1. The ISRP requests that the proponents develop an adaptive management (AM) plan, one that encompasses both internal and external AM. This plan was also requested in past ISRP project reviews. The ISRP notes that while an internal AM process is not described in the proposal, the proponents do provide internal goals and objectives. However, these are only part of an AM process. Please present the internal AM process for ISRP review.

"Adaptive management differs from trial and error by the structure used in adaptive decision making, involving the articulation of objectives, identification of management alternatives, predictions of management consequences, recognition of key uncertainties, and monitoring" (National Research Council 2004 Adaptive Management for Water Resources Planning. The National Academies Press. Washington, D.C.

Adaptive Management Process for the StreamNet Project

Following is an adaptive management process outline (**in bold**), followed by examples or descriptions of how this is currently used or will be used in the future.

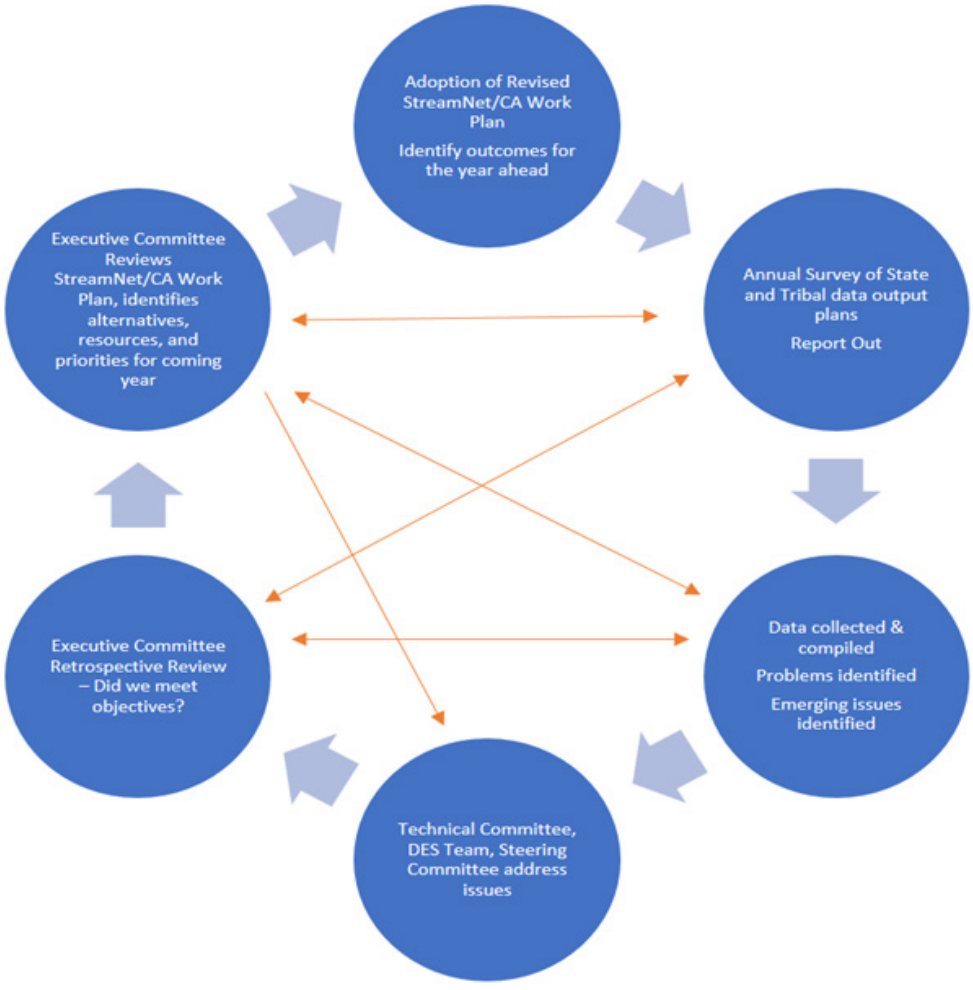

Figure 1. StreamNet adaptive management process outline

Goals and Objectives for the project are established through an overall strategic plan and also though a 5 year plan for the StreamNet/Coordinated Assessments effort. The StreamNet Executive Committee (ExComm) considered and adopted both of these plans in 2015. The strategic plan is a long term document for StreamNet that will be reviewed in 2020. The Coordinated Assessments (CA) five year plan provides the core direction for the project by identifying data delivery priorities for the short and medium term. **The CA plan is reviewed by ExComm every year, and establishes annual priorities for the StreamNet project.** These are published on the StreamNet website after adoption (https://www.streamnet.org/updated-coordinated-assessments-5-year-plan-adopted/). **AM is practiced through the creation of a feedback loop where priorities are established, implemented, evaluated, and adjusted at multiple levels.**

1. **Data management priorities are established at the annual adoption of the CA plan for the year (StreamNet Executive Committee).**
2. **The StreamNet Steering Committee translates that direction into individualized plans for their respective organizations.** These include annual budgets, and prioritized funding of staffing such as funding of staff in specific locations to facilitate data collection for priority populations.
3. **Annual surveys and predictions of CA data flow are compiled by each organization and reported to PSMFC**. These reports for Bonneville Power Administration (BPA), Northwest Power and Conservation Council (NPCC), and NOAA Fisheries (NOAA) document the attainment of CA objectives for the year. They specifically include predictions of data flow, by population and indicator (https://www.streamnet.org/wp-content/uploads/2019/04/Final-Calendar-year-2018-CA-data-delivery-predictions-20181018.pdf. In addition, BPA priority population data are highlighted on a webpage that gives real time information on data flow for these populations (https://www.streamnet.org/ca-priority-data/)
4. **PSMFC completes an annual predictive report on data flow for CA**. These predictions are circulated to the StreamNet ExComm.
5. **Data are compiled and reported. Problems with attaining predicted data are articulated during Steering Committee meetings and via regular discussion with database users**. The Steering Committee members within each organization are utilized as trouble-shooters to assist data users with obtaining information that is not available according to plan. As an example, on March 26, 2019 BPA tried to obtain data for several populations that were not in the database as predicted. This elicited the following exchange between PSMFC, ODFW's StreamNet staff, the field biologist collecting and analyzing data, and the state's data compiler.

