Overview of PNAMP's Monitoring Resources

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Pacific Northwest Aquatic Monitoring Partnership (PNAMP)

- What does PNAMP do?
  - Forum for monitoring programs
  - Collaboration
  - Coordination

- Participants
  - State, federal, and tribal
  - Open, inclusive process
  - Voluntary participation

- Supported by partner funding and in-kind contributions

Online Resources

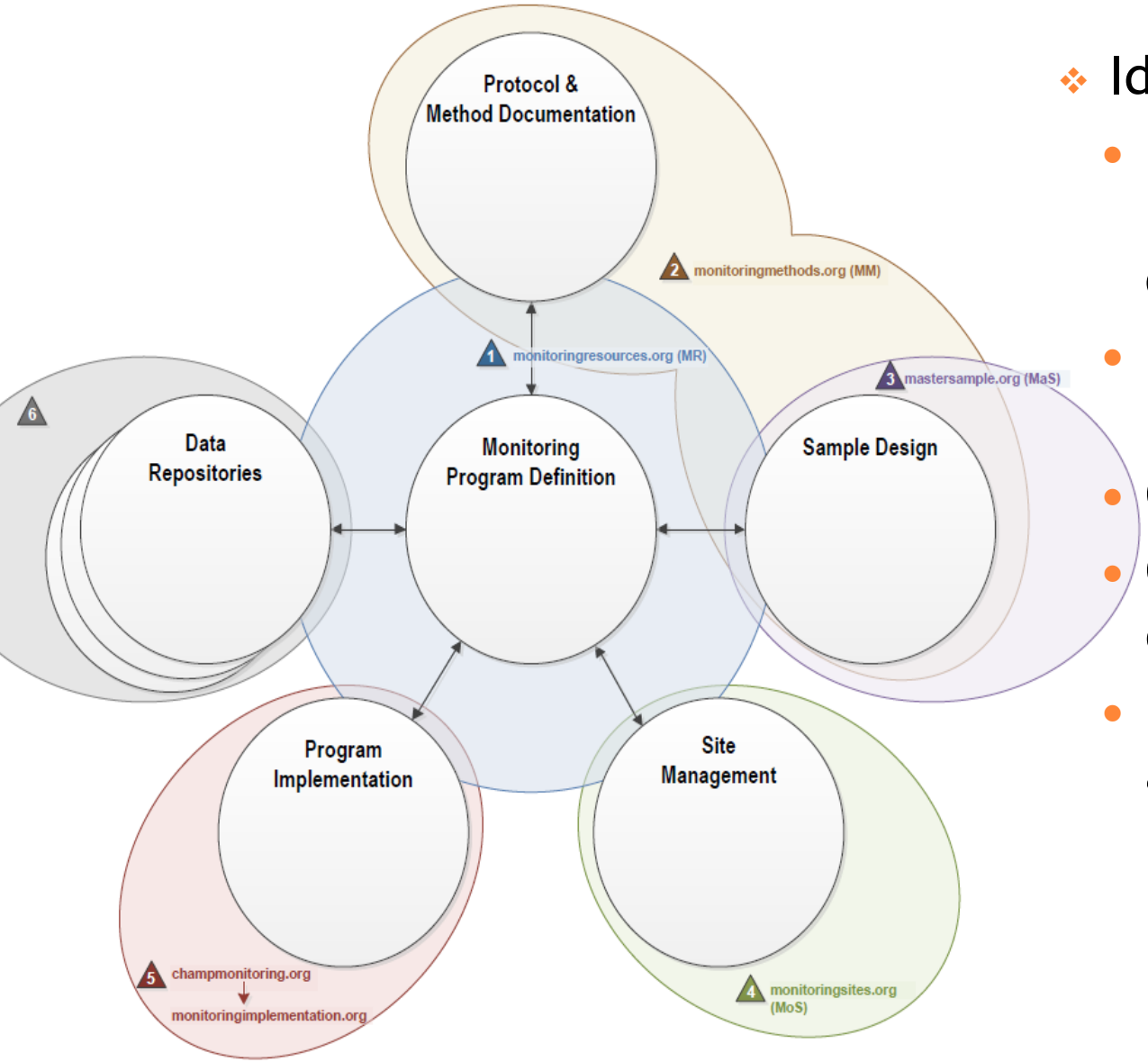
- Tools to make it easier to:
  - Design and document
  - Collaborate
  - Discover data
- Started with Protocol Manager/Monitoring Methods, prototype for Master Sample tool
- Main PNAMP website – not part of this discussion

Online Resources

- Current state
  - Existing: MonitoringMethods.org, Salmon Monitoring Advisor, prototype Master Sample tool
  - Planned: Master Sample tool (Sample Designer), Site Manager, prototype metadata builder

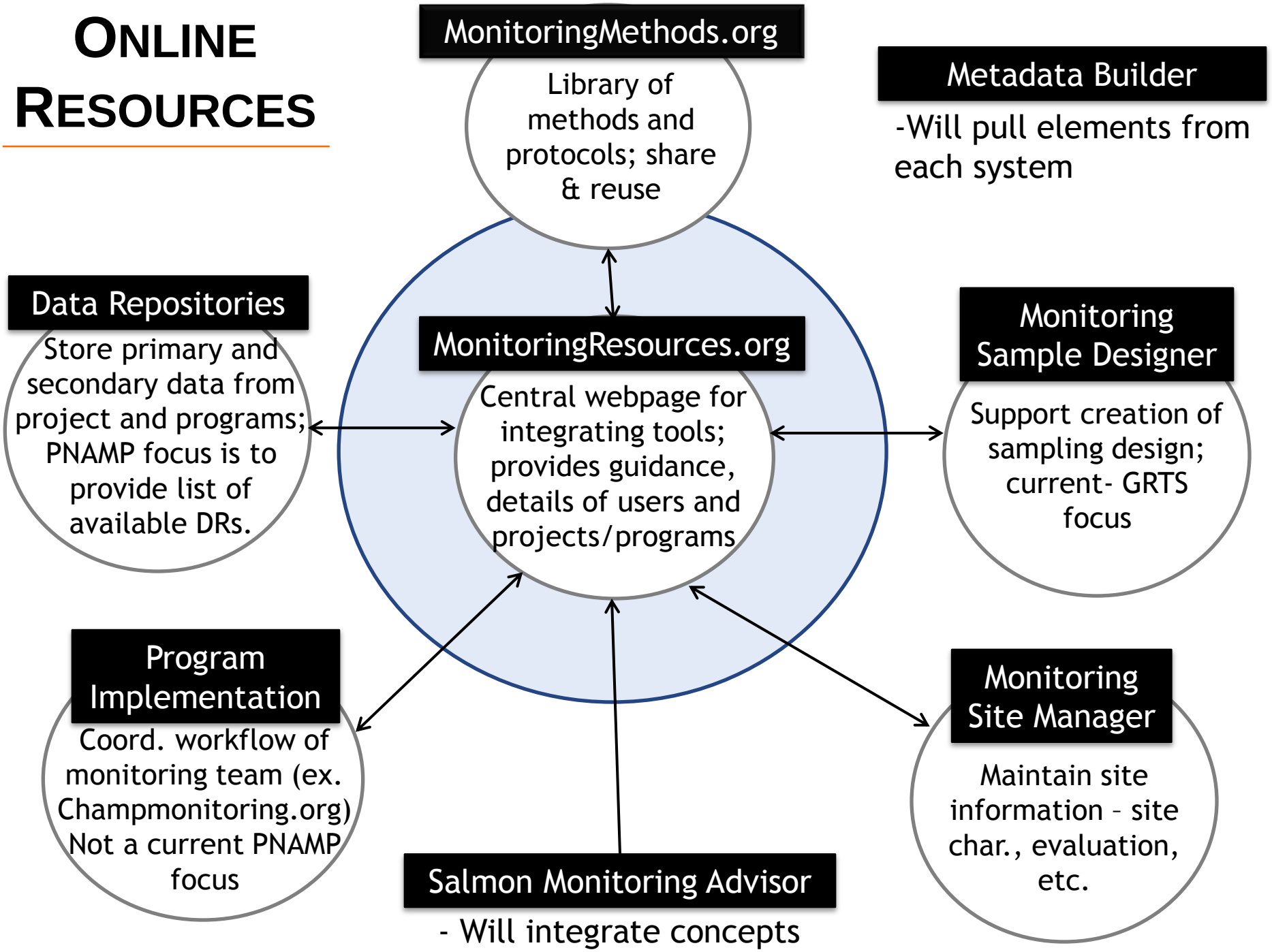
- Ideal state
  - Integration
  - Common terminology, consistent documentation

Online Resources



- Ideal state
  - Integration – central homepage, single sign on
  - Enter once, share many times
  - Common definitions
  - **Consistent** documentation
  - Enough information to adequately assess monitoring

Online Resources



Online Resources Support

- Guidance from PNAMP SC & Leadership Teams
- User Testing Groups convened during development
- PNAMP staff time
- Software development – contract with private vendor
  - Sitka Technology Group

- Funding – multiple sources; described at end of presentation

MONITORINGRESOURCES.ORG

- In development, mock up of central homepage
- Provide underlying framework for single sign on
- Move common content from MonitoringMethods.org
- Integrate existing guidance into the ‘Learn’ menu

MONITORINGMETHODS.ORG

- Need for better, more consistent documentation of protocols and methods to support research and reporting needs
  - Pacific NW issues
  - BUT…basic need could be found anywhere and could be related to various topics
- USBR brought a tool to PNAMP for consideration years ago
  - Partner feedback led to current tool

MonitoringMethods.org

- Need for a community forum
  - to discuss and vet methods, metrics and indicators, and study designs
  - to identify and make use of best practices
  - expand information in out-of date publications
  - to give access to information and help each other gain a better understanding of regional work

WHY?

