



## **- FY 1998 Annual Report -**

Columbia River Inter-Tribal Fish Commission  
Idaho Department of Fish and Game  
Montana Fish, Wildlife, and Parks  
Oregon Department of Fish and Wildlife  
Pacific States Marine Fisheries Commission  
Shoshone-Bannock Tribes  
U.S. Fish and Wildlife Service  
Washington Department of Fish and Wildlife

# **StreamNet**

## **FY 1998 Annual Report**

Period Covered:

October 1, 1997 - September 30, 1998

Prepared by:

StreamNet Regional Staff & Steering Committee

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Idaho Department of Fish and Game  
Montana Fish, Wildlife, and Parks  
Oregon Department of Fish and Wildlife  
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Washington Department of Fish and Wildlife

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## Summary

This document constitutes the annual report of the StreamNet project. It identifies tasks undertaken during fiscal year 1998 (hereafter FY 98) and presents a summary of project accomplishments.

StreamNet was established to promote exchange and dissemination of aquatic information in a standardized electronic format throughout the Columbia River Basin. StreamNet is authorized by the Northwest Power Planning Council's (Council) Fish and Wildlife Program and is funded by the Bonneville Power Administration (BPA), as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. StreamNet is administered by the Pacific States Marine Fisheries Commission with active participation by tribal, state, and federal fish and wildlife agencies.

Significant accomplishments during FY 98 included:

- 1. Data Development.** The data included in the StreamNet system was significantly enhanced, both by updating existing anadromous fish trend datasets and incorporating new datasets. The most significant enhancement to existing anadromous fish trends was the addition of 75,000 records of historic hatchery release data in Oregon. New datasets included a region-wide 1:100,000-scale anadromous fish and bull trout distribution coverage and a 1:100,000-scale coverage of native salmonids for the state of Montana. Historic data added to the system included findings from the Council's Protected Areas Program and Sub-basin Planning. In cooperation with BPA, StreamNet also incorporated information on historic Fish and Wildlife Program mitigation projects.
- 2. Data Management.** Two new versions of the StreamNet data exchange standards document were released, as was an updated StreamNet data plan. A new StreamNet Internet data query system was released. The graphic interface was made more intuitive, geographic search options were expanded, and overall system power was expanded. Mapping capabilities were incorporated, allowing for the creation of user-defined fish distribution maps at a variety of different scales for all Pacific Northwest watersheds. Expanded library reference materials and electronic maps queries were also provided. System documentation and user help features were significantly enhanced. Significant progress was also made in converting data previously attached to 1:250,000-scale hydrography to 1:100,000 hydrography. Several technical enhancements were made to provide for more efficient integration of StreamNet data with a SQL environment.
- 3. Library/Referencing System.** The StreamNet Library moved to a new, expanded location at the end of FY 97. In FY 98 the library was made fully operational. All materials were catalogued and integrated into the stacks. The library also acquired and implemented catalog and reference software that is consistent with national

library standards and allows efficient information exchange with other libraries. An agreement was established with the Council whereby the StreamNet Library will maintain the Council's extensive fish and wildlife document collection. The Council's collection was subsequently transferred to the library, reviewed for duplication, and catalogued. This transfer both guarantees that the Council's collection will be maintained according to professional library standards and provides the region's resource managers and policy makers with access to these important materials. In addition, the library catalogued approximately 2,000 books and technical reports were catalogued. With these, the StreamNet Library now houses 8,000 catalogued publications. No other library houses such an extensive collection of published and unpublished materials related to Columbia Basin fish resources.

- 4. River Reach System/Hydrologic Referencing.** A multi-year effort to create a regionally consistent and referenced 1:100,000-scale river reach system was completed. The entire system was error-checked and differences between state and regional datasets reconciled. Stream routing was completed for named streams. This product constitutes the most comprehensive 1:100,000-scale system in the nation and is being used as a prototype for a national effort sponsored by the Environmental Protection Agency and U.S. Geological Survey.
- 5. Data Delivery/Information Services.** Project participants responded to approximately 2,000 individual data and information requests during the fiscal year. Services were provided to federal, state, and tribal agencies, as well as several private organizations. Resource management and regulation agencies were the dominant users of StreamNet data services. Products typically included electronic maps and custom tabular data products. Use of the StreamNet Internet data delivery system increased significantly during FY 98. StreamNet also provided significant support to region-wide initiatives including preparation of an Internet product that tracked development of the FY 98 and FY 99 Annual Implementation Work Plans and participation in Fish and Wildlife Program monitoring and watershed planning activities. StreamNet also provided technical support to other Fish and Wildlife Program projects including the Upper Columbia Resident Fish Stock Assessment and the Upper Snake Resident Fish Stock Assessment, among others.
- 6. Project Management.** During FY 98 the Steering Committee made a considerable effort to identify areas where data and data services needed to be expanded or modified in order to respond to emerging Fish and Wildlife Program and related program needs. An exhaustive review of regional policy and science guidance documents was conducted and a correlation made between the StreamNet data plan and the data needs as identified in these documents. StreamNet project managers and steering committee members also participated in several state and regional-level forums that were relevant to aquatic data and data services in order to identify needs and establish relationships with data providers and data users.

In all, 41 people participated in the project during the year, some full-time, some part-time. A total of 371 person months were spent on the project. Of these,

approximately 36 person months were funded from other sources. Staff allocations among project objectives were as follows:

Objective 1: Data Development	46%
Objective 2: Data Management	8%
Objective 3: Library	9%
Objective 4: River Reach System	9%
Objective 5: Data Services	19%
Objective 6: Management	9%

## Objective 1. Data Development

**Objective:** Increase the knowledge base concerning the region's fish and wildlife resources through the acquisition of new, high priority information, and the update and enhancement of existing information.

**Summary:** Compilation of data related to fish and other aquatic resources is a primary objective of the StreamNet project. Data reports, web sites and presentations are of little value to our user community if these products are not supported by high quality, up to date, information. In 1997 significant progress was made in both increasing the data content of StreamNet and solidifying exchange formats and data exchange processes. Details concerning the content of specific datasets are available from the StreamNet web site under the heading "on-line data." A fundamental building block for an interagency data system of this type is the design and implementation of data exchange standards to ensure compatibility of data across agencies. All of the data compiled by this project conforms to these standards. For FY 97 the project focused on eight distinct data compilation tasks, arranged by subject matter. Accomplishments relating to each task are summarized below.

### ANADROMOUS FISH

**Task 1.1** Prepare and maintain standardized data on anadromous salmonids and, as available, other anadromous fish, to include:

- a) Ocean range and distribution.
- b) Freshwater distribution, life history, and barriers.
- c) Adult abundance (escapement, redd counts, trap counts, dam counts).
- d) Juvenile abundance (smolt monitoring, index of abundance, hatchery/wild ratio).
- e) Harvest (ocean, in-river, terminal).
- f) Natural production (survival, production factors, spawner recruit numbers).
- g) Hatchery production (releases, exploitation, maturation, returns, and disposition).
- h) Age composition at return.
- i) Genetic origin, production type, stock and population identification.
- j) Historic range.
- k) Data and appropriate analytical results derived from PATH.

**Task 1.1 Accomplishments.** Spatial data depicting distribution and use type for six salmonid species were integrated with the PNW 1:100,000-scale hydrography. Use was divided in three categories: spawning and rearing, rearing only, and migration. 1:250,000-scale anadromous fish distribution from the Council's Subbasin Planning initiative was also integrated into the StreamNet query system.