    A) BPA identified missing data for Lostine Chinook (which is part of the Wallowa-Lostine population), and requested PSMFC assistance in obtaining those data.
    B) PSMFC contacted ODFW StreamNet staff with that request.
    C) ODFW queried their field biologists and data compilers, and determined that 2009, 2010, 2012, 2013 are in the database and do show. They also determined that 2011 and 2014 - 2017 exist, but Publish=No, so ODFW does

not want those released. Given BPA's need for data, ODFW determined the reason for this, which was

"Methods for NOSA calculations were under review and the biologist in charge asked that they not be published."

D) ODFW's StreamNet personnel then worked with the biologist, and provided this update on April 3, 2019;

"The data has been approved for submission, and will be (submitted) once QA/QC is completed. We will replace 1997 - 2017 data due to method changes in certain years."

E) On April 10, 2019 "NOSA data for the Wallowa/Lostine spring chinook… now available on the CAX"

F) This problem was successfully addressed within 12 working days.

6. **Issues at this level are also periodically addressed by the StreamNet Technical Committee**, which is a group of data compilers, database managers, computer programmers, and other technical experts, both in the program or users of the database. This group identifies and resolves issues at the technical level. If they cannot be addressed there, they are elevated to the Steering Committee, and, if not resolvable there, to the ExComm.
7. **ExComm meets (at least annually, more frequently as needed), and looks back retrospectively on attainment (or lack thereof) of objectives in the previous year. This informs discussion of the prospective plan for the next year, and revision of the CA plan for the upcoming year occurs.** The makeup of the ExComm, with representatives from data users such as BPA, NOAA, NPCC, US Fish and Wildlife Service (USFWS), and data providers such as the state and tribal fisheries agencies, results in a vigorous dialog on data needs and the realities of population monitoring in a real world budget and staffing environment.
8. ExComm representatives from the StreamNet partner agencies received feedback on these realties, as well as proposed goals and objectives, from their own agency staff, who are funded (sometimes in part) by StreamNet. Data users have to respond to pressing legal and management mandates. **At ExComm, they all discuss possible management alternatives**, such as a focus on specific populations, moving on to other species, developing new indicators, etc. Given resource limitations, they must balance these with impacts to existing priority data management efforts. **Alternatives are discussed and the management implications of these alternative are considered. Decisions and recommendations on CA priorities for the upcoming year are then made by consensus, and published in a revised CA planning document. This is reviewed by ExComm and then published on the StreamNet website.** This is an annual AM decision-making process that sets priorities for the StreamNet project.
9. **Implementation of the plan** is the responsibility of the partner agencies and PSMFC staff. Review and discussion occurs on a regular basis, and issues are highlighted at meetings of the StreamNet Steering Committee. Discussion leads to **elevation of management problems, issues, and alternatives to the policy level**, creating a feedback loop to the ExComm, as needed.

10. **If changes to the Data Exchange Standard (DES) are required, that group is called together and DES modifications are made.** These are then reviewed by the Technical and Steering committees and implemented across the region when complete.
11. **The process is repeated annually** and formulates the core of the program and our AM approach.

During the most recent 5 year period, significant issues relating to StreamNet and the CA effort have been identified, and several remain items of discussion for the future. These have included:

1) Stable to declining budgets, which has often limited potential expansion of the project into new populations and indicators, and threatens to impact data flow for existing priorities.
2) Direction from the funding agency to focus on specific populations and indicators, which has led to refocus away from plans to expand the project into new species and indicators.
3) A lack of regional consensus on data sharing for other species, populations, and indicators. This has included direction from the funding agency to NOT expand CA efforts in these areas, if that would negatively impact data flow for priority salmon and steelhead populations. This has led us to concentrate on natural origin indicators for priority salmon and steelhead populations, and has constrained the AM approach in the most recent 2 year period. Addressing other data needs, such as for hatchery fish, bull trout, or resident fishes, has been precluded.

In addition to our internal AM processes, StreamNet is an important participant in the external process of determining monitoring strategies for Columbia Basin salmon and steelhead populations. As policies and goals for populations are established under recovery plans, biological opinions, and the NPCC F&W program, monitoring is needed to evaluate whether the region is meeting established objectives.

The question of the quantity, type, scale, and precision of monitoring to measure populations has been a subject of substantial debate in the region for many years. In 2009 the “Skamania process” (so named for a regional workshop to discuss salmon and steelhead monitoring) produced a framework that was the genesis for CA. Regional fisheries biologists from virtually all of the agencies and tribes reviewed and recommended modifications to the then-current monitoring strategies used by their organizations. Also discussed was a common data management framework, to allow sharing of data and to reduce the duplication in workload needed at the time as multiple agencies attempted to assess populations for their own individual purposes and mandates.

The listing of many populations under ESA gave participants a common focus and need for data - NOAA Fisheries was now responsible for assessing the status of listed populations under the Act. Regional biologists and NOAA staff prioritized a standard set of “high level indicators” (HLI) as the first priority for population monitoring, using the Skamania framework. The NOAA salmon population summary (SPS) database became the target for standardized and compiled indicator data for these populations. State and tribal databases were renovated and aligned with SPS using a common data architecture, to facilitate this sharing. StreamNet was the funding

mechanism and organizational structure that state and tribal data managers used to pay for programming, data compilation and revision, and other tasks needed for this alignment. StreamNet and CA remain involved in this process as we are the data management link between the policy level decisions on which populations to monitor and indicators to collect, and the field data collection projects where the monitoring takes place. ExComm and the Steering Committee are forums to convene discussions of the species, populations, indicators, and metrics to be used for monitoring and evaluating the success of recovery and management strategies.