- Good science – documentation
- Consistency > collaboration

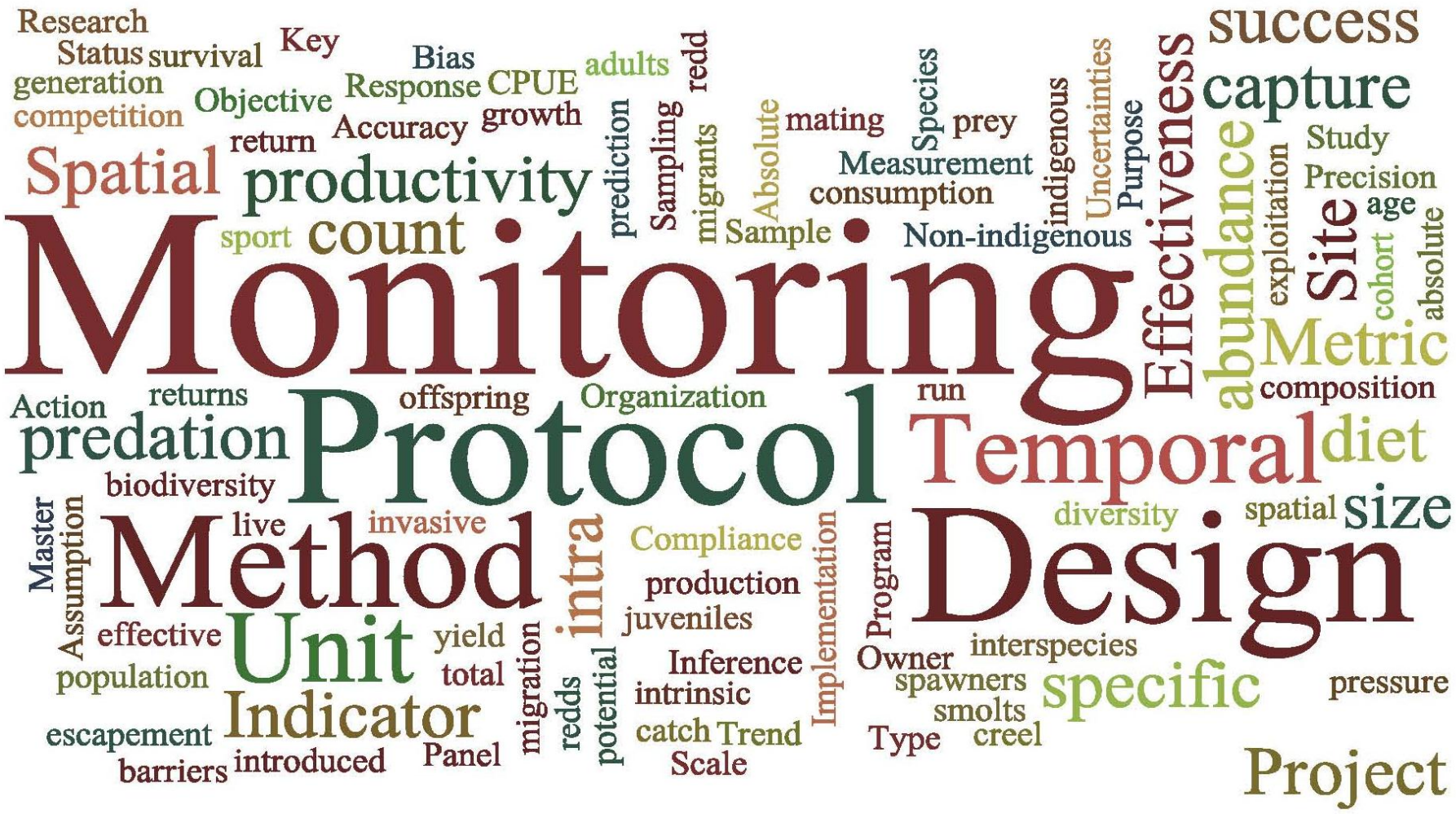
*What **kind** and **amount** of documentation is needed:*

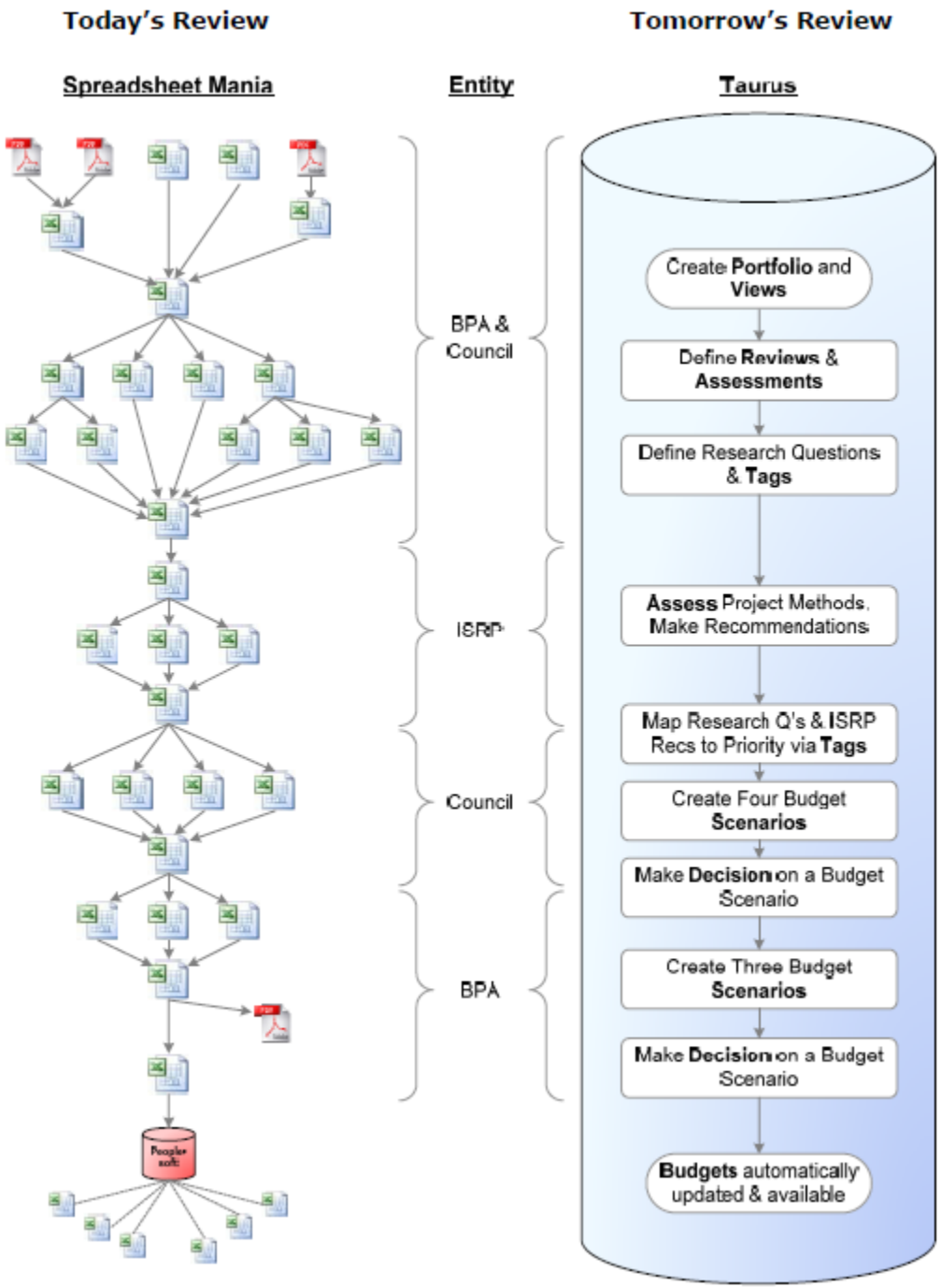
- *to minimize uncertainty about utility of others' data?*
- *to promote collaboration and data exchange between programs?*
- *to help each other gain a better understanding of who's collecting what information, why and how?*

- Answers to foundational questions like these are not straightforward. . . but are critical to designing the system.
- Data may be useful to others; good documentation is key

WHY?

- Terminology - Inconsistent use and disagreement about monitoring terms, definitions, and their relationships




Today's Review
Tomorrow's Review
Spreadsheet Mania
Entity
Taurus
BPA & Council
ISRP
Council
BPA
Peoplesoft
Create Portfolio and Views
Define Reviews & Assessments
Define Research Questions & Tags
Assess Project Methods, Make Recommendations
Map Research Q's & ISRP Recs to Priority via Tags
Create Four Budget Scenarios
Make Decision on a Budget Scenario
Create Three Budget Scenarios
Make Decision on a Budget Scenario
Budgets automatically updated & available

MONITORINGMETHODS.ORG

- What: www.monitoringmethods.org/
  - Free, web application to document and discuss monitoring protocols, methods, metrics and indicators, and study designs
- Purpose:
  - Promote consistent documentation
  - Improve access to monitoring information
  - Promote community discussions among a variety of users - insight and experience
  - Streamline creation of metadata
  - Help increase interoperability between data systems

MONITORING METHODS TEAM

Sponsors:

pacific northwest aquatic monitoring partnership
&
PNAMP Partners

STATE OF THE SALMON

KNOWLEDGE ACROSS BORDERS • ЗНАНИЕ СКВОЗЬ ГРАНИЦЫ • 国境を超えた知識

A JOINT PROGRAM OF
THE WILD SALMON CENTER AND ECOTRUST

ecotrust

Development Team:

sitka technology group

Leadership Team & User Testing Groups from the following entities:

- BPA
- CRITFC
- EDS
- EPA
- NOAA
- NPT
- NWHI
- NWHI
- NWIFC
- ODFW
- PSMFC
- PSP
- SFR
- TTECI
- UCSRB
- USBR
- USFS
- USGS
- WA Forum
- WA GSRO
- WDFW
- YBFWRB

Funders:

BONNEVILLE POWER ADMINISTRATION

GORDON AND BETTY MOORE FOUNDATION

MONITORIGMETHODS.ORG GLOSSARY

Indicator

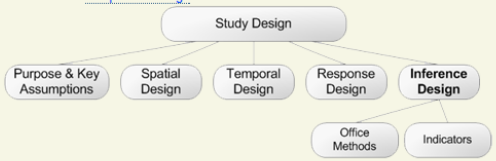
Value resulting from the data reduction of Metrics across sites and temporal periods based on applying the procedures in the Inference Design. A reported value used to indicate the status, condition, or trend of a resource or ecological process; intended to answer questions posed by the Objectives of the Protocol. Contrast with Metric.

Metric J + Metric K = **Indicator X**

Per the Inference Design, Metrics are combined or reduced to produce Indicators

Inference Design

Component of the Study Design that defines the process of determining Indicator values based on Metric values observed at sites during specific temporal units over the course of the study. Contrast with Response Design.



NOTE: monitoringmethods.org will not support detailed documentation of Inference Design; however users may add Data Analysis/Interpretation Methods to their Protocol that explain how Metrics are combined to produce Indicators.