Trend data were added to the following datasets:

- Adult abundance (spawner escapement, redd counts, trap counts, dam counts)
  - 1997 mainstem dam counts
  - updated natural escapement trends for Oregon salmon and steelhead
  - updated natural escapement trends for Washington steelhead
  - updated adult escapement for Oregon
  - 1997 redd counts for Idaho
  - 1997 weir counts for Idaho
- Harvest (ocean, freshwater)
  - updated sport harvest for Oregon
- Natural production (spawner recruit numbers)
  - data from PATH analysis
- Hatchery production (release numbers, and return rates)
  - 75,000 records of historical (from 1940) hatchery releases for Oregon
  - 1996 and 1997 hatchery releases nationwide
  - 1997 hatchery returns for Idaho (new format)
  - 1997 hatchery returns for Oregon (new format)
  - 1997 hatchery returns from Washington (new format)
- Age composition
  - updated from CWT data

Smolt density data from the Council's Subbasin Planning initiative were added to the online data query system.

Genetic origin data initiatives involved two activities:

First, the concept of incorporating genetic data into the StreamNet query system was investigated. The idea was ultimately rejected due to a) a reluctance among researchers to provide these data, b) the variability among collection techniques and data structures, and c) the belief that providing technical data of this nature via the web may not be productive. Rather, the decision was made to pursue the identification of "metadata," that is, information on where genetics data have been collected. No effort was made to actually compile these data during FY 98.

Second, agency population classification schemes were identified. Both Oregon and Washington have systems for recording stocks and populations. NMFS also classifies stocks of endangered species using "Evolutionarily Significant Units," or "ESUs." The sources for these data were identified. It was decided not to incorporate these data at this time as these are evolving.

It was determined that it is not possible (or prudent) to attempt a reach-by-reach identification of historic habitat. Rather, this is best accomplished by identifying blocked hydrologic units at the 5<sup>th</sup> or 6<sup>th</sup> field HUC where fish are known to have occurred historically. Basic coverages were secured but not subjected to detailed review as there were other higher priorities, i.e., current fish distribution.

Table 1 summarizes StreamNet anadromous fish data holdings as of July 1998. (No new data were added between August 1 and October 1 to allow for hiring and orientation of a new regional data manager.)

**Table 1. Anadromous Fish Data Holdings for Version 98.5 of *StreamNet Online*.**

Table shows generalized types of available data. An online, detailed data dictionary can be seen by running the StreamNet online data query and clicking the Data Holdings button. This will generate an up to the minute report of current data holdings.

Adult Data, Smolt Density Model								
Geographic Area	Species	Mainstem Dam Counts	Wier/Dam Counts	Redd Counts	Peak Spawn. Counts	Est. of Spawn. Pop.	Spawn - Recruit Est.	Smolt Density Data
Alaska	Salmon		X					
	Steelhead		X					
California	Salmon		X	X	X	X		
	Steelhead		X		X			
Idaho Col. Basin	Salmon		X	X			X	X
	Steelhead			X				X
Montana (West Side)	Various Resident							
Oregon Coastal	Salmon		X		X			
	Steelhead					X		
Oregon Col. Basin	Salmon	X	X	X	X	X	X	X
	Steelhead	X	X	X	X			X
Washington Coastal	Salmon				X	X		
	Steelhead					X		
Washington Col. Basin	Salmon	X	X	X	X	X	X	X
	Steelhead	X				X		X
Washington Puget Sound	Salmon		X		X	X		
	Steelhead					X		

**Table 1. Anadromous Fish Data Holdings for Version 98.5 of StreamNet Online**  
(continued).

Geographic Area	Species	Hatchery Data				Harvest Data			
		Releases	Returns	FW Sport	FW Comm.	FW Treaty	Marine Sport	Marine Comm.	Marine Treaty
Alaska	Salmon			X			X		
	Steelhead			X			X		
California	Salmon	X					X	X	
	Steelhead	X							
Columbia R	Salmon			X	X	X			
	Steelhead			X	X				
Idaho Col. Basin	Salmon	X	X						
	Steelhead	X	X	X					
Oregon Coastal	Salmon	X	X	X			X		
	Steelhead	X	X	X			X		
Oregon Col. Basin	Salmon	X	X	X					
	Steelhead	X	X	X					
Washington Coastal	Salmon	X	X				X	X	X
	Steelhead	X		X			X		
Washington Col. Basin	Salmon	X	X	X	X	X			
	Steelhead	X	X	X					
Washington Puget Sound	Salmon	X	X						
	Steelhead	X		X					

**RESIDENT FISH AND OTHER AQUATIC SPECIES**

**Task 1.2** Prepare and maintain standardized data on resident fish and other aquatic species, to include:

- a) Distribution and, when known, life history.
- b) Hatchery production (releases and outplants) for salmonids.
- c) Natural production.
- d) Genetic origin, production type, stock and population identification.
- e) Historic range.

**Task 1.2 Accomplishments.** Bull trout distribution data were updated in all four states.

Montana resident data were updated through a comprehensive review of data by regional biologists. This update addressed distribution, adult abundance, and habitat quality. This also led to a "re-rating" of streams originally rated for resource significance in the original Pacific Rivers Study. Distribution data layers were produced for all native and non-native salmonids. Data are currently linked to a non-standard 1:100,000-scale hydrography so are not readily adapted to a region-wide system. Montana also updated its hatchery production database (using other funds) and these data were made available

to the region. (A regional resident fish hatchery production exchange format will be prepared in FY 99.)

Resident fish activities in the other three states focused on the development of species distribution data layers for native salmonids. In Idaho all native salmonids have distribution layers, though they lack final review by regional biologists. Washington resident fish data were previously available but were dated. A review of these layers was initiated and is slated for completion in FY 99.

Hatchery releases for Oregon resident fish were also captured from 1940 to present as part of an effort to encode historical anadromous fish hatchery release records.

## **HABITAT**

**Task 1.3** Prepare and maintain standardized data relating to fish and aquatic habitat, to include:

- a) Data exchange formats consistent with interagency “core variables.”
- b) ICBEMP and comparable westside datasets.
- c) Proposed and final ESA critical habitats for fish and aquatic wildlife.
- d) Clean Water Act 303(d) data.
- e) Estuary and ocean habitat - devise a strategy.
- f) Other sources that can contribute to characterization of aquatic habitat.

**Task 1.3 Accomplishments.** Data on aquatic habitat is the most illusive of all data types in the StreamNet system. This is due to the wide range of habitat types in the basin, the lack of agreement on the habitat variable that determine species health, and the lack of field sample data and agreement on the factors that should be included in such field-level data collection.

StreamNet reviewed scientific literature, Fish and Wildlife Program documents, Endangered Species Act documents, and other relevant materials in an effort to identify what data elements should constitute a core habitat dataset. StreamNet sponsored a four-state meeting among fish and wildlife agency habitat biologists where the concept of interagency cooperation on data standards was discussed. StreamNet also was an active participant in the interagency IRICC process, which produced a proposed list of habitat core variables and procedures for collecting data related to these variables. StreamNet also monitored the Federal ICBEMP process in order to identify data collaboration opportunities.