This AM process is a forum where possible monitoring strategies and practical monitoring considerations are forged into the actual monitoring program for populations of salmon and steelhead. As an example, in 2015 BPA requested that as much data for the existing CA indicators as possible be collected for 69 "priority populations" that were critical for their BiOp reporting. Surveys were conducted of field staff to determine the likelihood and difficulties associated with monitoring each of these populations. The StreamNet ExComm reviewed results, and approved this request to change priorities. This was conveyed to Steering Committee staff in the agencies, who then went about focusing on getting as much data as possible for these populations into the CA database. This revealed that several of these populations had very little monitoring data. The reasons for this were explored, and where possible, additional resources were allocated to obtain and process data.

Current priority populations for monitoring and data sharing were determined by the ExComm after a specific request from BPA, which was based on the previous BiOp for the FCRPS. The new BiOp for the Hydro system (March 29, 2019| NOAA Fisheries | 2019 CRS Biological Opinion https://www.westcoast.fisheries.noaa.gov/publications/hydropower/fcrps/master_2019_crs_biological_opinion__1_.pdf), released last month, states;

"The CRS Action Agencies shall support continued fish population status and trend monitoring where ongoing status and trend programs are located and linked to overall population viability assessments. Support assessing adult abundance monitoring in tributaries as a component of fish population status and trend monitoring in as many populations as possible."

And;

"The CRS Action Agencies shall continue to support efforts pertaining to the coordination of monitoring efforts including standardization of collection protocols and data sharing.
The CRS Action Agencies shall continue to support monitoring and coordination forums and other efforts that the region's tribes, state, other federal agencies, NGOs and other entities participate in to coordinate monitoring actions."

And;

"Refine the fish population status and "fish in/fish out" monitoring approach and prioritize needs for fish in/fish out and status and trend monitoring that is representative of populations and habitats throughout the Columbia River basin.
Make any adjustments that are contemplated to the existing fish population status and trends monitoring network following completion and through the roll-out of the Fish Population strategy

within the Columbia Basin Research Monitoring and Evaluation Framework developed during the term of this biological opinion.

It is anticipated that priority species, populations, indicators, and metrics for monitoring and data sharing will again be determined by the ExComm after these discussions between BPA, NOAA, state and tribal fisheries agencies, and others. These discussions then drive implementation at the StreamNet project as part of CA. As such they form an important part of the AM process for the region's salmon and steelhead recovery efforts. It is also important to note that 74.9% of the StreamNet annual budget ($1,500,350 in FY 2019) is direct pass-through to partner agencies, used to fund data management staff and infrastructure needed to monitor these fish populations.

2. As described in the 2006 ISRP Review, "The project should have in place a system for monitoring and evaluating its performance. The program still needs to develop more in-depth measures of monitoring effectiveness and assess its impact in terms of user satisfaction. Use of the services should be documented, and more focus should be placed on outputs rather than inputs. A systematic way of evaluating effectiveness is needed. Who are the users? Were these users satisfied? Is tracking software used (e.g., Web Trends)? The sponsors should provide some evaluative performance information to address these questions."

The following description is tendered in order to clarify exactly who the primary users of our database are. This is essential in order to address this question. As noted in the proposal, the primary focus of the StreamNet project is now Coordinated Assessments, and the CA database/query system (CAX). The CAX primarily functions as a client database, similar to RMIS and PTAGIS. Our clients are primarily the federal and state agencies that want a single, regionally standardized dataset that contains selected high level indicators for salmon and steelhead populations in the Columbia Basin. These include NOAA, BPA, USFWS, NPCC, and the state and tribal fisheries agencies that contribute and utilize the data. These clients are represented on the governing committees that run the project. They help us to set policy, address issues, and contact us routinely if they are not satisfied with the CAX performance, have questions about the data, or for any other purpose. If they are dissatisfied, they tell us directly.

What could have been more clearly stated in our proposal was the fact that this process has led to <u>less</u> generalized data collection and posting on StreamNet, and consequently less public use of StreamNet by individuals, schools and universities, local governments, and others seeking specific local and often anecdotal information. We do not generally survey these public users of StreamNet data, and several approaches we tried in the past failed. Where StreamNet was once a repository for large volumes of information, very little of it comprehensive, we are now a more focused project, with the goal of helping the region's fishery managers obtain consistent access to the data that they determine to be their highest priority. If we did survey the non-target users, it is likely that they would want us to provide much more generalized information than we do now. That is not the focus of the project, and we have been explicitly directed by our ExComm, and by BPA in our contracts, to focus on the CA priorities they have established.

Systematic determination of effectiveness occurs annually during the review and prioritization process. CAX users are primarily organizations who are a part of the organizational structure of the project, and are contributors to establishing the priorities of the CA effort annually. We believe that their satisfaction with the program is addressed to the fullest extent possible during

the StreamNet governance process, which involves multiple levels of staff from each agency providing and/or using data. Figure 2 summarizes all users of PSMFC StreamNet in calendar year 2018.

StreamNet Usage Summary (PSMFC Only)	2018
Website	2,399,444
Mapper Visits	5,729
CAX Downloads	79
GIS Downloads	1,150
Data Store Downloads	1,325
Help Desk Requests	34
Grand Total	2,407,761

Figure 2. StreamNet annual use summary 2018

StreamNet provides a number of mapping and GIS services, including regional fish distribution, NPCC protected areas, and the system of record for BPA-funded fisheries facilities. Visitation of these sites are summarized in Figure 3. Mapping data include fish distribution information, which is used by federal agencies when they delineate critical habitat for ESA-listed species. It also includes the BPA facility mapper, which is BPA's system of record for program-funded facilities including large dams, hatcheries, and PIT tag arrays (https://www.streamnet.org/data/interactive-maps-and-gis-data/).