Want to learn more? check out salmonmonitoringadvisor.org

Key Assumption

Something that is accepted as true or as certain to happen, without proof. When describing a Protocol's Study Design it is important to document its Key Assumptions. Examples:

- My frame is accurate
- Gear (smolt trap, seine, weir, etc.) is functioning properly
- Gear is calibrated

Master Sample

The full list of sites that would be sampled with a complete census used to generate a random sample of sites for a probabilistic study. These sites can be used for comparable, complementary monitoring among separate monitoring organizations and across geographic scales. A Master Sample retains the principle of randomization and spatial balance (see Larsen, D.P., A.R. Olsen, and D.L. Stevens. 2008. Using a master sample to integrate stream monitoring programs. JABES 13: 243-254.).

PNAMP is currently working with the EPA and Oregon State University to develop a Master Sample web application.

Measurement

A value resulting from a data collection event at a specific Site and temporal period. Measurements can be used to produce Metrics using a Response Design.

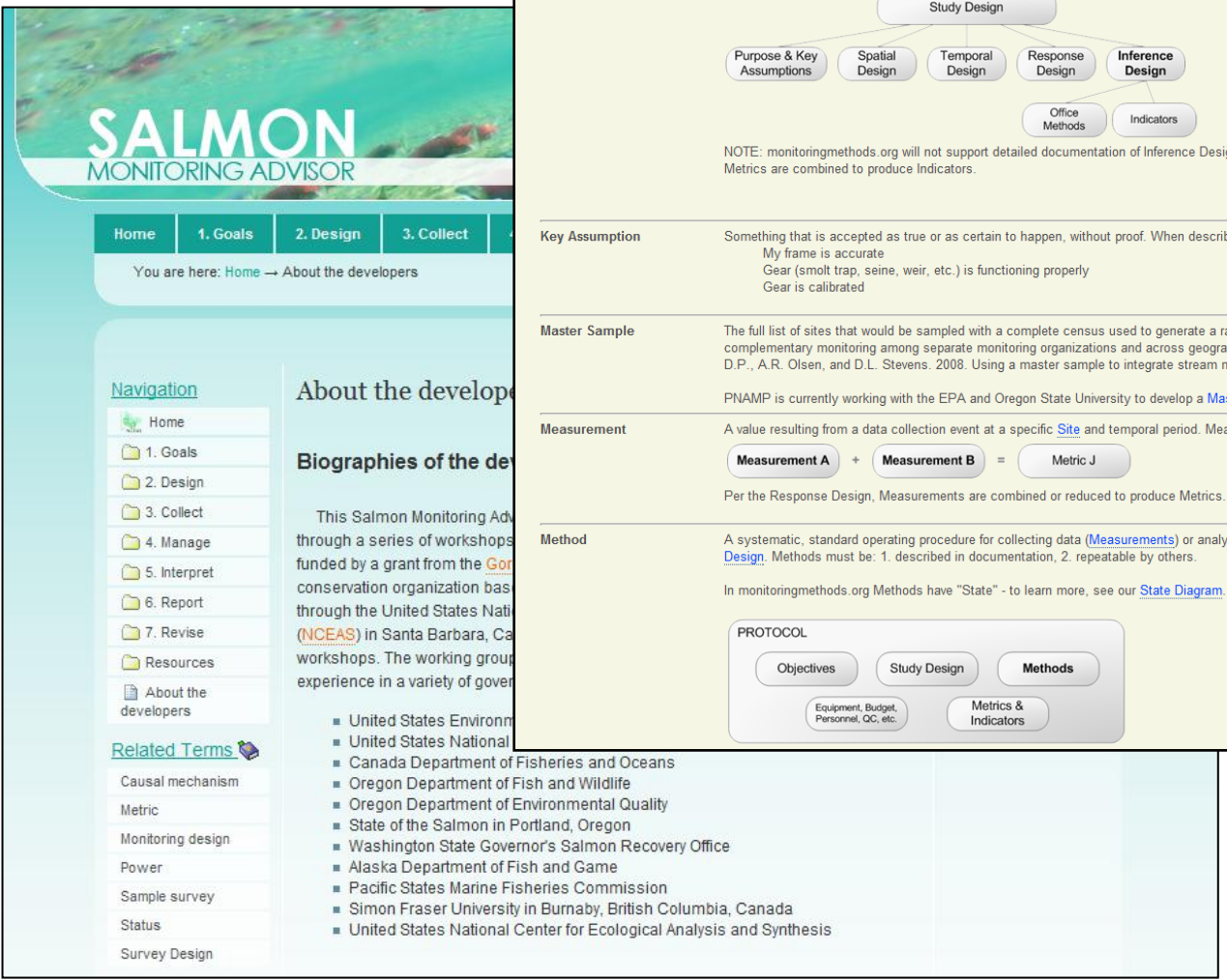
Measurement A + **Measurement B** = Metric J

Per the Response Design, Measurements are combined or reduced to produce Metrics.

Method

A systematic, standard operating procedure for collecting data (Measurements) or analyzing data (deriving Metrics from Measurements). Method descriptions are part of the Response Design. Methods must be: 1. described in documentation, 2. repeatable by others.

In monitoringmethods.org Methods have "State" - to learn more, see our State Diagram.



METRICS & INDICATORS

Home | Browse | Create | Learn | Discuss

Home > Metric Subcategories

List of Subcategories for Metrics and Indicators

An important part of documenting a Protocol is identifying the Metrics and Indicators that its Study Design will produce. Since the list of specific Metrics and Indicators that researchers and scientists produce is rather long and changes regularly, this tool does not attempt to catalog them all. Instead, it strives to catalog the various types of Metrics and Indicators.

Our taxonomy for classifying Metrics and Indicators is: Subject -> Category -> Subcategory

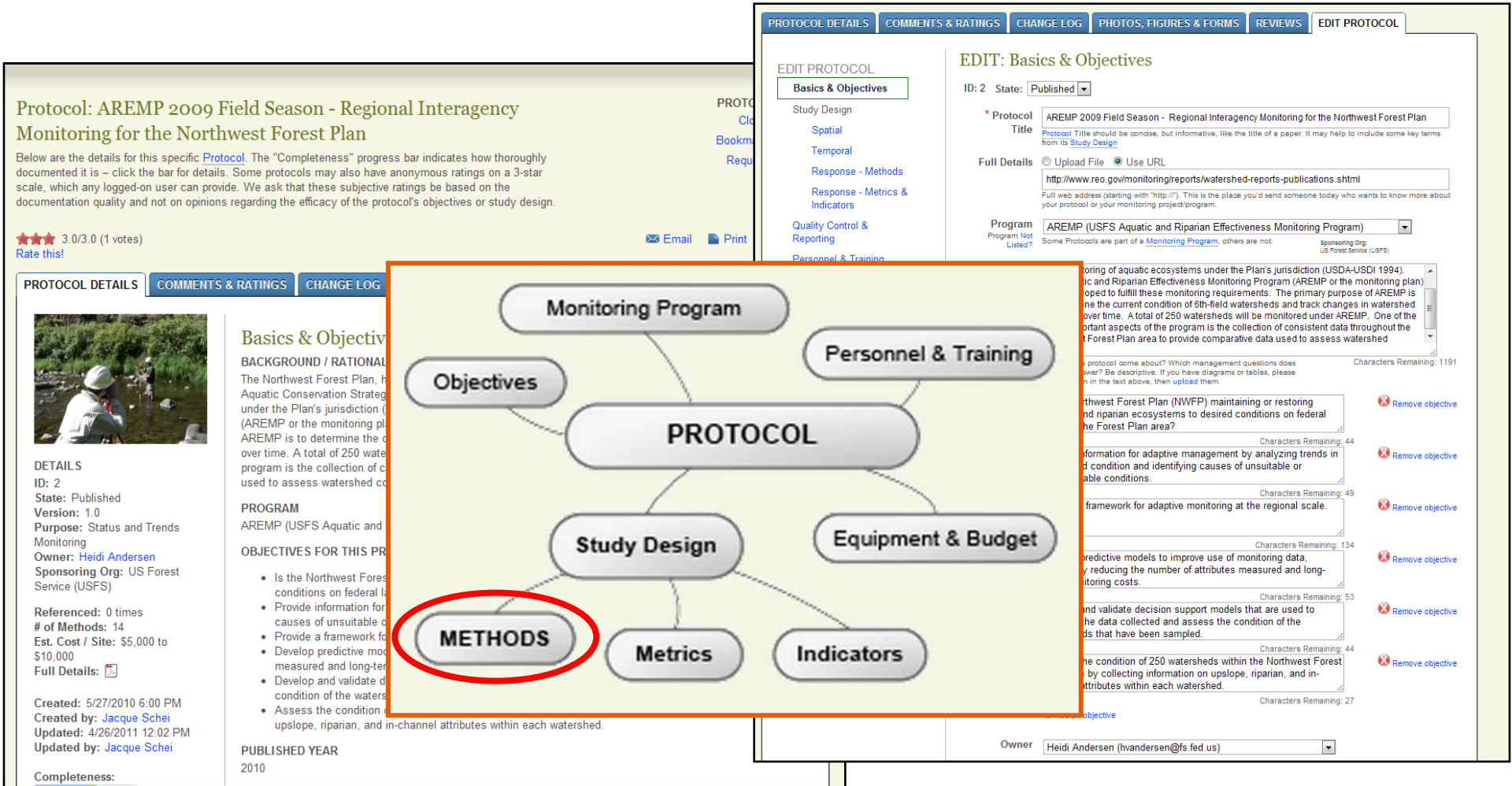
Currently viewing 487 of 487 Subcategories