Historic habitat rating data from the Council’s Sub-basin Planning, Smolt Density Model, and Protected Areas Program were integrated into the StreamNet data query system. Currently these represent the only regionally standard habitat quality/suitability data in the Columbia Basin.

Discussions were held with EPA regarding compilation of water quality data including 303(d) data and existing data were acquired. No new critical habitat areas were designated during FY 98 and so no new data of this type were added.

StreamNet researched available web-based sources of ocean data and created a web feature that provided access to these data. Little effort was placed on estuary data as separate program is in place to address Columbia Estuary issues.

## **FACILITIES**

**Task 1.4** Maintain standardized data relating to facilities affecting fish and aquatic habitat.

- a) Dams.
- b) Irrigation diversions and screening status (exchange format only).
- c) Man-made blockages and fish passage facilities (exchange format only).
- d) Anadromous and resident hatchery facilities.

**Task 1.4 Accomplishments.** StreamNet maintained the existing dams dataset.

Each state reviewed their irrigation diversion and screening data in order to a) determine the potential for compiling these data into a statewide and later regional dataset, and b) identify common parameters that might constitute a regional data exchange format. Based on this, it was determined that the existing data were not in a condition that could be consolidated without considerable new effort. Based on this the decision was made to halt work on the development of an exchange format pending further clarification by Program decision-makers on the need for these data.

An exchange format for barriers was created, reviewed, and incorporated into the StreamNet Data Exchange Format document (version 98.2).

A draft hatchery facility data exchange format was created and presented to Program's Artificial Production Review group for comment. The decision was made to defer final agreement on the format pending further clarification from this group. A final format is expected in FY 99.

## **AQUATIC MITIGATION AND RESTORATION PROJECTS**

**Task 1.5** Prepare and maintain standardized data relating to the tracking of aquatic management and restoration projects, to include:

- a) Fish and wildlife enhancement projects funded through the Fish and Wildlife Program.
- b) Aquatic restoration projects funded in accordance with the interagency MOA.
- c) Other restoration, protection, and mitigation projects (evaluate).

**Task 1.5 Accomplishments.** Project tracking efforts focused on three areas:

First, a data exchange format was created based on Fish and Wildlife Program project data maintained by BPA. This format was distributed for review to agencies involved in aquatic enhancement projects. Considerable energy was expended in discussions with these agencies in an effort to identify common ground. The variety of needs and mandates made this an especially complex undertaking. The focus within the Fish and Wildlife Program on the Annual Implementation Work Plan made it difficult to get Program managers to look beyond this short-term imperative to the longer-term project tracking issue. Nonetheless, a much-enhanced version of the exchange format was created, with agreement on a final version anticipated in early FY 99.

Second, StreamNet collaborated with BPA in integrating BPA's historic Fish and Wildlife Program project dataset into the StreamNet query system. This was a major accomplishment, offering for the first time the opportunity to sort through historic project data to identify projects that meet specified criteria.

Third, StreamNet collaborated with BPA, CBFWA, and NPPC in the creation of a web-based version of the FY 97 and 98 Annual Implementation Work Plans. These products received significant use and quickly became the preferred means to track AIWP progress and to access data on these projects.

## **DATA REFERENCE**

**Task 1.6** Document data incorporated into StreamNet with reference number and source; collect applicable source documents and provide to the Library.

**Task 1.6 Accomplishments.** In accordance with StreamNet data exchange procedures, all data delivered to the regional system were accompanied by applicable source documents and reference numbers. Reference numbers were incorporated into the regional dataset. Source documents were forwarded to the StreamNet Library, catalogued, and shelved. 498 documents were catalogued through this process. The query system was also upgraded to provide more complete reference information.

## **RIVER SYSTEM OPERATIONS**

**Task 1.7**      Compile historic data on mainstem hydro and storage dam operations.

**Task 1.7 Accomplishments.** Based on discussions with the Fish Passage Center, the CBFWA Anadromous Caucus, BPA, and NPPC, and on comments of the Independent Science Review Panel, it was decided that work on this task should be deferred pending development of a Fish and Wildlife Program-wide data development strategy. The concern was that undertaking this task may give the impression of duplication with other Program-funded activities.

**Task 1.8**      Participate in regional discussions on providing in-season and dam operations data and determine the appropriate role for StreamNet.

**Task 1.8 Accomplishments.** This task had been proposed by BPA as one possibility for initiating a “second-tier” data system for the Fish and Wildlife Program. Considerable controversy exists regarding the utility of such a system and there is a general disinclination within the Fish and Wildlife Program to address this issue. No formal discussion on the topic occurred during FY 98. StreamNet did participate in appropriate informal discussions regarding this topic.

## Objective 2. Data Management

**Objective:** Provide high quality data management services, with specific emphasis on the creation of regionally consistent data sets.

**Summary:** High quality data management is key to effective integration of data into the StreamNet system. StreamNet's data management activities include management of both tabular and spatial data. Development of data exchange standards and formats and the integration of data using these formats is at the core of the StreamNet system. Data management occurs at both the agency and regional levels. At the agency level, each state has data management staff assigned to the project. These staff work with biologists and others to compile data and ensure efficient exchange with the regional team. In FY 97 CRITFC secured the services of a data manager to promote coordination between member tribes and StreamNet. At the regional level StreamNet employs a regional data manager and, during FY 97, secured the services of a regional GIS data manager.

The major data management accomplishments in FY 97 were 1) development of significant new datasets and data exchange formats, 2) development of a geographic information system capability and integration of tabular and spatial datasets, 3) coordinating the evolution of data from a stand-alone system to an Internet-based system and 4) designing and establishing a StreamNet web server capability. The six tasks associated with data management undertaken during FY 98 include:

**Task 2.1** Design, develop, and maintain standard codes and data exchange formats for data being compiled as part of the StreamNet project, and for similar data development initiatives.

**Task 2.1 Accomplishments.** New exchange formats were created for temperature, hatchery facilities, juvenile abundance, project tracking, distribution and barriers, and resident fish. Technical changes were made to several tables. A description of procedures for submitting references to StreamNet was also added. Changes are tracked in an appendix to the data exchange format document.

**Task 2.2** Update the existing data exchange formats report.

**Task 2.2 Accomplishments.** The StreamNet Data Exchange Formats document was updated twice during the fiscal year. Version 98-1 was released in January 1998; Version 98-2 was released in July 1998. 98-1 contained normal, incremental changes. 98-2 was a more ambitious modification that was made in anticipation of the departure of our regional data manager. Both versions are available on the Project Management portion of the project's web page.

**Task 2.3** Provide database management and administration, to include: 1) maintaining StreamNet data sets, 2) processing exchange data into the regional database, 3) transporting data to SQL, 4) enhancing StreamNet database structures and capabilities, and 5) providing programming services to participants to allow for efficient data entry and transfer.

**Task 2.3 Accomplishments.** StreamNet maintained necessary staff at both the regional and agency level to ensure efficient and effective database management and administration. At the regional level two staff members were involved - a regional database manager and a regional GIS manager. Both were employed full time. StreamNet also maintained a contract with a programmer who acted as part of the regional team. Each state team included a database specialist and a GIS specialist. A data manager was also employed at CRITFC to coordinate tribal data transfer.