Application*	Unique Visits	Daily average unique visits
Reporting period: 1/1/2018 - 12/31/2018		
Columbia Basin Fish Facilities Map Application	635	1.7
PNW Protected Areas & Streams Mapper	509	1.6
StreamNet Mapper	4,585	12.6
Reporting period: 1/1/2017 to 12/31/2017		
Columbia Basin Fish Facilities	655	1.8
PNW Protected Areas & Streams	466	1.28
StreamNet Mapper	4,509	12.39
Reporting period: 1/1/2016 to 12/31/2016		
Columbia Basin Fish Facilities	628	1.72
PNW Protected Areas & Streams	404	1.11
StreamNet Mapper	4,220	11.56
Reporting period: 3/1/2015 to 12/31/2015		
Columbia Basin Fish Facilities	657	1.8
PNW Protected Areas & Streams	351	0.96
StreamNet Mapper	2,850	7.83
**A unique daily visit is sometimes referred to as a 'session' in web analytics terms*		
*** All StreamNet web mapping applications that are currently in use were published on the ArcGIS platform as of 3/1/2015*		
web analytics for prior applications are different in nature and are not comparable.		

Figure 3. The number of unique visitor daily visits for StreamNet mapping applications from 2015 – 2018.

There were also 1,150 GIS data downloads for 2018, an average of 3.15 downloads/day. A summary of StreamNet GIS data download activity for the recent past is shown in Figure 4, primarily to illustrate the summary of use of this type of data by organization type.

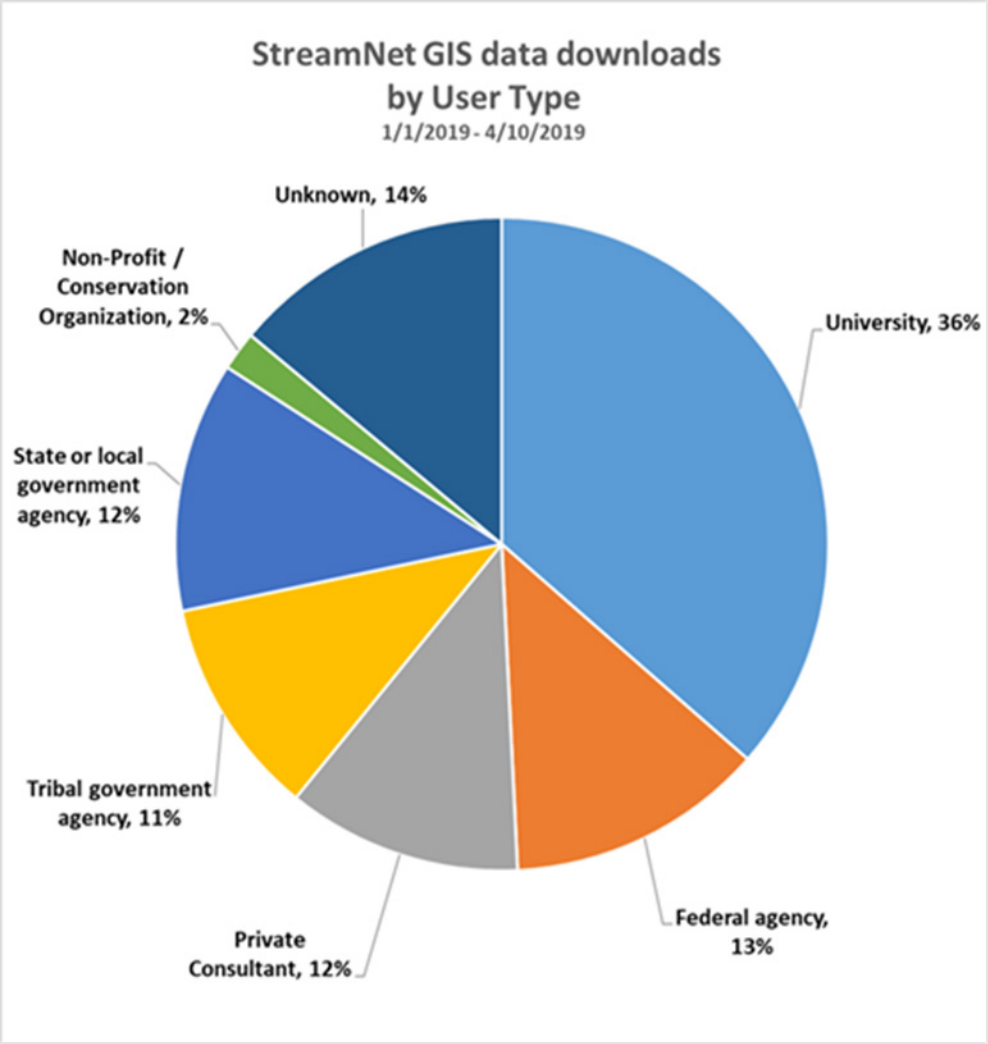

Figure 4. GIS data downloads for the period from 1/1/2019 to 4/10/2019.

We can determine the number of successful data set downloads that occur. These are counted when a user successfully downloads a data set from the Data Store, the full CAX spreadsheet, or the Microsoft Access version of the main StreamNet database. In 2018 there were 1,325 downloads from the Data Store (3.6/day); in the first 3 months of 2019 there were 645 (3.8/day). Total downloads of the CAX full spreadsheet plus the main StreamNet database in Access format was 79 downloads in 2018 (0.2/day), and 48 in the first 3 months of 2019 (0.5/day); roughly 2/3 of these were the Access version of the StreamNet database, and 1/3 the CAX spreadsheet.

Specific detail on website usage over time is displayed in Figure 5. Please note that usage statistics for partner websites is generally not provided here, and is substantial.

StreamNet Website Use Statistics	2018	2017	2016	2015	2014	2013
Total Visits	13,371	22,630	29,708	32,590	39,171	44,798
Unique Visitors	9,197	14,228	18,399	20,014	31,424	36,683
Pageviews	34,551	54,677	83,182	63,880	75,112	89,681
Ave. Page Views	3	2	3	3	2	2
Ave. Time on Site (min)	2	1	3	3	1	1
Data API Usage (hits)	2,399,444	508,123	412,504	144,698	51,358	n/a

Figure 5. StreamNet website statistics.