Download

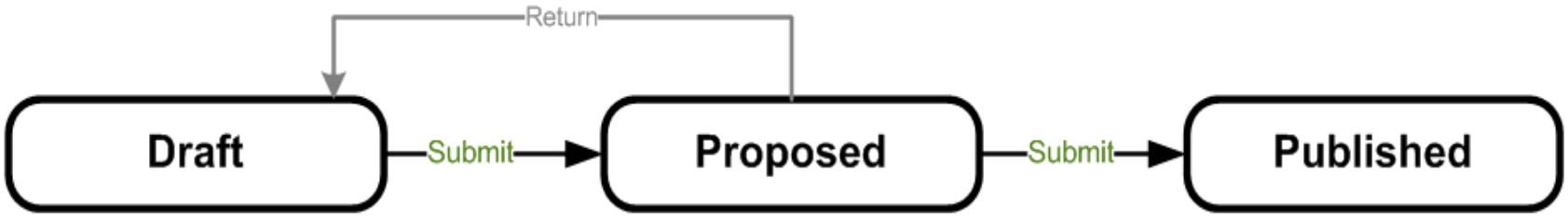
ID	CATEGORY	SUBCATEGORY	DESCRIPTION	KEYWORDS
124	Disease/Pathogens/Parasite	Pathogen/Disease Type	The type of individual disease, pathogen, or parasite observed (viral, bacterial, fungal, parasitic).	virus, name, bacteria, whirling, IHNV, VHSV, infection,
125	Disease/Pathogens/Parasite	Liver Disease	Collection of both levels and risk rates of liver disease.	hepatic disease, liver inflammation, liver function, netp
126	Disease/Pathogens/Parasite	Pathogen Values	The concentration of specified pathogens in a species over a given range or life stage.	disease, virus, infection, bacteria, bacterial, viral, whir
26	Disturbance/Restoration	Distribution of Non-wood Engineered Fis	Spatial extent of engineered habitat structures (excluding barriers, pools, and wood).	instream, frequency, complexity, per, kilometer, mile, b
28	Disturbance/Restoration	Disturbance Presence	The presence and proximity of various types of human land-use activities, or natural disturbances.	rangeland, farmland, farms, livestock, cattle, grazing, r
407	Disturbance/Restoration	Restoration Action	The presence and proximity of various types of human land-use activities, or natural events that restore the environmer	rangeland, farmland, farms, livestock, cattle, grazing, r
457	Disturbance/Restoration	Area of Disturbance or Restoration	The area of various types of human land-use activities, or natural disturbances or restoration actions.	scale, acres, rangeland, farmland, farms, livestock, ca
458	Disturbance/Restoration	Length or Width of Disturbance or Resto	The length or width of various types of human land-use activities, or natural disturbances or restoration actions.	rangeland, farmland, farms, livestock, cattle, grazing, r
459	Disturbance/Restoration	Abundance of Disturbance or Restoratio	The number of various types of human land-use activities, or natural disturbances or restoration actions.	count, rangeland, farmland, farms, livestock, cattle, gr
436	Fish	Tissue Sample: Fish	The collection of a tissue or cells from fish species for analysis.	hatchery, wild, origin, genetics, DNA, age, aging, blooc
507	Fish	Spawning/Nesting	Measurements of numbers of nests per fish, or of fish spawning events.	redds, mating, gravels, hatchery, wild, broodstock, stc
417	Fish	Species Type: Fish	The type of individual fish species observed, where species may range from species to a specific race.	subspecies, monotypic, hybrids, identification, stock, E
381	Fish	Mark/Tag Recovery	The act of recovering a mark or tag on a fish species.	PIT, radio, mark-recapture, tracking, telemetry, scannin
362	Fish	Abundance of Invasive Fish Species	The number (count) of individual fish by species within a particular life stage that are present within a specified area th	population size, distribution, estimate, sampling, survey
46	Fish	Abundance of Fish	The number (count) of individual fish by species or by species within a particular life stage.	return, run, prediction, escapement, effective, populati
47	Fish	Abundance of Fish Predators	The number (count) of individual fish by within a particular life stage that are present within a specified area that predat	pikeminnow, predation, population size, distribution, es

CONTENT

- Oakley, K.L., Thomas, L.P., and Fancy, S.G. 2003. Guidelines for long-term monitoring protocols. Wildlife Society Bulletin. 31(4):1000-1003.



CONTENT



Viewing:
Only the "Owner" and their Colleagues ("Reviewer" or "Collaborator") can see and comment on Draft protocols.

Editing/Deleting:
Only the "Owner" and their "Collaborator" Colleagues can edit or delete Draft protocols. These people can also **Submit** a Draft protocol for review, provided it meets minimum requirements.

Viewing:
Everyone, even general public (e.g. not logged in) people can see and comment on Proposed protocols.

Editing/Deleting:
"Owners" and their "Collaborators" Colleagues can edit (but not delete) Proposed protocols. They can also **Return** it to Draft state.

*While not built yet, we're thinking only a "Reviewer" should be able to **Submit** a Proposed protocol which makes it Published.*

Viewing:
Everyone, even general public (e.g. not logged in) people can see and comment on Published protocols.

Editing/Deleting:
No one (other than an Administrator) can edit a Published protocol. Not even an Administrator can Return a Published protocol to Proposed state.

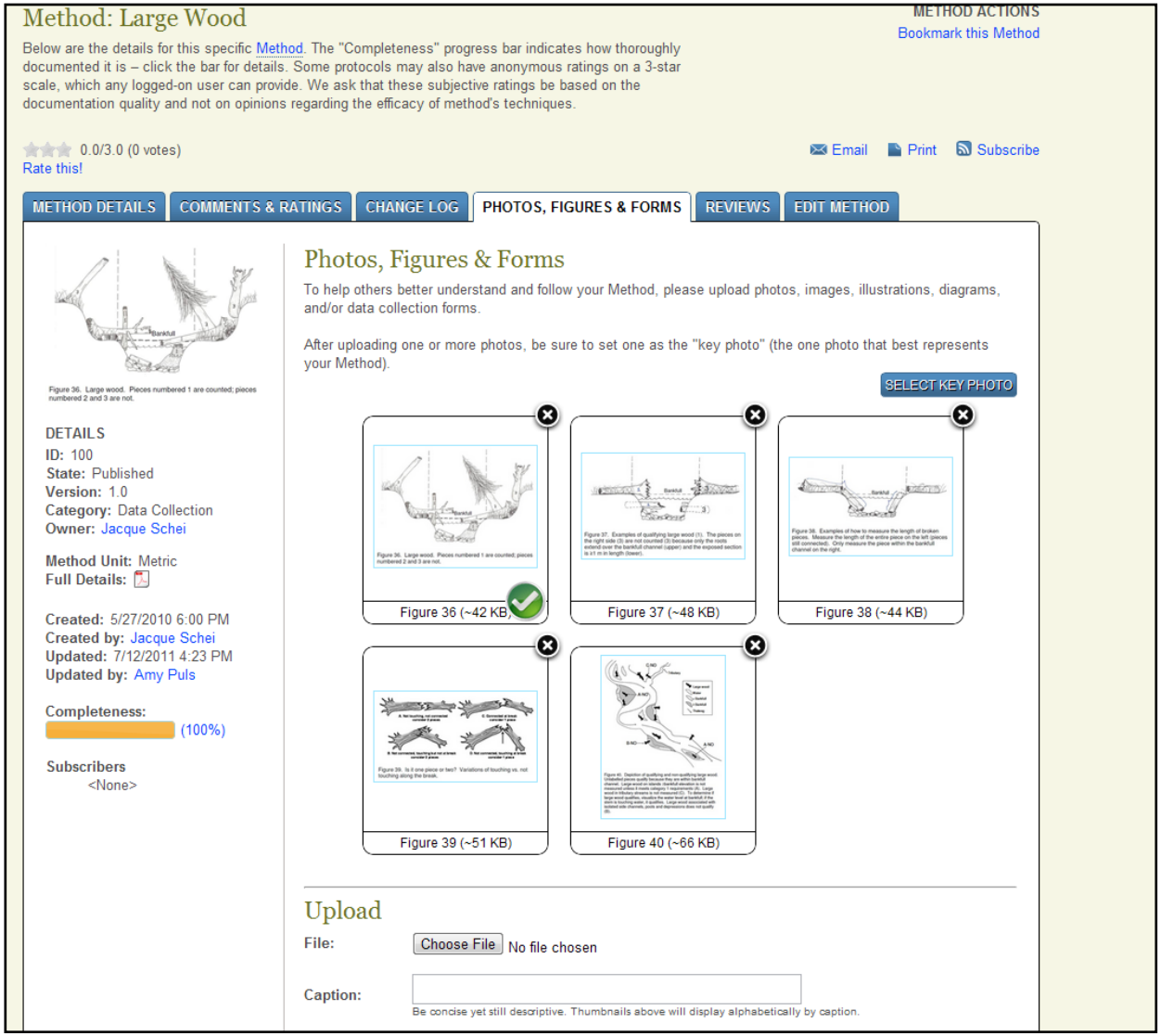
*Not shown here, and not yet built, is the ability to **Amend** a protocol, which creates a new version.*

*Also not shown, but is built, is the ability to **Expire** a protocol.*

- State Diagram
  - Methods & Protocols
- Review Process

CONTENT

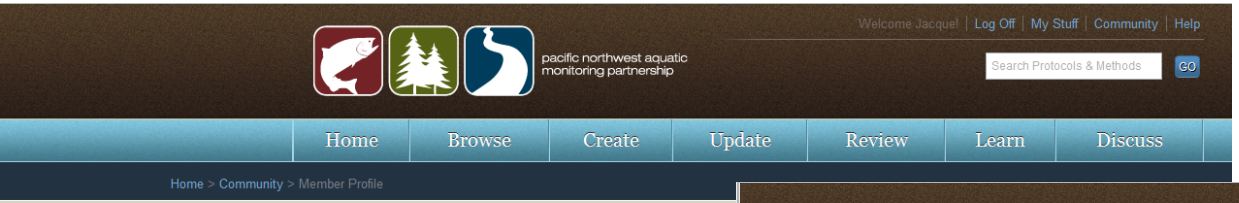
- Highlights
  - Upload full details or link
  - Upload photos, figures, forms
  - Cloning – protocols
  - Customize Methods
  - Subscriptions, notifications
  - Approve Methods for use in a Program