In July 1998 StreamNet’s regional data manager resigned after several years at the helm of the StreamNet data system. This caused some disruption in incorporation of data into the regional system. Disruption was minimized as we had several months to prepare for this and activities were planned so as to have the bulk of the year’s data submittals available prior to his departure. A search for a replacement was conducted in August and September, resulting in the hiring of a qualified individual on the first day of the FY 99 contract.

During FY 99 five major revisions to the regional dataset were made. The dates of these revisions and a summary of the data added are shown in table 2.

**Table 2. FY 98 StreamNet Data Releases.**

Version	Additions
Version 98.1 (February 1998)	1:100,000-scale anadromous species distribution data.
Version 98.2 (March 1998)	OR escapement data, static maps of major dams, photo library.
Version 98.3 (April 1998)	Protected Areas, Smolt Density Model data, 1:100,000 bull trout distribution.
Version 98.4 (May 1998)	1997 mainstem dam counts, updated WA steelhead natural escapement data, natural escapement data for OR, comprehensive historical hatchery release data for OR.
Version 98.5 (July 1998)	1996-7 hatchery releases, historic salmon releases for WA, updated natural escapement for OR, updated references.

**Task 2.4** Designate and maintain a metadata format for spatial data.

**Task 2.4 Accomplishments.** This task was deferred due to the need to focus GIS attention on completion of the new PNW hydrography and the creation of updated distribution coverages. StreamNet did monitor progress on a similar task being undertaken by a NPPC consultant and the evolution of the ICBEMP project, which contains numerous data layers. A metadata format will be prepared in FY 99 as part of the multi-Species Framework project. StreamNet GIS staff did maintain internal metadata formats for project use.

**Task 2.5** Establish and implement procedures for coordinating spatial data activities among participating organizations.

**Task 2.5 Accomplishments.** The regional GIS manager maintained frequent contact with state counterparts, including at least one site visit to each location. Conference calls were held on three different occasions to facilitate coordination of specific data issues. The increased attention to this on the part of the regional GIS manager resulted in better consistency among state products and an increase in the amount of data delivered to the regional system.

**Task 2.6** Update/maintain a project data plan that identifies 1) current data holdings, 2) data items to be incorporated, and 3) data development expectations for participating agencies.

**Task 2.6 Accomplishments.** StreamNet updates its data plan on at least an annual basis. During FY 99 increased attention was placed on the current year data plan, including the identification of staff allocations to each task, staff assignments, and state data priorities. The data plan is available on the StreamNet web site, in the data development section of “project management.”

## Objective 3. Library/Reference Services

**Objective:** Provide high quality library services targeted to meeting the needs of the region's decision-makers, planners, managers, and the public in the areas of fish, wildlife, and aquatic habitat. This includes continuing to acquire and catalog relevant research reports and other documents and providing open and efficient access to these materials.

**Summary:** This was a year in which the Library solidified its presence as a regional resource for Columbia Basin fisheries information. The StreamNet Library is now considered a primary source for both print and electronic information about fish resources. It was still a year of growth and development and it may be some before the Library operates in a purely maintenance mode.

The StreamNet Library performs several functions, including creating and maintaining a collection of reference documents related to StreamNet datasets, maintaining a broad collection of additional materials related to Pacific Northwest fish science and management, and performing research support tasks. The StreamNet Library is managed by a professional librarian. Support staff assist with cataloging and other library functions. During FY 97 the library had moved into a new facility and, for the first time, became a fully functioning reference library. In FY 98 the collection continued to grow. All materials were cataloged. This marked the first time that there was no cataloging backlog. The number of users also continued to grow.

The FY 98 work statement included five specific library tasks. Accomplishments related to each task are highlighted below.

**Task 3.1** Continue to develop a collection of materials including:

- a) Documents used as source materials for StreamNet data.
- b) Documents prepared by Fish and Wildlife Program contractors, including final products published by BPA and draft documents suitable for public release.
- c) Documents from the Council's Fish and Wildlife Program-related collection.
- d) Additional books, journals, agency reports, gray literature, research reports, and documents that are applicable to management of the region's aquatic resources.
- e) Documents related to NMFS ESA activities.

**Task 3.1 Accomplishments.** The major enhancement to the collection was the transfer of 3,000 volumes from the Northwest Power Planning Council to the library. These materials were sorted, reviewed for duplication, catalogued, and prepared for shelving, which will occur in early FY 99. This transfer offers two advantages. First, it provides professional maintenance for a major Columbia Basin fish and wildlife collection. Second, it provides access to this collection to users who previously would have had access.

In addition to the Council collection, the library acquired 950 new books, reports, and other materials. The majority of these were StreamNet data reference materials provided by participating agencies.

Some in the region have suggested that it might be appropriate for the library to assume management of the National Marine Fisheries Service's Portland collection and/or administrative records in order to provide professional management and broader public access. The library did maintain contact with NMFS, including providing technical recommendations as requested. However, no discussions were held regarding a broader role in management of the collection.

**Task 3.2** Provide improved user access to the materials described in Task 3.1, including:

- a) Maintain an appropriate facility for the storage and use of the physical collection.
- b) Organize and maintain the collection for appropriate on-site use.
- c) Provide access to the StreamNet Library Catalog via the Internet.
- d) Construct a useful keyword thesaurus/subject heading list.

**Task 3.2 Accomplishments.** Significant progress was made in the area of user access to materials. The facility itself was made more conducive to on-site use. New equipment was purchased in accordance with the overall library improvement plan. These included table sand chairs (ordered and paid for in FY 97), map drawers, and display cases. The Columbia River Inter-tribal Fish Commission contributed art works and rugs that significantly enhanced the library's visual appeal.

All materials from the previous location were catalogued, shelved, and otherwise made available for use.

An online web-based catalog was created which, for the first time, integrates all of the collections held at the library. This proved very useful for both on-site and remote use. The StreamNet query system was refined to provide increased query capability to library materials.

The librarian and the StreamNet data manager jointly prepared new protocol for the cataloging of StreamNet reference materials. These were incorporated into the StreamNet Data Exchange Standards document.

**Task 3.3** Catalog, index, and prepare a summary of materials acquired in Task 3.1a; catalog and index materials acquired in Task 3.1b; catalog materials acquired in Task 3.1c,d.

**Task 3.3 Accomplishments.** A full-time cataloger was hired. As a result, all materials collected during the year were catalogued, including the Council's collection. All

uncatalogued materials from previous years were also catalogued. The library now maintains 9,054 catalogued titles. A summary of catalogued StreamNet reference materials is available via the StreamNet Internet site.

The library also conducted a comprehensive review and re-ordering of the topographic map collection.

**Task 3.4** Manage the StreamNet Library and provide library services including reference and referral, document delivery, inter-library lending and borrowing, and on-line search.

**Task 3.4 Accomplishments.** Significant advancements were made in streamlining the electronic reference system. The system was also updated to link all new data to reference materials.

During the year the library served users from over 70 different organizations including state and federal agencies, environmental organizations, universities, tribes, inter-governmental entities, and consultants. Services included 440 reference inquiries, 274 inter-library loans, 345 circulated items, and 6,051 photocopies.

The library access guide, which describes policies and services, was revised during the year.

Several library open houses were held to introduce the various user and professional communities to the library.

**Task 3.5** Engage in networking with other agency and regional library service providers including:

- a) Collect information about other regional fish and wildlife library collections, access policies.
- b) Provide consultations for on ways to coordinate catalogs and services.
- c) Coordinate with (others) to improve services and avoid unnecessary duplication.
- d) Facilitate communications between agency library service providers.