The use of APIs, where computers routinely transfer information electronically, is rapidly dwarfing all other use categories (Figure 6.). Our clients and partners are increasingly using APIs to share data. Data users can obtain data directly, via the API, or they can download the data at any time. Data providers and data users all contact us directly if they are not satisfied with the CAX performance or have questions about the data. As the project has been transformed over the last 5+ years, our average website use is declining, but the automated exchange of information between our database and others has increased exponentially. This is certainly reducing the number of webpage "views" by the general public, but for many of our clients – StreamNet partners and primary data consumers - data sharing via API has increased dramatically.

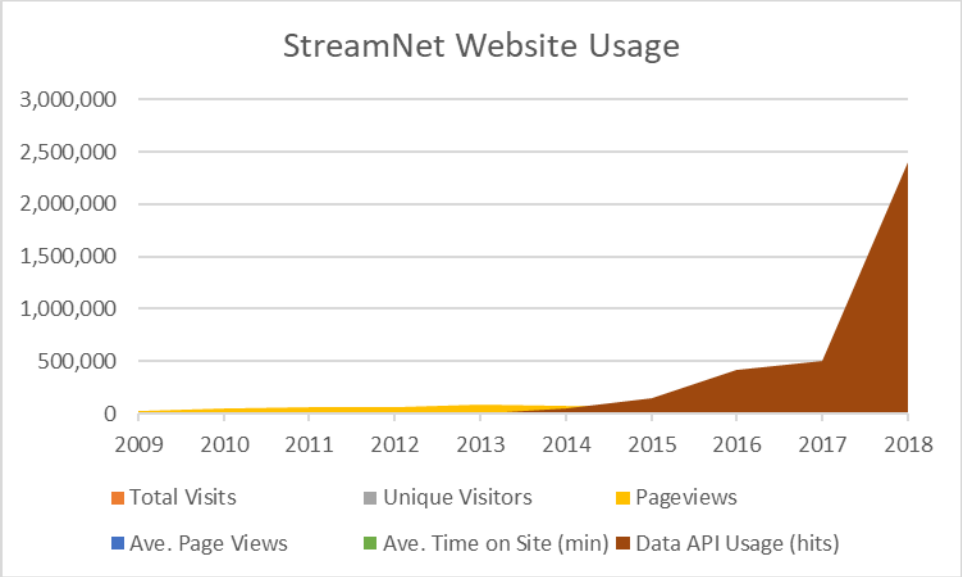

Figure 6. StreamNet website usage by type.

Each year, we conduct meetings and discuss both the flow of existing data and the pros and cons of expanding CA into other populations and indicators. During these discussions, the priorities of the region's fish and wildlife agencies are reviewed. Predictions for data flow for

existing indicators are elucidated by survey, on an annual basis (https://www.streamnet.org/wp-content/uploads/2019/04/Final-Calendar-year-2018-CA-data-delivery-predictions-20181018.pdf). States and tribes are asked to evaluate and predict CA data flow, and to categorize data flow for ESA listed populations as either "Yes" (data will be provided this year). "No" (indicator calculation for this population is theoretically possible, but will not be provided), or "X" (it is not possible to calculate this indicator for this population).

Agencies that want more or different data express their needs. Data providers confer their abilities to provide data, given the resources provided to them by StreamNet and other sources. As the culmination of these discussions, a consensus is reached by the StreamNet ExComm, and priorities for species, populations, indicators, and related data are established for the year. This process is repeated annually and the priorities are reported at https://www.streamnet.org/updated-coordinated-assessments-5-year-plan-adopted/). Each agency represented is directly asked about their priorities, their ability to provide data, and their organization's perspective on the future of the CA effort. We do not use survey methodology to gain input from CAX users for user satisfaction, we directly solicit their input, discuss it in an open forum with all of the agencies represented, and then integrate it into the annual work plan for CA.

The use of StreamNet services is also documented here; https://www.streamnet.org/wp-content/uploads/2019/04/ISRP-StreamNet-User-Information-20190411.pdf. Our primary clients can access the CAX either through query, data download, or API. The quantitative measure of usage (i.e. number of website "hits") does not provide a useful picture of the importance of the CAX. A single download by NOAA, for instance, can inform a five year status review. On the other hand, a single data provider may exchange data thousands of times annually via API. The primary users of the StreamNet website, where identifiable by organization, are shown in Figure 7.

Top users of the StreamNet website (no. of visits)	2018	2017	2016	2015	2014	2013
Internet service providers (Comcast, Verizon, etc.)	6,170	9,621	10,906	9,241	17,862	17,711
State of Oregon	203	380	948	776	640	600
U.S.D.A. Forest Service	172	218	308	347	241	393
National Oceanic and Atmospheric Administration	115	251	540	574	349	309
Bonneville Power Administration	91	173	536	448	213	220
U.S. Fish and Wildlife Service, IRM/BFO hq	86	208	388	256	201	109
Portland State University	81	40	103	146	70	73
OregonState University	77	146	175	187	158	186
Headquarters USAISC (US Army)	72	120	198	394	360	462
University of Washington	65	17	141	167	114	91
Washington State Department of Fish and Wildlife	64	111	220	194	165	89
State of Idaho	52	134	270	158	118	120
USDA Office of Operations	50	78	129	126	122	148
U.S. DOI Bueau of Land Management	38	83	125	176	122	139
Nez Perce Tribe	36	37	80	99	0	0

Figure 7. Top users of StreamNet website.

The singular focus reflected in the CAX is presenting standardized data for selected populations, as determined by the ExComm. If there are discrepancies in data between say, a state database and the CAX, these discrepancies are a significant issue for all concerned. Decisions relating to ESA listing status, state or tribal conservation status, FCRPS operations, and the like are ultimately based on a common data set representing the status and trends of these populations, which is the CAX. The partners providing the data spend a great deal of time ensuring that they are accurate. The agencies using the data are equally concerned if those data are questionable. The primary function of the CAX is to be an accurate, updated record of these data. The QA/QC processes (addressed elsewhere in this response) are significant and robust. We are held accountable for this through the professional work of the many data management professionals who contribute to and conduct the QA/QC activities to ensure that the information in the CAX is accurate. These data are shared with our partners and clients, via download or API, and populates the NOAA SPS database, the Council's dashboards and summary pages, and the contributing partner databases such as ODFW's Salmon Recovery Tracker. Users of these data may access them at any of those portals, as well as through StreamNet.