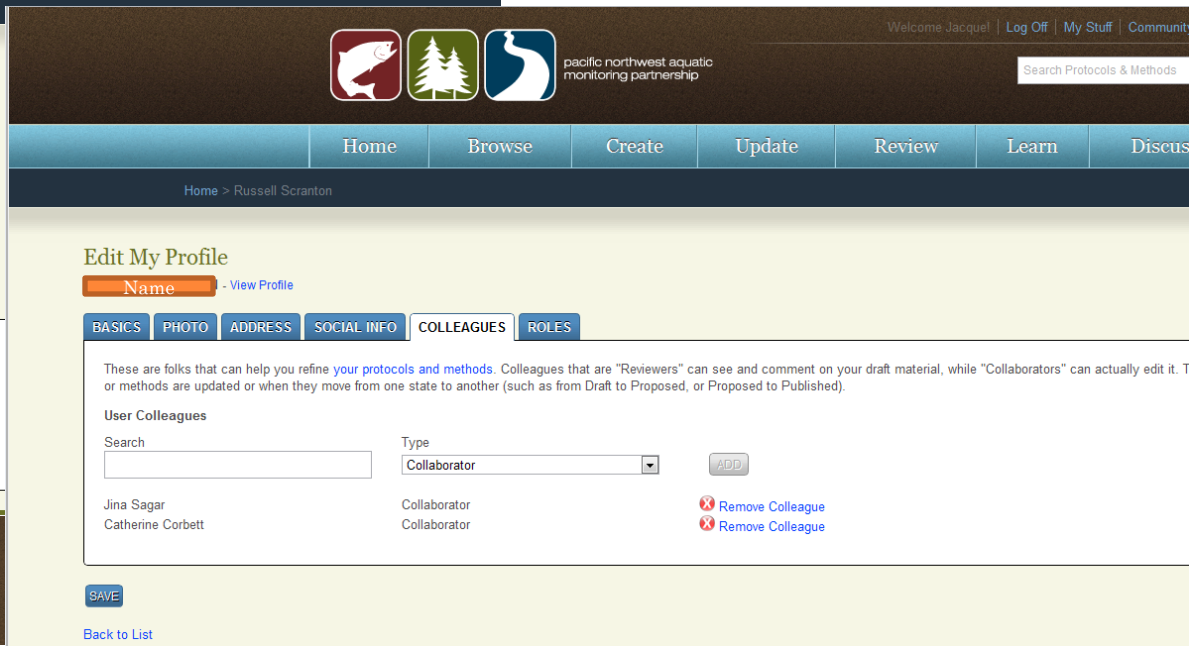


Users

- 140+ Organizations
- My Stuff
- Profile
- Colleagues

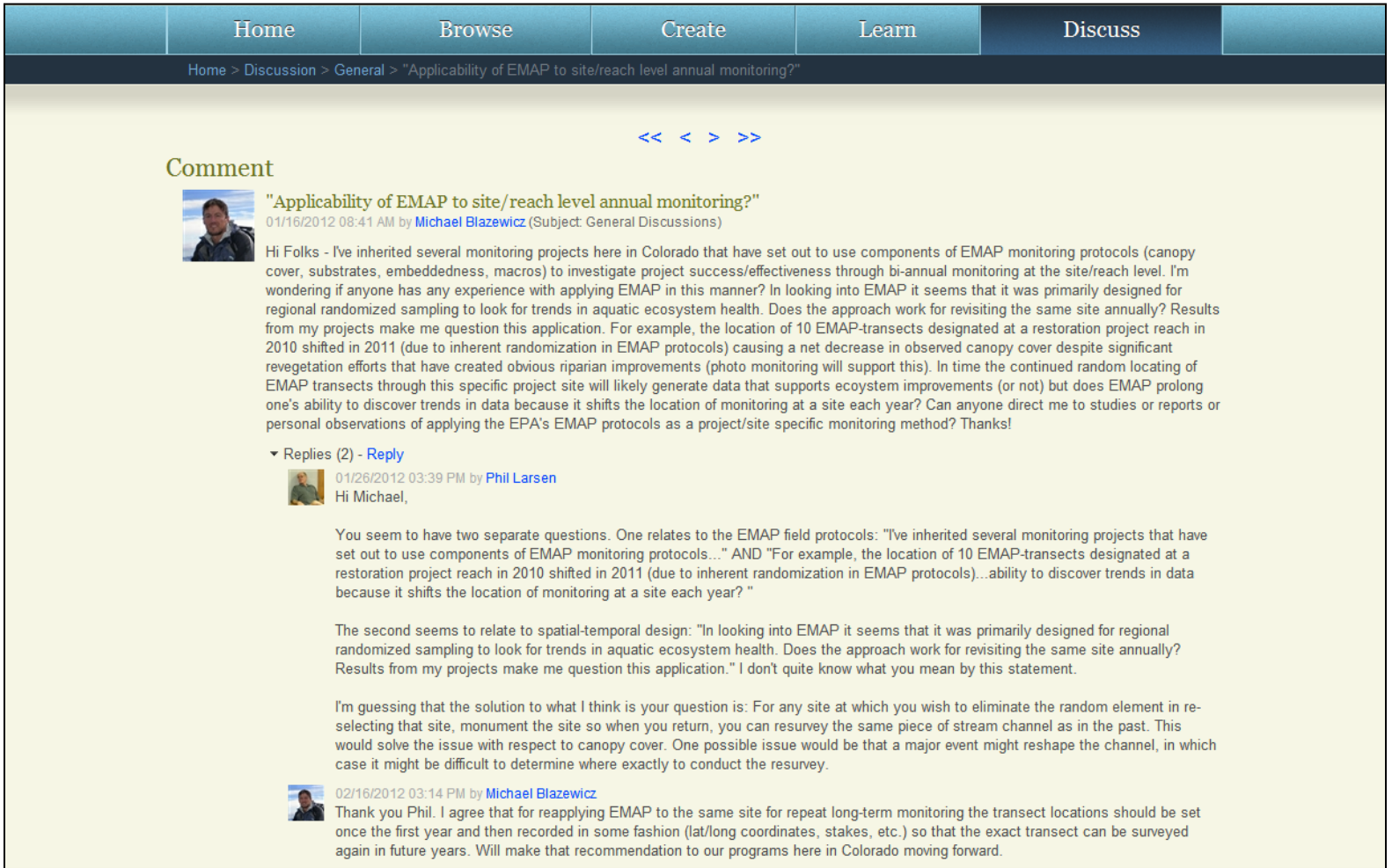
- Support variety of users
  - Scientist/Researcher
  - Program Manager
  - Policy Analyst
  - Others…





Discussion Board

- Discussions documented and available online for future reference
  - Reach more practitioners; convenient



MONITORINGMETHODS.ORG

- Current work:
  - Method review for completeness
  - Metric–method linkages
  - Update Customize Method feature
  - Add ‘Implementation Notes’ page
  - Modifications to details of Data Repository list
  - Added a new Reviewer Role – need to identify users who can provide reviews of ‘Proposed’ content when owner requests it be published
  - Finish in June 2012
- Future
  - Possible additional development depending on requests – complete versioning, review cycle business rules, etc.

Monitoring Sample Designer: Background

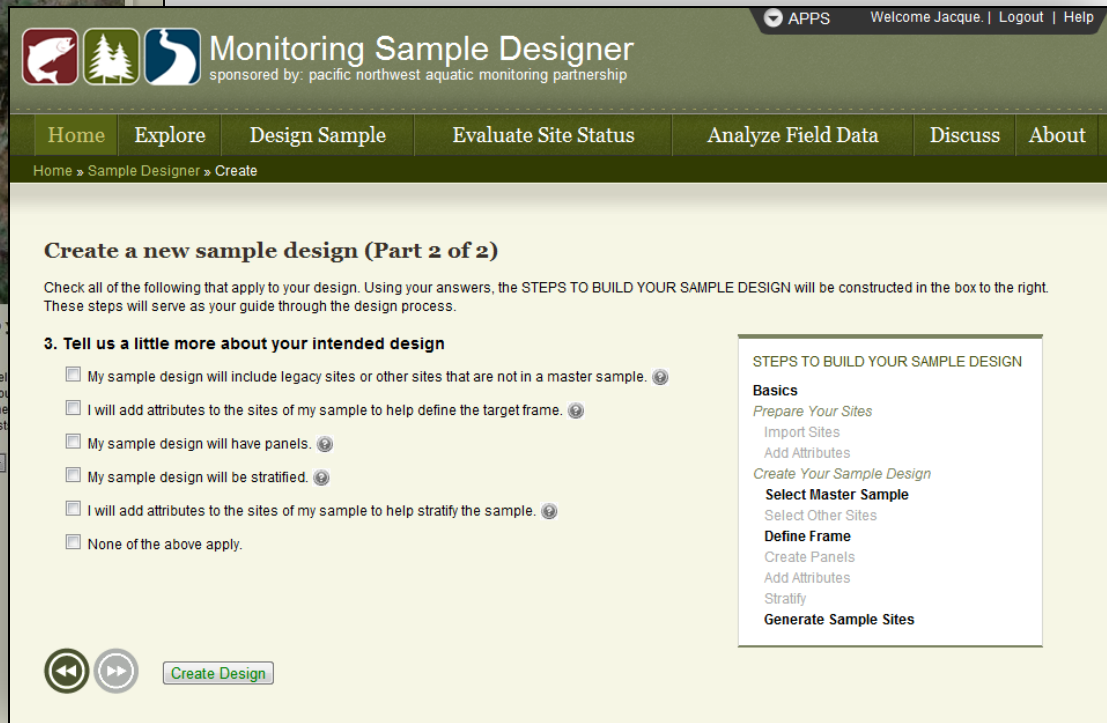
- Many agencies interested in regional scale monitoring of stream networks/watersheds, using similar attributes and similar protocols
- Can't afford to monitor everywhere (i.e., can't census)
  - Monitor a representative set of sites – represent a region
- Collaborate/Integrate: Data from different sample surveys can be combined if certain design principles are followed
- GRTS: Generalized Random-Tessellation Stratified design
  - Incorporates randomization
  - Is spatially balanced
  - Creates ordered list of sites

Monitoring Sample Designer: Background

- Oregon State University developed prototype
  - Prototype covered lower Columbia River ESU
  - Supported users in developing sample design, adding legacy sites, and basic statistical analysis functions
  - PNAMP - expand regionally
- Current contract with Sitka Technology Group to redevelop
  - Will develop Sample Designer and Site Manager
  - Looking for participants to review design concepts, give feedback as it relates to their own needs to help guide development