**Task 3.5 Accomplishments.** The library participated in a variety of professional activities within the library community. The librarian participated in professional meetings, assisted in the preparation of an article describing the library for a professional library publication, and co-hosted a local library conference. Frequent contact was maintained with other local and regional libraries through inter-library loan and related activities. The StreamNet librarian provided significant technical assistance to the Montana Department of Fish, Wildlife, and Parks in the establishment of that agency's resource library.

## **Objective 4. River Reach System/ Hydrologic Referencing**

**Objective:** Create and maintain the means to link StreamNet data to hydrologic units, streams, and specific locations and to analyze and display this information using database and geographic information system technologies.

**Summary:** The EPA River Reach System plays a fundamental role in organizing StreamNet data. All StreamNet data is associated with an EPA reach number, or a derivation of an EPA reach number. By doing so, all data in the system can be queried using a single query system. Furthermore, since the EPA system has a GIS component, use of the reach code enables spatial analysis and display of StreamNet data in a GIS system. Considerable effort has been expended over the past several years to update the existing 1:250,000-scale EPA Reach file to the higher resolution 1:100,000-scale. StreamNet efforts during FY 98 focused on 1) completing an accurate and functional 1:100,000 Pacific Northwest River Reach System (referred to as the 100K PNW), 3) using the 100K PNW to compile regionally-consistent anadromous fish distribution data, and 4) continued coordination with the National Hydrographic Dataset (NHD) project. The six river reach system tasks that constituted the FY 97 were as follows:

**Task 4.1** Maintain active coordination with the NHD team, providing comments and technical assistance as necessary.

**Task 4.1 Accomplishments.** StreamNet serves as the official contact within the Pacific Northwest for the NHD project. StreamNet's regional staff has maintained frequent telephone and email communication with the EPA/USGS effort. Staff has provided NHD with electronic files of the 100K PNW, revised these files as necessary to meet NHD needs, and error checked draft NHD products. The NHD project has fallen behind schedule and it was determined that, while we should continue to coordinate with that effort, improvements to the PNW hydrography would proceed.

**Task 4.2** Assess the status of the 1:100,000-scale hydrography in terms of its treatment of lakes and reservoirs; establish graphic links and provide regionally consistent unique numbers for stream-linked water bodies (and high mountain lakes if feasible).

**Task 4.2 Accomplishments.** WDFW and IDFG both created statewide lakes and reservoirs datasets and linked these to spatial data. A regionally-consistent lakes dataset was not created. This was due to 1) the lack of a completed NHD product, and 2) the need to focus GIS and database attention on more immediate priorities.

**Task 4.3** Evaluate the NHD product in terms of accuracy and applicability to StreamNet. Make appropriate corrections to the NHD.

**Task 4.3 Accomplishments.** This task was postponed due to delays at the national level. StreamNet staff did review all NHD products and provided comments as appropriate.

Given the delays in completing this project, the decision was made to proceed with plans for finalizing a PNW 1:100,000-scale hydrography for use by StreamNet. StreamNet supports completion of a national product and will continue to monitor progress and provide technical assistance. However, decisions on use of the resultant product will be deferred until it is available.

**Task 4.4** Implement the river reach system maintenance strategy including:

- a) Establish maintenance and enhancement protocol and procedures.
- b) Aggregate route and ID coverage's into one library.
- c) Assign names to unnamed streams, create routes, and add unique stream ID.

**Task 4.4 Accomplishments.** During FY 98 a hydrographic datalayer was created for Idaho, Oregon, Washington, and the Columbia Basin portion of Montana that included stream routing and unique identifiers for each route (LLIDs). Unnamed streams were incorporated for Oregon and Washington. The decision was made to postpone incorporating unnamed streams in Idaho until the next iteration. A complete Montana hydrographic layer will await the NHD. The creation of this dataset represents a significant accomplishment that has been years in the making.

**Task 4.5** Port applicable StreamNet data to the new 1:100,000-scale hydrography.

**Task 4.5 Accomplishments.** The new hydrography was not available until late in the fiscal year. Nonetheless, anadromous and bull trout distribution data were integrated for all areas where the hydrography was available. (A complete port was accomplished in early FY 99.)

**Task 4.6** Provide technical assistance regarding use of the 1,000,000-scale river reach system.

**Task 4.6 Accomplishments.** StreamNet regional staff created a web product that allowed access to PNW hydrography and provided documentation and user assistance. StreamNet was a major participant in the inter-agency IRICC process, which sought to establish inter-agency protocol for using hydrographic data. A report was co-authored by StreamNet staff that defined these protocol. StreamNet staff also participated in several inter-agency meetings where they offered technical assistance in the use of the PNW.

## Objective 5. Data Delivery / Information Systems

**Objective:** Provide StreamNet data to users in formats that meets their policy, planning, and management needs.

**Summary:** Objective 5 addresses the delivery of data and other services to fish and wildlife managers, decision-makers, and the public. Often this involves responding to individual requests for data in a variety of ways. Increasingly, it also involves providing data in a variety of electronic formats that can be accessed by users via computer. StreamNet has historically delivered electronic data through a Distributed System (DS) and through file transfer capabilities of bulletin board systems. While the DS continued to be used in FY 97, the project has embarked on an ambitious effort to provide data via the Internet. For FY 98 the project addressed nine distinct information services tasks. Accomplishments relating to each task are summarized below.

**Task 5.1** Receive and respond to requests for data, source materials, and custom products.

**Task 5.1 Accomplishments.** During FY 98 data and information requests were received and responded to at both the regional and state levels. A total of 2,153 data/information requests were responded to during the year, compared to 1,849 in FY 97, 1,702 in FY 96 and approximately 900 in FY 95. Data/information requests were reported throughout the year via quarterly progress reports. Requests varied widely from general information and document requests to requests for custom maps and data analyses. The number of requests handled by participating organizations is shown in Table 3. Table 3 does not include StreamNet data accessed via the Internet. Access of data through the Internet is discussed in task 5.4.

**Table 3. StreamNet Information Requests in FY 98.**

Agency	1 <sup>st</sup> Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
CRITFC	52	32	186	131	401
IDFG	24	30	17	23	94
MFWP	47	54	80	74	255
ODFW	42	97	76	181	396
PSMFC	36	31	25	34	126
WDFW	135	139	152	151	577
<b>Total</b>	<b>336</b>	<b>383</b>	<b>536</b>	<b>594</b>	<b>1,849</b>

**Task 5.2** Continue to maintain and enhance the existing client-server system to provide access to StreamNet data products through the Internet.

**Task 5.2 Accomplishments.** During FY 97 the StreamNet web site established itself as the primary means for delivering data to users. This was also the case in FY 98. StreamNet maintains its web site through a cooperative effort among the regional data manager, a web specialist, and PSMFC's computer support specialists. The site is

maintained on a dedicated NT-based computer, with firewall, regular backup, and other features that meet accepted industry standards.

Given the nature of the world wide web, and the way that different people both access and use the web, it is difficult to generate precise use statistics. Use of the StreamNet site is monitored using a shareware web statistics generator, which utilizes the log files build by the web server. Summary statistics are available through the “about this site” feature of the home page. Recognizing the inherent limitations of current use statistics, there are certain conclusions that can be drawn regarding use of the StreamNet site.