The project also continues to have a public facing internet query system. Public use of this system has generally declined over time, as StreamNet has focused on a more limited suite of high level indicators (viable salmonid population (VSP) parameters), and has reduced efforts to gather other data types. This decision was made consciously, and with the support of the ExComm. It is summarized in the first objective of the Strategic Plan (**emphasis added**) as follows:

Goal 1. Serve as a primary regional coordination forum for fish and aquatic habitat information management and data sharing.

> *Objective 1.* ***Identify and prioritize the key fish indicators, metrics, and metadata most desirable for decision making, and provide leadership in a collaborative process to develop Data Exchange Standards (DES) that facilitate regional sharing****.*
>
> *Objective 2. Develop and maintain partnerships with states, tribes, agencies and the public that will facilitate cooperation and coordination in data collection, management, and sharing across the region.*
>
> *Objective 3.* ***Once key indicators and metrics are identified, work collaboratively with partners to provide efficient quality review and timely information flow on key indicators for decision and policy makers.***

We do respond regularly to individuals who request help with technical issues with the database and query system. In 2018 we assisted over 34 users directly through the help desk, and in the first 3 months of 2019 we have assisted at least 8 users to date. In addition, partner agencies funded by StreamNet track their help desk assistance. These efforts are summarized in Figure 8.

Help Desk Requests*	2018	2019 thru April 10
PSMFC	34	8
Colville Tribes	0	0
IDFG	65	10
WDFW	25	4
ODFW	138	38
MFWP	45	16
Total	307	76
* numbers are minimums		

Figure 8. StreamNet help desk responses.

We also periodically use survey methodology to address data management questions. As an example, in 2015 BPA requested that as much data for the existing CA indicators as possible be collected for 69 "priority populations" that were critical for their BiOp reporting. Surveys were conducted of field staff to determine the likelihood and difficulties associated with monitoring each of these populations. StreamNet ExComm reviewed results, and approved this request to change priorities. This was conveyed to SC staff in the agencies, who then went about focusing on getting as much data as possible for these populations. This revealed that several of these populations had very little monitoring data. The reasons for this were explored, and where possible, additional resources were allocated to obtain and process data.

A similar survey was completed prior to the development of the 5 year plan for CA. In that effort, an online inquiry was conducted of state, tribal, federal, and university fisheries staff who had been involved in the CA effort. Respondents' input was used to develop a longer term vision and schedule for the CA effort that included an outline of when the next indicators would come on line. The input identified that maintaining close contact with HLI users (such as BPA, NPCC, NOAA) and revisiting the plan annually to ensure alignment with regional priorities were important to participants. These principles were incorporated into the final 5 year plan.

This survey also asked participants to rank the importance of focusing the project on existing or potential new species, populations, and indicators. Participants were asked to rank the relative importance of data categories such as “Additional natural origin salmon and steelhead Indicators”, “Hatchery fish (Interactions in nature/spawning in the wild data”, “ESA listed fish populations (i.e. Bull Trout)”, “Habitat data”, and so forth. These survey results were presented to the ExComm, who then decided on the schedule and implementation of these priorities in the first CA 5 year plan. The plan was then reviewed annually, and adjustments made after discussion and feedback.

In considering expansion of the CA effort, the basic focus has been to bring together the higher level, policy driven users of data with the field project and database managers who collect and provide that information, in order to determine which common, standardized indicators and metrics will be pursued. To date, the necessary combination of need, direction, funding, and support has not occurred beyond the current focus of CA on natural origin salmon and steelhead populations. The constraints of stable or declining budgets has also precluded

expansion. However, we continue to raise this issue, starting with our ExComm, on at least an annual basis.

In summary, the StreamNet project has evolved significantly since the last ISRP review. We hope that this response provides clarification about how the StreamNet governance structure and CA prioritization process directly involves the primary users of our database in evaluating performance, effectiveness, and user satisfaction. The use of services is further documented in this response, and is also documented in our annual reports. We believe that the primary "output" of the project is the CAX, a system of record for the region on HLIs documenting the status and trends of a prioritized list of salmon and steelhead populations. We believe that the effectiveness of CA and the satisfaction of its users are also evaluated annually by the agencies represented on the StreamNet governance committees. Users of the CAX are documented. We acknowledge that public users of the data are not effectively surveyed for satisfaction, an unfortunate side effect of a singular focus on CA, which is likely to continue unless major directional change to StreamNet is instituted.

3. The proponents still need to respond to a previous qualification from the 2012 ISRP review, specifically: That the proponents: "Provide a report describing in detail the data quality assurance and quality control (QA/QC) procedures used by StreamNet." If this is in another StreamNet publication, please provide the link. Otherwise, please provide a response detailing the QA/QC procedures.

Here is a link to the data quality assurance and quality control page on our website;

https://www.streamnet.org/data/coordinated-assessments/data-qa-qc/

Please note that significant detail is provided in the documents and links listed on that web page.

4. (Other comments) The ISRP was surprised that photographs are no-longer stored. For habitat restoration work, photographs provide visual evidence of changes over time. Are these superseded by other formats? StreamNet seems like a logical place to store images from photopoints recorded over time.

StreamNet does store an extensive photo archive of habitat photos within the HEP repository https://www.streamnet.org/hep/hep-file-explorer. These are searchable and accessible in the HEP file explorer.

We agree that StreamNet could be a logical place to store archival photographs. However, we are not funded to do so and have not added photographs since 2003. (There is a single photograph from 2007 -- added by staff). We are not aware of any other formats for collecting visual records of habitat changes that would supersede the photographic format.

Access to the older StreamNet photographs is available here:
http://q.streamnet.org/Request.cfm?cmd=BuildQuery&NewQuery=BuildCriteria&Required=Run&DataCategory=103&_Count=1065.

5. (Other comments) Do the proponents have suggestions on how the Fish and Wildlife Program could assist in addressing these important threats and limiting factors?