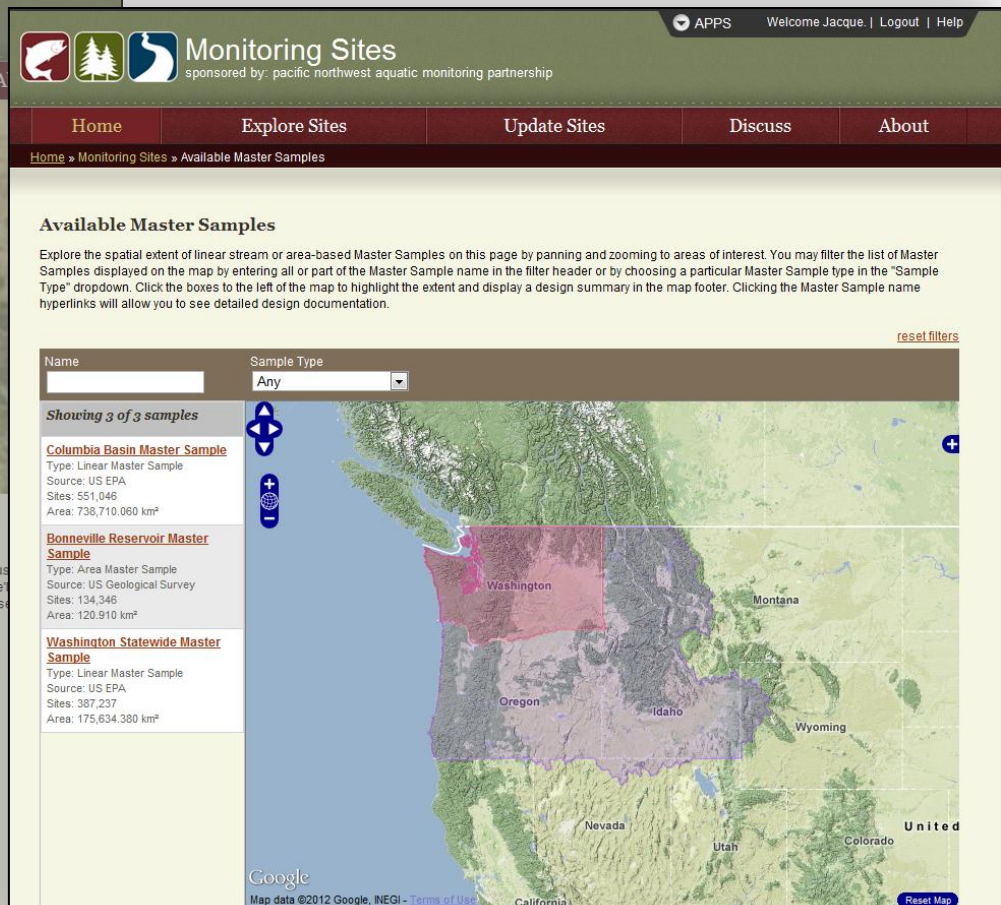
MONITORING SAMPLE DESIGNER

- In development – product expected November 2012
- Incorporate Master Sample prototype tool functions (support development of sample design, basic analysis), make tool regional
- Intended user group – knowledgeable about GRTS design



MONITORING SITE MANAGER

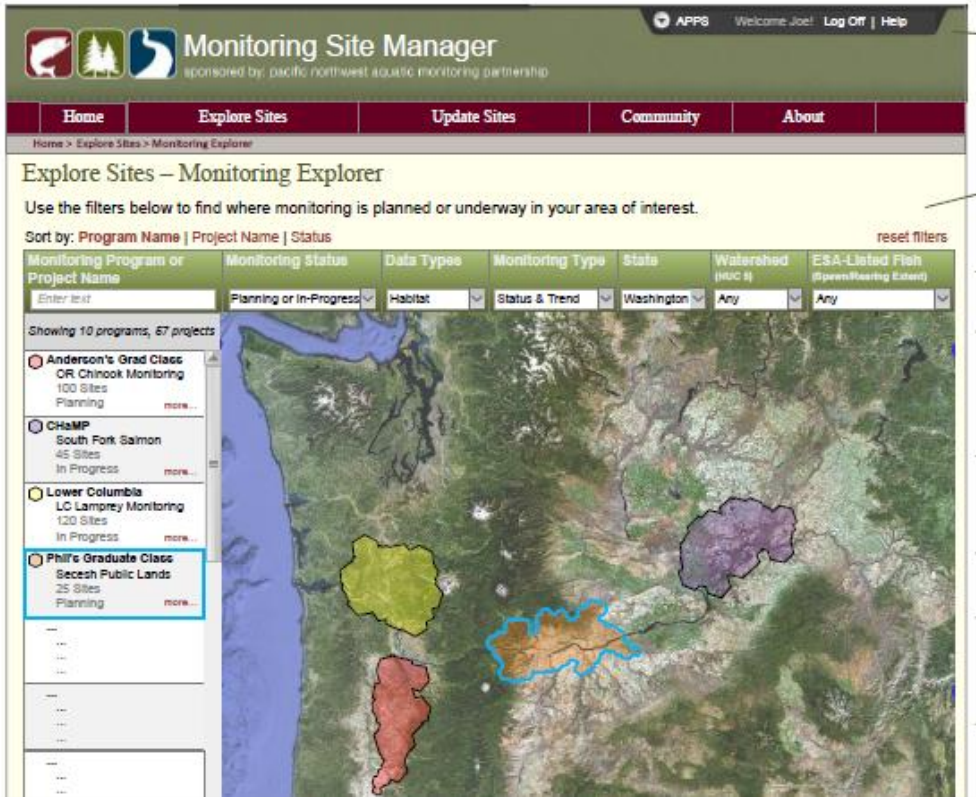
- In development – product expected November 2012
- Sampling site management tool – import samples/legacy sites, add attributes
- Will work closely with Sample Designer – sites, master samples, sample designs (public and private) will be stored here



SITE MANAGER – EXPLORER FEATURE

- Explore sites – locate, find information about, and see regional monitoring projects displayed on a map
  - With continued support for entering and updating content, this tool will support many 'inventory' needs
  - Gather content via web services and manually

This page is designed to answer the question, "Show me the monitoring that's happening in my _____" (state, county, watershed, etc.) and variants thereof.



User is logged in

This page is a vision of what could be possible…
But there are lots of challenges to overcome to pull something like this off.

There could be numerous filter options. Will be tough to choose… ideally we can keep it simple and not have to support more complex querying (e.g. multiple selection for a given filter or more complex Boolean logic).

List on the left side is the list of all Monitoring Projects that match the filters set by the user. Entering text in the filter above would match keywords in the monitoring program or project name. Map only shows polygons for the monitoring projects that match the filter criteria.

The more filtering, the fewer polygons on the map. Note: Using distinct colors for each project like shown here is problematic in that it doesn't scale well when there are > 10 or so projects – *we should be so lucky, right?*

Ideally, user could select a monitoring program from the filtered list and the corresponding polygon would be highlighted on the map.

Clicking "more…" would take user to details of that Monitoring Program/Project.

For an example of a filterable map like this, see Sitka's Terramet project that they did for Metro.

Site Manager – Explorer Feature

- Current effort is scoping exercise to develop requirements
- Requesting feedback from community
  - What information should be associated with sites?
  - What should user interface do – map sites, filter by A, B, C; advanced search? What do these things look like?
  - For more background information about this scoping exercise, see new report (on PNAMP website: http://www.pnamp.org/document/3845)

SALMONMONITORINGADVISOR.ORG

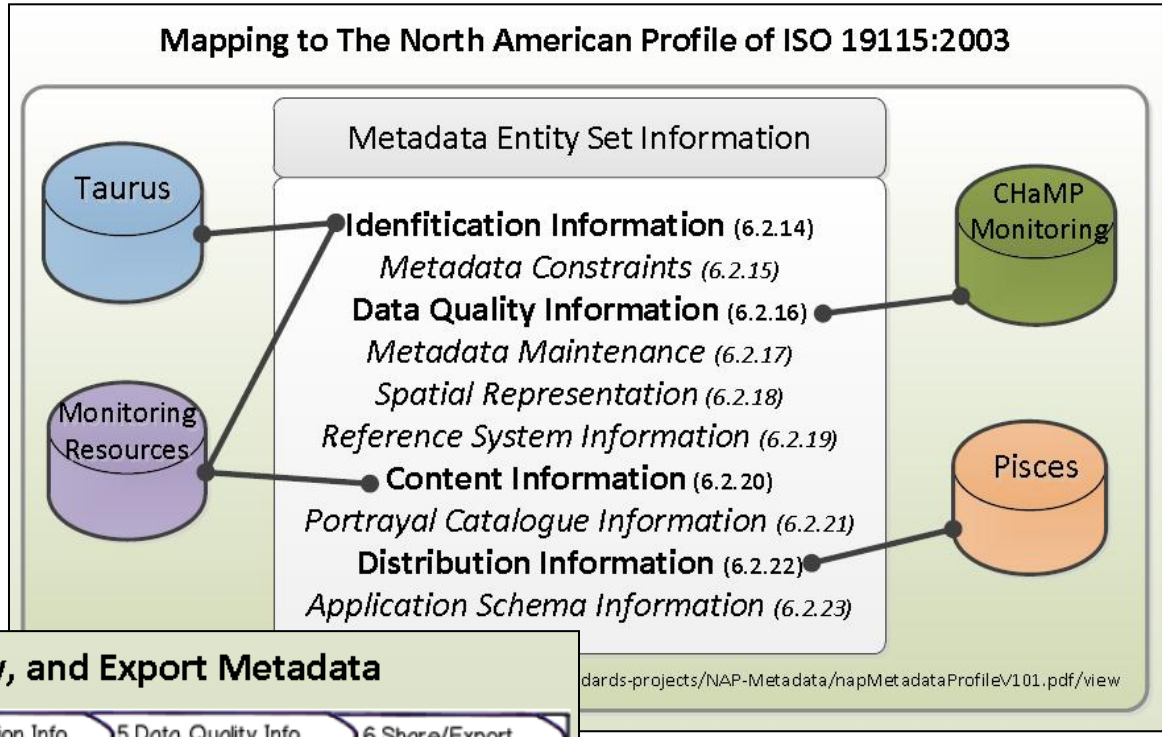
- Complete website transferred from NCEAS
- Educational resource – monitoring program design
- Integrate generic concepts into MonitoringResources.org
- Future – add topics beyond salmon