Table 4 presents an estimate of the number of visits (or sessions) by month to the StreamNet site during FY 98.<sup>1</sup> Total use in FY 98 was 45,594, significantly higher than in FY 97, when 23,871 sessions were recorded. FY 97 had been a year of growth, with three times as many users in the last month of that year as opposed to the first month. FY 98, by contrast, was more consistent month-to-month. This is an indication of a mature site with regular users. Though use has leveled compared to the past year, FY 98 did bring a 30% increase from the first month to the last.

**Table 4. Estimate of monthly visits to the StreamNet WWW Site.**

Oct-97	3,300
Nov-97	3,674
Dec-97	2,968
Jan-98	3,472
Feb-98	3,821
Mar-98	3,245
Apr-98	4,120
May-98	3,846
Jun-98	4,389
Jul-98	3,989
Aug-98	4,280
Sep-98	4,490
total	45,594

Daily and hourly statistics demonstrate that the site is predominantly used as a professional management tool as most of the use takes place during the workweek and during working hours. From statistics and communications with users it can be inferred that the site is predominantly used for resource planning and management, research, impact analysis, policy, and education.

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<sup>1</sup> A “visit” (or “session”) refers to one access of a web site by a user. Within each session the user may make multiple “requests” or “hits” on the site. For example, during one session with the StreamNet home page the typical user may make several hits on the data or library query system (one hit per query) as well as one or more hits to other features. Industry standards suggest that each user - on average - makes ten requests per session. Thus, 100 requests equals roughly 10 distinct use sessions. In this report, use figures refer to sessions unless otherwise noted.

The majority of users access the system through commercial Internet providers, making it difficult to determine their organization. Nonetheless, it is possible to determine that the site receives the majority of its use from educational institutions, federal and state government agencies, and private organizations involved in resource management and advocacy. 74 colleges and universities used the site. Among these, Oregon State University was the major user, followed by the University of Washington.

Among government agencies the Northwest Power Planning Council and the Bonneville Power Administration were the top users. Other federal agencies with notable use included the National Marine Fisheries Service, the Environmental Protection Agency, and the Forest Service. State use came principally from Idaho, Oregon, and Washington fish and wildlife, water resource, and transportation agencies. These state agencies each make between 200 and 400 requests per month.

Use of the site by private organizations is extensive and no one group stands out as a primary user. The site was visited by in excess of 100 different non-governmental organizations during the year. Private use is primarily from the Pacific Northwest region, though there is use from every section of the country and throughout the world. Foreign use comes principally from Canada, and within Canada, principally from British Columbia. After Canada, European countries and Australia are the major foreign users.

Within the StreamNet site the principal use area is the query system, with 40% of total use. The StreamNet map gallery is the next highest with 30%.

The StreamNet data manager maintained the systems hardware with assistance from PSMFC's computer support team. Weekly back-ups of information were performed. Initial system lock-up problems were solved.

**Task 5.3** Maintain and enhance other components of the StreamNet home page and incorporate new features that complement existing components.

**Task 5.3 Accomplishments.** StreamNet regional staff maintains a running "to do" list that identifies a wide range of potential site enhancements, identifies priorities, and defines monthly targets. This list is available through the web site. Following is a synopsis of the major enhancements made during FY 98:

**Site Organization** (October 1997). The site received a major functional overhaul. Most of the work was actually undertaken during FY 97. However, the product was released in early FY 98.

**New Query System** (February 1998). A data query system was released that provided far more flexibility in terms of how the user constructed queries. All StreamNet data categories were made available through the query and variety of geographical areas were added, including new hydrographic units and counties. The new system also allows for query of trend data by year. Also added was the option of creating user defined fish distribution maps. Products available through the new query system include additional

graphs, links to reference materials, and download options. Similar query systems were also implemented for the digital map catalog and library references. Detailed instructions were included in all query systems to guide the user in using the system. Updated data contents pages were also inserted.

**Database Download** (April 1998). A feature was added that allows download of the entire StreamNet database in ACCESS format. (Previously only ASCII was available.)

**Graphics** (April 1998). Graphic images were added to several web site features that enhanced the visual appeal of these products.

**Other Features.** A "What's New" feature was added (April 1998) that allows the user to track site enhancements. The feedback feature was enhanced (May 1998) in order to provide the user with more control over submitting comments and questions. A "Citing StreamNet" feature was added (June 1998) that provided detailed instructions on how to cite web pages as references in research reports. A new search function was added (August 1998) that allows searching for words in any document on the site.

**Task 5.4** Develop and implement a strategy for providing electronic access to StreamNet data through means other than the Internet.

**Task 5.4 Accomplishments.** A technical briefing paper was prepared that identified options for implementing a non-Internet data distribution system. Following detailed discussions involving the steering committee and the technical development team, it was concluded that implementation of such a system was not warranted at this time. There were several reasons: 1) Use of the Internet was expanding rapidly and was becoming the medium of choice for receiving data. 2) Development of a stand-alone system would have taken significant resources that could be better utilized on improvements to the Internet-based system. 3) It appeared that new technologies may be available in the near future that would allow cross-development of Internet and stand-alone systems.

**Task 5.5** Provide training and orientation for users of the StreamNet data delivery systems upon request.

**Task 5.5 Accomplishments.** In large part, this was accomplished through creation of help features available through the web site query system. Staff also responded to questions made by telephone and use of the web site's feedback feature.

**Task 5.6** Prepare data development strategies and products in support of Fish and Wildlife program monitoring and evaluation activities.

**Task 5.6 Accomplishments.** Fish and Wildlife Program policies, programs, and plans were reviewed in order to identify data needs related to monitoring. These needs were integrated into the StreamNet data plan. StreamNet personnel participated in all regional forums related to monitoring. StreamNet also prepared schematics, data lists, and other products for use in these forums.

**Task 5.7** Prepare map products for use in aquatic resource policy, planning, and management.

**Task 5.7 Accomplishments.** StreamNet GIS staff at both the regional and state levels prepared a variety of GIS products on request by federal and state managers. Most requests were for fish distribution maps for use in ESA, FWP, and state fisheries management activities. Representative products are available through the StreamNet web site's "map catalogue" feature.

**Task 5.8** Prepare topical reports that describe content, methods used, and sources of select large StreamNet datasets.

**Task 5.8 Accomplishments.** This task was not undertaken in FY 98. The reason that the task was included in the work statement was to allow for preparation of a report that could be referenced if large, unreferenced datasets were compiled. This appears to be an artifact of past years when such datasets were common. Today, however, most of this historic data has been integrated into StreamNet and such reference reports are therefore not often required.

**Task 5.9** Provide technical assistance to others involved in the Fish and Wildlife Program activities and other activities that support the Program.

**Task 5.9 Accomplishments.** StreamNet provided technical start-up assistance to the Upper Columbia Resident Fish Assessment Project regarding hardware, GIS strategies, and data management strategies. StreamNet provided similar assistance to CRITFC's watershed planning initiative. Internet access to the State of Oregon's Oregon Plan was also provided. Short-term technical assistance was provided to several Fish and Wildlife Program-related committees and activities. For example, StreamNet assisted a mainstem hydrology workgroup in the compilation of temperature data. These data were then provided via the StreamNet web site.

## Objective 6 - Project Management / Coordination

**Objective:** Provide effective leadership that ensures the production of high quality products targeted at critical applications and the development of these products in a timely, cost-effective manner.