The StreamNet ExComm formulated the following as part of the Council's request for Fish and Wildlife Program Amendment Recommendations;

Recommendations on data management for fish populations from the StreamNet Executive Committee

The Coordinated Assessments (CA) effort has successfully reviewed and implemented data sharing for most natural origin salmon and steelhead populations in the Columbia River Basin, to the extent that population-scale data is available. The StreamNet Executive Committee (SNEC) is the leadership team for this effort, and recommends that membership be expanded, to include all federal, state, and tribal fish and wildlife managers involved in data collection for species and populations. Full participation in the CA project is needed to ensure continued progress in coordinated regional data management. Developing and sharing regional High Level Indicators (HLIs) will provide the Northwest Power and Conservation Council (NPCC), Bonneville Power Administration (BPA), and NOAA Fisheries the ability to efficiently evaluate and report on their respective roles in fish and wildlife mitigation and recovery.

NOAA's Columbia Basin Task Force, the NPCC, BPA, and the respective states and tribes are developing a monitoring framework for natural origin salmon and steelhead populations that balances available resources with the need to monitor populations. As appropriate monitoring levels are designated for each population, implementation and data sharing should be coordinated through application of the CA process. Continued support for efforts to coordinate and implement a consistent, sustainable regional direction, including StreamNet, PNAMP, the tribal ITMD project, the CRITFC StreamNet Library, and the Regional Coordination forum, is invaluable and should be continued.

The SNEC should be tasked with implementing a monitoring data matrix for fish species under the F&W Program. The Council should clearly articulate realistic, sustainable and affordable long-term reporting fish populations goals under the F&W Program that engage all responsible regional parties, including Federal and non-Federal utilities. Regional F&W managers should prioritize monitoring to ensure that RM&E efforts at the project and contract level feed into a designed system that yields constructive, valuable and timely feedback on species trends that can effectively inform recovery, mitigation, and harvest programs. Regional collaboration on the monitoring data matrix will help guide expectations on what population data is needed and will be available at the regional level.

The Fish and Wildlife Program would benefit from aligning BPA contracting and reporting (e.g. work elements) with the data management needs outlined in the above approach. A regionally coordinated data management system, with adopted metrics and HLIs under a monitoring framework, would help direct RM&E projects to channel results into this metric/indicator matrix. Projects that monitor salmon and steelhead populations could then provide data to the CA in the proper data exchange standard format as deliverables under contract requirements, supporting the identified consensus data needs of the region.

The Council program would further benefit if monitoring matrices for other species groups were then developed using the CA process, to include;

1. *All natural origin salmon and steelhead populations (listed and non-listed)*
2. *Lamprey*
3. *Sturgeon*

4. *Resident fish species (e.g. bull trout)*
5. *Wildlife*
6. *Hatchery origin salmon and steelhead*

Data management activities could then be directly tied to the development and implementation of regional monitoring strategies. Work elements and reporting at the project and contract level could then be better aligned to ensure that RM&E information is focused on these agreed-to regional monitoring priorities, and would allow for data management funding to be targeted at developing and maintaining databases, websites, and repositories for these prioritized data.

6.(Other comments) There are three primary objectives listed in the 2019 proposal that address priority work items identified in the Five-Year Plan for CA. These objectives are qualitative and do not lend themselves to tracking accomplishments with given timelines. The ISRP believes that the StreamNet project needs to establish quantitative objectives and timelines as well as interim milestones for meeting them.

We will address this in our new SOW. Quantitative objectives for delivering data on priority populations will be added to our work element descriptions. These objectives will likely be addressed in the form of “obtaining Y high level indicators for X populations” during the relevant time period. These quantitative objectives will be tied to the contracting work year, with quarterly reporting in cbfish.

We should also note that our objective is to ensure that the data required for status and trend monitoring for ESA listed salmon and steelhead populations as specified in the current FCRPS Biological Opinion are available, to the greatest extent possible. We will align our priorities with these requirements as the new BiOp is implemented.

Previous Council and ISRP Review History

Assessment Number:	1988-108-04-NPCC-20120313
Project:	1988-108-04 - StreamNet - Coordinated Information System (CIS)/ Northwest Environmental Database (NED)
Review:	Resident Fish, Regional Coordination, and Data Management Category Review
Proposal:	RESCAT-1988-108-04
Proposal State:	Pending BPA Response
Approved Date:	3/5/2014
Recommendation:	Implement with Conditions
Comments:	Council recommendation: Fund as proposed with the following supplemental recommendations through FY 2013:

- Data access under this work should continue to evolve towards a more accessible platform for various users and optimize dynamic web-services to facilitate coordinated data-sharing and data depiction. **{See proposal, as well as ISRP Response #2, particularly API use statistics}**

- As feasible, this work should expand to include additional managers (and data collecting entities3) that currently cannot easily provide access to their data, whether raw or synthesized, to improve accessibility to their data. {**This work HAS been implemented with regards to coordination with CRITFC tribal data providers, particularly most recently via the Tribal ITMD project. This work HAS NOT been expanded into other species or population groups – see proposal, as well as ISRP response #1 – Adaptive Management}**

- StreamNet should strive to be a comprehensive data portal (e.g. linking to and depicting data from other sources etc.) for locating fish data needed to inform Program implementation and broad Program evaluation, emphasizing on using web-services. With respect to salmonid fish data, data collectors could provide their data directly to StreamNet while non-salmonid fish data could be made accessible to StreamNet through web-services from resident fish databases or a resident fish data portal. **This work HAS been implemented with regards to focusing on "the fish data needed to inform Program implementation". This work HAS NOT been expanded into other species or population groups – see proposal, as well as ISRP response #1 – Adaptive Management}**

- Data stored and accessed through StreamNet should include synthesized information, e.g. population estimates, needed for informing Program implementation and broad Program evaluation. **{This is the principle focus of StreamNet and the CA Project See proposal and ISRP Responses #1 and #2}**