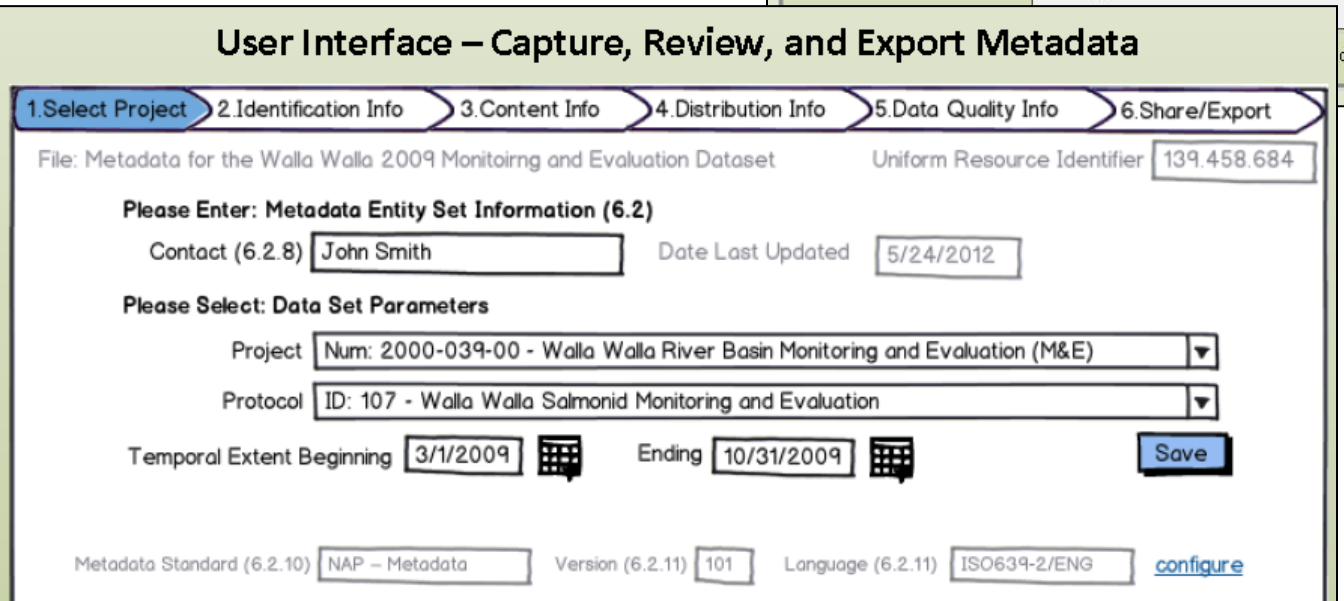
Metadata Builder

- Pilot project – prototype tool development
  - Concept – support for development of a complete metadata record for datasets
  - Pull information from existing online resources into a metadata record template
    - Different organizations would need different web services
    - Not all elements will be found; users will need to fill in what cannot be accessed online
  - Develop prototype specific to BPA; pull elements from Pisces, Taurus, MM.org, etc.
- Seek review of prototype from PNAMP Metadata WG
  - Feedback on tool
  - Regional use
  - Costs

METADATA BUILDER

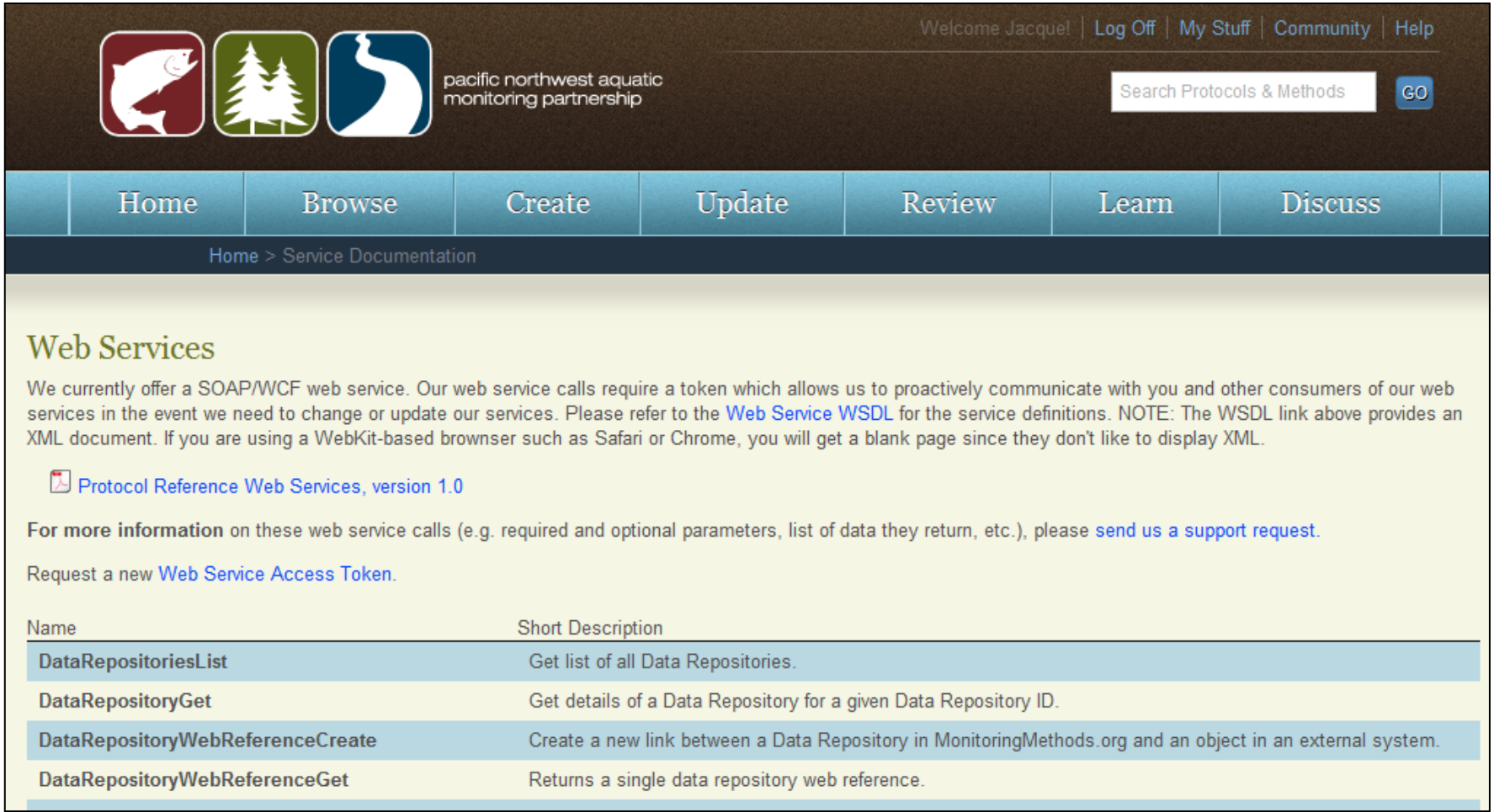
- Current work:
  - New ISO standard
  - Map fields to database information
  - Design concepts for Builder





Web Services with Regional Systems

- Offer web services to exchange information – MonitoringMethods.org
- Encourage use of bi-directional web services
  - Content is dynamic – always up to date in both systems



Web Services with Project Tracking Systems

- Information from MonitoringMethods.org available via web services
- Bonneville Power Administration's cbfish.org – system for selecting and funding projects

Screenshot of portion of a proposal in cbfish.org

DELV-1: **Okanogan River Basin-wide habitat and salmonid assessment**

In 2004, the OBMEP began collecting data throughout the Okanogan River basin. Once 5 years of each data type needed has been collected, these data will be evaluated to compare subwatershed changes over time regarding salmonid habitat. Our analysis will leverage the new and improved EDT3 model to evaluate each of the hydrologic reachs within the Okanogan River Basin. The EDT3 model will provide limiting factors for each hydrologic reach and sub-watershed and a trend in estimated salmonid productivity. Further refinment of these outputs will be accomplished by breaking each limiting factor down to identify the specific input driving this result. Once the input variable driving the limiting factor has been determined, empirical data can be used to evaluate the most relavant metric for status and trend. The derived metric analysis, along with actual adult and juvenile salmonid data, will be used to determine progress toward restoration or degradation and used to focus recovery action efforts in the future. Results will be shared with the Upper Columbia Salmon Recovery Board through their Regional Technical Teams Data analysis workshop and incorparated into the implementation schedule created by the local watershed action teams. In addition to these very specific reports this deliverable will also cover small scale experiments needed to answer important local management questions that require minimal addition data be collected but represent important but yet undefined questions this program will be asked to answer.

Start: 2011 End: 2020
Budget: $1,150,000
Associated Work Elements: 70. Install Fish Monitoring Equipment, 156. Develop RM&E Methods and Designs, 157. Collect/Generate/Validate Field and Lab Data, 160. Create/Manage/Maintain Database, 161. Disseminate Raw/Summary Data and Results, 162. Analyze/Interpret Data, 189. Coordination-Columbia Basinwide, 191. Watershed Coordination
Protocols:
OBMEP-habitat (2003-022-00)
OBMEP-Population estimates of adult summer steelhead spawners and distribution (2003-022-00)
OBMEP-rotary screw trap (2003-022-00)
OBMEP-snorkel, macroinvertebrate, temperature, and water quality montioring (2003-022-00)

DELV-2: **Long-term salmonid data set**

Since 2005, OBMEP has been building a long-term data set for evaluation of status and trend in the Okanogan River Basin. The biological component of this includes; standing crop estimates for salmnoids and macroinvertebrates at all randomly selected habitat sites, juvenile out-migrant data collection at a rotary screw trap, and annual adult summer steelhead population estimates. In addition we assemble, and assisst with data collection events lead by other agencies related to summer Chinook and Sockeye, rather than duplicating these data collection efforts. As this data set becomes more robust it will become the focal point for all data users interested in data related to salmonids in the Okanogan River Basin.