**Summary:** The project seeks to restrict the percent of time (and resources) that goes into interagency coordination and project management and maximize the percent of time that goes into data development and data management. Nonetheless, coordination and management are critical to the success of the project. The project employs a decentralized management model. With much of the actual data development occurring at the sub-contractor level. Coordination is accomplished through a project steering committee, consisting of sub-contractor coordinators and key regional staff. Bureaucracy is minimized by having steering committee members be actively involved in data development and management. In all cases, participation by steering committee members was partially funded through their respective agencies rather than the project.

At the regional level, the project manager, data manager, and GIS manager are all active full time project participants. The project manager is responsible for networking with other projects and activities to ensure that the project can provide maximum benefit to the overall Fish and Wildlife Program.

**Task 6.1** Administer all aspects of the project at the regional and sub-contractor levels, including oversight of budget and personnel and monitoring of project activities.

**Task 6.1 Accomplishments.** Statements of work, status reports, invoices, and other contract imperatives were prepared on schedule. A project-wide staff allocation chart was prepared and revised at mid year. (This chart is included in the StreamNet web site, in the "work plan" section of "project management.") Table 5 presents a summary of staff allocations.

**Table 5. Summary of FY 98 Staff Allocations by Task and Participating Agency.**

(Numbers are in person months.)

	Obj. 1	Obj. 2	Obj. 3	Obj. 4	Obj. 5	Obj. 6	Total
CRITFC	31.30	5.30	28.20	.00	.50	3.70	69.00
IDFG	21.50	11.50	.00	10.00	11.00	2.00	56.00
MFWP	16.25	5.40	3.00	5.45	11.90	5.20	47.20
ODFW	33.80	2.60	1.70	3.00	15.40	4.00	60.50
PSMFC	6.50	7.50	1.00	4.50	13.00	7.50	40.00
SBT	1.60	.00	.00	.00	1.90	2.50	6.00
USFWS	1.00	.00	.00	.00	.50	1.00	2.50
WDFW	33.25	13.00	.00	10.44	15.00	3.00	74.69
Total	145.20	45.30	39.90	33.39	69.20	28.90	355.89

**Task 6.2** Organize/participate in coordination meetings with the steering committee, BPA, CBFWA, Council, NMFS, ISAB/ISRP, and participating agencies.

**Task 6.2 Accomplishments.** Regular quarterly steering committee meetings were held. The regional project manager met individually with each participating agency for a formal mid-year review. Two briefing sessions were held with BPA; both involved discussions of StreamNet's role in preparing an online version of the Annual Implementation Work Plan. StreamNet participated in several meetings with the Council regarding use of StreamNet data and web capabilities. StreamNet staff attended one CBFWA anadromous fish caucus meeting at the request of the caucus to provide information on StreamNet activities.

**Task 6.3** Prepare project administration reports including:

- a) Brief quarterly reports.
- b) A final report that describes project accomplishments.

**Task 6.3 Accomplishments.** Four quarterly reports were produced. This document serves as the final report.

**Task 6.4** Produce public information materials including updated versions of the project brochure, computer demonstration materials, and/or other appropriate materials.

**Task 6.4 Accomplishments.** During the year the StreamNet web site was the primary means for providing public information. The StreamNet brochure and power point show were revised but, with the increasing use of the Internet, there was little need for these products. (They are available via the StreamNet web site.) There was no need to prepare computer demonstration materials. When it was necessary to provide a demonstration of computer products this was accomplished through linking to the web site.

**Task 6.5** Participate in educational and professional conferences.

**Task 6.5 Accomplishments.** Steering Committee members and staff participated in state-level American Fisheries Society meetings in all four states, the Pacific Northwest GIS Users Conference, and appropriate agency-level conferences.

**Task 6.6** Maintain communications between StreamNet and other fish and wildlife activities in order to identify means for collaborative data collection, storage, and dissemination.

**Task 6.6 Accomplishments.** Briefings on StreamNet were presented at a variety of regional and state meetings. Project managers maintained frequent contact with the Council, CBFWA, and NMFS. State coordinators maintained contact with applicable state-level programs, including the Oregon Plan, the Washington Salmon Policy initiative, the Idaho Bull Trout Plan, and the Montana Cutthroat Management Plan.

**Task 6.7** Participate in F&W Program advisory groups and other applicable forums.

**Task 6.7 Accomplishments.** StreamNet personnel maintained active involvement in Fish and Wildlife Program activities regarding monitoring and evaluation, the Annual Implementation Work Plan, and watershed planning.

**Task 6.8** Update the StreamNet data plan.

**Task 6.8 Accomplishments.** The StreamNet Long-term Data Plan was updated. A new component was added to the plan that depicted current-year priorities for each participating agency. The Data Plan is posted to the project management feature at [www.streamnet.org](http://www.streamnet.org).

**Task 6.9** Compile a project record consisting of final versions of all significant written materials that are prepared during the contract period.

**Task 6.9 Accomplishments.** This record is included in the StreamNet web site, under "project management." Reports and other written products prepared during fiscal year 1998 included:

- Technical Applications Priorities (revised quarterly)
- Data Exchange Formats (Versions 98-1 and 98-2)
- Revised Long-term Data Plan
- FY 1998 Data Development Priorities
- Revised Briefing Paper on PNW Reach File and Stream ID Methodology
- Revised Strategy for Long-term Maintenance of the 1:100K River Reach System
- Revised StreamNet Brochure
- Updated StreamNet Library Access Guide
- Quarterly Reports (Oct-Dec 1997, Jan-March 1998, April - June 1998)
- StreamNet FY 1997 Annual Report
- StreamNet "Quick" Plan
- StreamNet Policy on Hydrography
- 1:100,000 PNW Documentation
- Revised Briefing Paper on PNW Reach File and Stream ID Methodology
- Visual Pass Status for 100K in ID, MT, OR, and WA
- Technical Paper on Transfer of Information Between GIS Layers with Different Scales
- Strategy Paper on StreamNet Assistance to Watershed Projects
- Strategy Paper on StreamNet Assistance with FWP Project Tracking
- FY 99 Project Tracking Proposal
- FY 99 Project Proposal

## Appendix A.

### StreamNet FY 98 “Quick” Plan

*Note: The StreamNet Quick Plan is an abbreviated form of the Statement of Work. The quick plan lists all tasks but does not include explanations, deadlines, etc.*

**Goal:** Contribute to the region’s efforts to protect and restore aquatic resources by:

1. acquiring current data and source materials concerning fish and wildlife life history, production, habitat, and restoration efforts,
2. incorporating these data and materials into a regionally consistent whole, and
3. providing critical data via the Internet, library services, and custom products.

#### **Objective 1 - Data Acquisition**

##### ANADROMOUS FISH

Task 1.1 Prepare and maintain standardized data on anadromous salmonids and, as available, other anadromous fish, to include:

- a) Ocean range and distribution.
- b) Freshwater distribution, life history, and barriers.
- c) Adult abundance (escapement, redd counts, trap counts, dam counts).
- d) Juvenile abundance (smolt monitoring, index of abundance, hatchery/wild ratio).
- e) Harvest (ocean, in-river, terminal).
- f) Natural production (survival, production factors, spawner recruit numbers).
- g) Hatchery production (releases, exploitation, maturation, returns, and disposition).
- h) Age composition at return.
- i) Genetic origin, production type, stock and population identification.
- j) Historic range.
- k) Data and appropriate analytical results derived from PATH.

