Committee meetings were held September 21-22, 2022, in Portland, OR (event)
    - September 21, 2022, Notes
    - September 22, 2022, Notes

Appendix B: Acronym Key

pacific northwest aquatic monitoring partnership

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
Colville Tribes	Confederated Tribes of the Colville Reservation
CRITFC	Columbia River Intertribal Fish Commission
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
DOI	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
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

Acronym Key Continued

IMW	Intensively Monitored Watershed
IPTDS	Instream PIT Tag Detection System
ISRP	Independent Scientific Review Panel
MAFAC	Marine Fisheries Advisory Committee
NARS	National Aquatic Resources Surveys
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	National 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 Committee
PTAGIS	PIT Tag Information System
RSF	Remote Sensing Forum
RST	Rotary Screw Trap
SC	Steering Committee
TEK	Traditional Ecological Knowledge
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFS	United States Forest Service (Department of Agriculture)
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