Start: 2011 End: 2020
Budget: $4,000,000
Associated Work Elements: 70. Install Fish Monitoring Equipment, 156. Develop RM&E Methods and Designs, 157. Collect/Generate/Validate Field and Lab Data, 160. Create/Manage/Maintain Database, 161. Disseminate Raw/Summary Data and Results, 162. Analyze/Interpret Data, 189. Coordination-Columbia Basinwide, 191. Watershed Coordination
Protocols:
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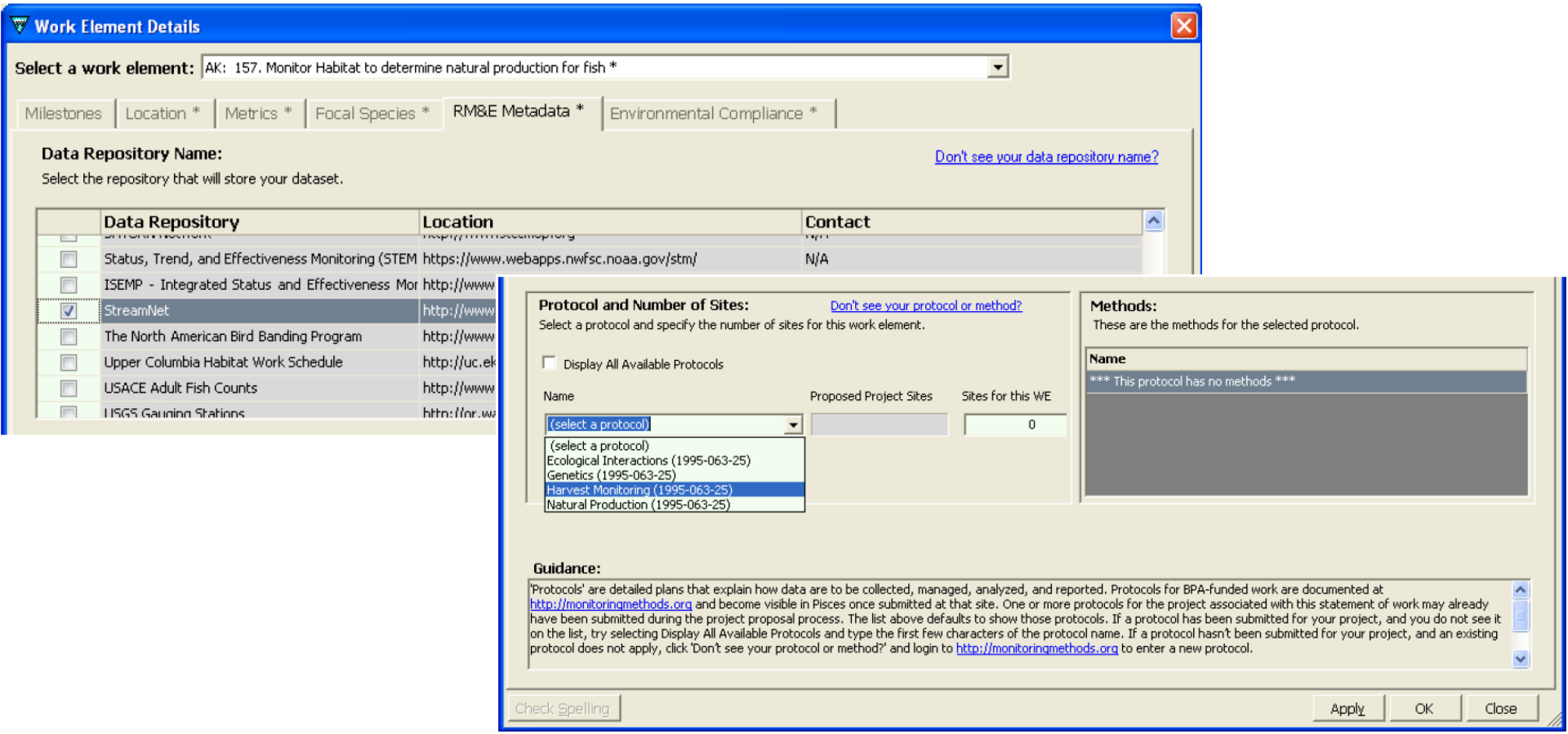
Links to MonitoringMethods.org protocols →

Web Services with Project Tracking Systems



- Bonneville Power Administration's Pisces – system that tracks contracts, SOWs, metrics, status
- Associate Protocol or Data Repository in MonitoringMethods.org with specific tasks in SOW in Pisces

Web Services

- Looking for other systems to connect with…some ideas mentioned so far include:
  - SOTR?
  - StreamNet
  - PCSRF
  - CRITFC Tribal Data Network?
  - Habitat Work Schedule
  - PRISM
  - Washington Department of Ecology EIM
  - JMX
  - ODFW Salmon & Steelhead Salmon Recovery Tracker
  - Others?

Online Tools Budget Overview

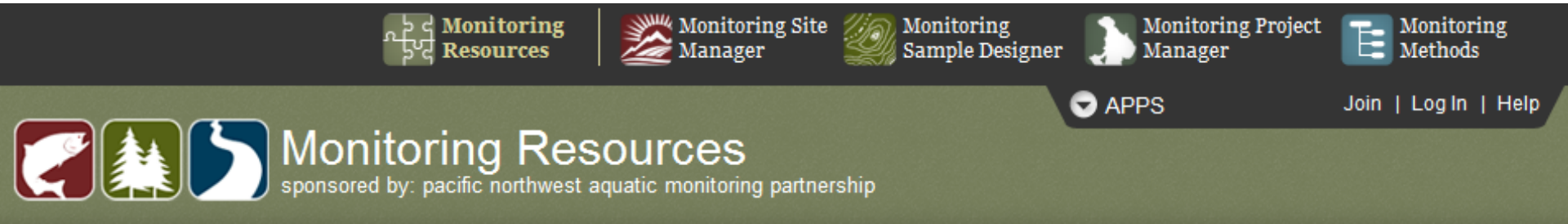
- Prior to 2010, USBR supported development of Protocol Manager/Protocol Library
- 2010
  - Allocated ~$104,000 (BPA funds) and $60,000 (GBMF funds) to MonitoringMethods.org development
- 2011
  - Allocated ~$80,000 (BPA funds) to additional MonitoringMethods.org development
- 2012
  - Allocated ~$310,000 (BPA funds) to development tasks for MonitoringResources.org, Sample Designer and Site Manager (part of Master Sample tool redevelopment), Monitoring Explorer scoping, Metadata Builder scoping
- In all years, funds from BPA, NOAA, and USBR have supported PNAMP staff time to oversee projects

Online Tools In-Kind Contributions

- Leadership team, user testing participants, & feedback rec'd from:
  - BPA
  - CBFWA
  - CCT
  - CHaMP
  - Clark Co.
  - CRITFC
  - CTUIR
  - Ecotrust
  - EPA
  - IDFG
  - LCFRB
  - LCREP
  - NOAA
  - NPT
  - NWHI
  - NWIFC
  - ODFW
  - PSMFC
  - PSP
  - TTECI
  - UCSRB
  - USBR
  - USFS
  - UW
  - USFWS
  - USGS
  - WDFW
  - WSC
  - WA ECY
  - WA Forum
  - WA GSRO
  - YBFWRB
- 2009
  - ~100 hours logged for meetings associated with Protocol Manager
- 2010
  - ~100 hours logged for meetings associated with Monitoring Methods and the Master Sample tool
- 2011
  - ~100 hours logged for meetings associated with Monitoring Methods and the Master Sample tool redevelopment
- 2012
  - ~35 hours logged for meetings associated with MonitoringResources.org, Sample Designer, and Site Manager

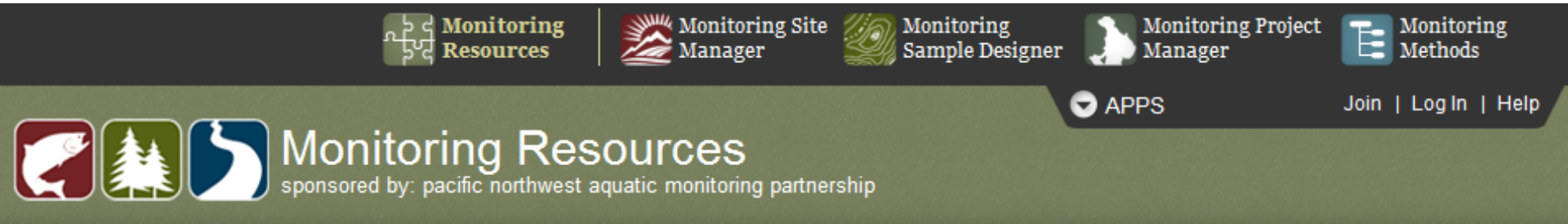
Online Tools: What's in it for You?

- Improved communication
  - Collaboration & data sharing opportunities
  - Who's doing what, where, how?
  - Information discovery; best practices; interaction with peers
- Long term storage of content
- Associate info with data, next contract
- Support for:
  - Data management and sharing processes
  - Documentation for reports
  - Metadata record creation
- Potential to lead to more efficient use of limited funds



Online Tools: Final Points

- PNAMP staff available to help
  - Training for MonitoringMethods.org, other tools as developed
  - Support for content entry
- Feedback – very important!
  - Frustrations, ideas, concerns = use to guide development
    - Help design/modify applications to support user needs
    - Example: "I would be more likely to come back to the tool if it did X, Y, Z for me"
  - Contact Jacque
  - Use Support/Help links on sites



QUESTIONS?

If you have any additional questions or comments, please feel free to contact us.

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MONITORING METHODS TERMINOLOGY

(www.monitoringmethods.org/Glossary/)

- **Protocol** – A detailed plan that explains how data are to be collected, managed, analyzed, and reported, and is a key component of quality assurance for natural resource monitoring programs (Oakley et al. 2003*).
  - A fully defined Protocol in monitoringmethods.org includes Objectives, Key Assumptions, Study Design, Methods, Personnel and Training considerations, etc.
  - What constitutes a new protocol?
    - Different study designs
  - What are good titles?
    - Concise, but informative, like the title of a paper.
    - Does not need to include specifics, but can (agency, project number, location, etc.)
    - *Adult Steelhead Escapement Monitoring in Joseph Creek*
    - *O. nerka Population Abundance Monitoring (hydroacoustics)*

* Oakley, K.L., Thomas, L.P., and Fancy, S.G. 2003. Guidelines for long-term monitoring protocols. Wildlife Society Bulletin. 31(4):1000-1003.

Monitoring Methods Terminology

(http://www.monitoringmethods.org/Glossary/)

- **Method** – A systematic, standard operating procedure for collecting data (Measurements) or analyzing data (deriving Metrics from Measurements). Method descriptions are part of the Response Design. Methods must be: 1. described in documentation, 2. repeatable by others.
  - What makes a good method?
    - Thorough description of one technique, **generic** so it can be shared
  - What is a good title?
    - **Generic**, identifies technique
    - Don't include specifics (agency, location)
    - *Channel Morphology: Bankfull Width*
    - *Redd Survey*
  - What constitutes a new method/customized method?
    - Changes in step-by-step procedures
  - Any change to an existing method should be documented.