## RESIDENT FISH AND OTHER AQUATIC SPECIES

Task 1.2 Prepare and maintain standardized data on resident fish and other aquatic species, to include:

- a) Distribution and, when known, life history.
- b) Hatchery production (releases and outplants) for salmonids.
- c) Natural production.
- d) Genetic origin, production type, stock and population identification.
- e) Historic range.

## HABITAT

Task 1.3 Prepare and maintain standardized data relating to fish and aquatic habitat, to include:

- a) Data exchange formats consistent with interagency “core variables.”
- b) ICBEMP and comparable westside datasets.
- c) Proposed and final ESA critical habitats for fish and aquatic wildlife.
- d) Clean Water Act 303(d) data.
- e) Estuary and ocean habitat - devise a strategy.
- f) Other sources that can contribute to characterization of aquatic habitat.

## FACILITIES

Task 1.4 Maintain standardized data relating to facilities affecting fish and aquatic habitat.

- a) Dams.
- b) Irrigation diversions and screening status (exchange format only).
- c) Man-made blockages and fish passage facilities (exchange format only).
- d) Anadromous and resident hatchery facilities.

## AQUATIC MITIGATION AND RESTORATION PROJECTS

Task 1.5 Prepare and maintain standardized data relating to the tracking of aquatic management and restoration projects, to include:

- a) Fish and wildlife enhancement projects funded through the Fish and Wildlife Program.
- b) Aquatic restoration projects funded in accordance with the interagency MOA.
- c) Other restoration, protection, and mitigation projects (evaluate).

## DATA REFERENCE

- Task 1.6 Document data incorporated into StreamNet with reference number and source; collect applicable source documents and provide to the Library.

## RIVER SYSTEM OPERATIONS

- Task 1.7 Compile historic data on mainstem hydro and storage dam operations.
- Task 1.8 Participate in regional discussions on providing in-season and dam operations data and determine the appropriate role for StreamNet.

## **Objective 2 - Data Management**

- Task 2.1 Design, develop, and maintain standard codes and data exchange formats for data being compiled as part of the StreamNet project, and for similar data development initiatives.
- Task 2.2 Update the existing data exchange formats report.
- Task 2.3 Provide database management and administration, to include: 1) maintaining StreamNet data sets, 2) processing exchange data into the regional database, 3) transporting data to SQL, 4) enhancing StreamNet database structures and capabilities, and 5) providing programming services to participants to allow for efficient data entry and transfer.
- Task 2.4 Designate and maintain a metadata format for spatial data.
- Task 2.5 Establish and implement procedures for coordinating spatial data activities among participating organizations.
- Task 2.6 Update/maintain a project data plan that identifies 1) current data holdings, 2) data items to be incorporated, and 3) data development expectations for participating agencies.

## **Objective 3 - Library / Reference Services**

- Task 3.1 Continue to develop a collection of materials including:
- a) Documents used as source materials for data compiled in Objective 1.
  - b) Documents prepared by Fish and Wildlife Program contractors, including final products published by BPA and draft documents suitable for public release.
  - c) Documents from the Council's Fish and Wildlife Program-related collection.
  - d) Additional books, journals, agency reports, gray literature, research

reports, and documents that are applicable to management of the region's aquatic resources.

e) Documents related to NMFS ESA activities.

- Task 3.2 Provide improved user access to the materials described in Task 3.1, including:
- a) Maintain an appropriate facility for the storage and use of the physical collection.
  - b) Organize and maintain the collection for appropriate on-site use.
  - c) Provide access to the StreamNet Library Catalog via the Internet.
  - d) Construct a useful keyword thesaurus/subject heading list.
- Task 3.3 Catalog, index, and prepare a summary of materials acquired in Task 3.1a; catalog and index materials acquired in Task 3.1b; catalog materials acquired in Task 3.1c,d.
- Task 3.4 Manage the StreamNet Library and provide library services including reference and referral, document delivery, inter-library lending and borrowing, and on-line search.
- Task 3.5 Engage in networking with other agency and regional library service providers including:
- a) Collect information about other regional f&w library collections, access policies.
  - b) Provide consultations for on ways to coordinate catalogs and services.
  - c) Coordinate with (others) to improve services and avoid unnecessary duplication.
  - d) Facilitate communications between agency library service providers.

#### **Objective 4 - River Reach System / Hydrologic Referencing**

- Task 4.1 Maintain active coordination with the NHD team, providing comments and technical assistance as necessary.
- Task 4.2 Assess the status of the 1:100,000-scale hydrography in terms of its treatment of lakes and reservoirs; establish graphic links and provide regionally consistent unique numbers for stream-linked water bodies (and high mountain lakes if feasible).
- Task 4.3 Evaluate the NHD product in terms of accuracy and applicability to StreamNet. Make appropriate corrections to the NHD.

- Task 4.4 Implement the river reach system maintenance strategy including:
- a) Establish maintenance and enhancement protocol and procedures.
  - b) Aggregate route and ID coverage's into one library.
  - c) Assign names to unnamed streams, create routes, and add unique stream ID.
- Task 4.5 Port applicable StreamNet data to the new 1:100,000-scale hydrography.
- Task 4.6 Provide technical assistance regarding use of the 1,000,000-scale river reach system.

### **Objective 5 - Data Delivery / Information Systems**

- Task 5.1 Receive and respond to requests for data, source materials, and custom products.
- Task 5.2 Continue to maintain and enhance the existing client-server system to provide access to StreamNet data products through the Internet.
- Task 5.3 Maintain and enhance other components of the StreamNet home page and incorporate new features that complement existing components.
- Task 5.4 Develop and implement a strategy for providing electronic access to StreamNet data through means other than the Internet.
- Task 5.5 Provide training and orientation for users of the StreamNet data delivery systems upon request.
- Task 5.6 Prepare data development strategies and products in support of Fish and Wildlife program monitoring and evaluation activities.
- Task 5.7 Prepare map products for use in aquatic resource policy, planning, and management.
- Task 5.8 Prepare topical reports that describe content, methods used, and sources of select large StreamNet datasets.
- Task 5.9 Provide technical assistance to others involved in the Fish and Wildlife Program and activities that support the Program .

### **Objective 6 - Project Management / Coordination**

- Task 6.1 Administer all aspects of the project at the regional and sub-contractor levels, including oversight of budget and personnel and monitoring of project activities.

- Task 6.2 Organize/participate in coordination meetings with the steering committee, BPA, CBFWA, Council, NMFS, ISAB/ISRP, and participating organizations.
- Task 6.3 Prepare project administration reports including:
- a) Brief quarterly reports.
  - b) A final report that describes project accomplishments.
- Task 6.4 Produce public information materials including updated versions of the project brochure, computer demonstration materials, and/or other appropriate materials.
- Task 6.5 Participate in educational and professional conferences.
- Task 6.6 Maintain communications between StreamNet and other f&w activities in order to identify means for collaborative data collection, storage, and dissemination.
- Task 6.7 Participate in F&W Program advisory groups and other applicable forums.
- Task 6.8 Update the StreamNet data plan.
- Task 6.9 Compile a project record consisting of final versions of all significant written materials that are prepared during the contract period.