- Data made accessible through StreamNet should focus on data funded by Bonneville and priority data for the program. Identification of Bonneville funded projects that collect fish data should be based on project information available at cbfish.org. **{This is the principle focus of StreamNet and the CA Project. Note Repository work element in proposal. Also note Data Store is now linked with cbfish. See ISRP response #1}**

- As necessary, prioritization of Bonneville funded data should be informed by Bonneville and Council's evaluation and reporting needs for the program (e.g., ISRP retrospective reports, Report to Congress, and HLI reports), and Bonneville FCRPS BiOp reports. Furthermore, if the PERC moves forward, it would be expected that the council recommendations based on the guidance from this committee would be incorporated in this work. **{This is the principle focus of StreamNet and the CA Project. See proposal, and ISRP Responses #1 and #2. We are not aware of any follow-up from PERC beyond those that we have been involved in.}**

- Sponsor to participate on the PERC as requested by the Council to assist in developing recommendations of the PERC. **{Completed as directed. See proposal}**

2012 Independent Scientific Review Panel Assessment

Assessment Number:	1988-108-04-ISRP-20120215
Project:	1988-108-04 - StreamNet - Coordinated Information System (CIS)/ Northwest Environmental Database (NED)
Review:	Resident Fish, Regional Coordination, and Data Management Category Review
Proposal Number:	RESCAT-1988-108-04
Completed Date:	4/13/2012

Final Round ISRP Date: 4/3/2012

Final Round ISRP Rating: Meets Scientific Review Criteria (Qualified)

Final Round ISRP Comment:

Qualification #1 - Qualification #1 - Resolve issues concerning Deliverable #2

Resolve issues concerning Deliverable #2 (update existing StreamNet datasets), as follows: (1) StreamNet proposes to stop updating or to provide only opportunistic updating of some of its primary datasets for an unspecified number of years until data collection activities for the Coordinated Assessment (CA) project are completed. The sponsors need to clarify how this will this impact the Council's Fish and Wildlife Program and other projects and programs that require updated StreamNet datasets to complete their work; (2) A regional discussion on which (if any) data types should be permanently dropped from StreamNet needs to be held; and (3) The sponsors need to clarify whether derived value data being collected for the Coordinated Assessments project meet the needs for reporting High Level Indicators (HLIs) for viable salmonid population (VSP) parameters.
{**Please see CA 5 Year Plan and StreamNet Strategic Plan**}
https://www.streamnet.org/updated-coordinated-assessments-5-year-plan-adopted/
https://www.streamnet.org/wp-content/uploads/2014/12/20141121-StreamNet-Vision-Strategic-Plan.pdf

Qualification #2 - Qualification #2 - Design and implement a plan for internal and external effectiveness monitoring

Design and implement a plan for internal and external effectiveness monitoring. Previous ISRP reviews cited "Lack of clarity of who uses StreamNet, site use, and user satisfaction." The sponsors responded that "Site usage and use by agency is reported annually in our annual reports" and that it is difficult to assess satisfaction because it is used over the internet. A very strong rationale for any project is that it is achieving its objectives, and it is important to assess how well StreamNet is meeting the needs of agencies, tribes, and other users. The ISRP suggests that the sponsors provide two letters of reference from each agency working with StreamNet, one from the administrative level and the other from the staff level, outlining progress, improvements, limitations and shortcomings of the approach, and whether alternative forums or approaches might better meet agency needs. **{Please see ISRP response #2}**

Qualification #3 - Qualification #3 - Provide a report describing (QA/QC) procedures

Provide a report describing in detail the data quality assurance and quality control (QA/QC) procedures used by StreamNet. In the FY 2007-09 review, the ISRP encouraged the sponsors "to complete the draft document describing QA/QC procedures soon." In this proposal, the sponsors state, "We hope to develop a report describing the entire QA/QC process more fully in the future." The lack of well-documented QA/QC procedures reduces confidence in the quality of StreamNet datasets and data management systems. **{Please see ISRP response #3}**

Summarized ISRP history from previous proposals (pre- 2011)

Previous ISRP evaluations pointed out several deficiencies, both in the proposals and in project direction. Key concerns over several previous reviews included the following:

• Lack of standardization in data collected, collection methods, and data standards

Please see CA Data Exchange Standard https://www.streamnet.org/coordinated-assessments-des/

• Unclear priorities for the types of data provided through StreamNet

Please see CA 5 Year Plan and StreamNet Strategic Plan
https://www.streamnet.org/updated-coordinated-assessments-5-year-plan-adopted/

https://www.streamnet.org/wp-content/uploads/2014/12/20141121-StreamNet-Vision-Strategic-Plan.pdf

• Lack of clarity of who uses StreamNet, site use, and user satisfaction.

Please see ISRP Response #2

• Lack of description of QA/QC procedures

Please see ISRP response #3

• Lack of adequate metadata

Please review metadata requirements in CA Data Exchange Standard
https://www.streamnet.org/coordinated-assessments-des/

• Justification of the amount of staff and infrastructure

Please see current proposal

• Description of the project interface

Please see current proposal

List of acronyms used:

Acronym / Abbreviation	Meaning
AM	Adaptive management
API	Application program interface
BiOp	Biological Opinion
BPA	Bonneville Power Administration
CA	Coordinated Assessments
CAX	Coordinated Assessments Exchange (a.k.a. CA query system)
DES	Data Exchange Standard
ESA	Endangered Species Act
ExComm	StreamNet Executive Committee (a.k.a. SNEC)
FCRPS	Federal Columbia River Power System
HEP	Habitat Evaluation Procedures (www.streamnet.org/hep)
HLI	High level indicator
NOAA	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NOSA	Natural origin spawner abundance
NPCC	Northwest Power and Conservation Council
ODFW	Oregon Department of Fish and Wildlife
PSMFC	Pacific States Marine Fisheries Commission
PTAGIS	Columbia Basin PIT Tag Information System (ptagis.org)
RMIS	Regional Mark Processing Center (rmis.org)
QA/QC	Quality assurance / quality control
SNEC	StreamNet Executive Committee (a.k.a. ExComm)
USFWS	US Fish and Wildlife Service
VSP	Viable salmonid population