



- FY 1997 Annual Report -

U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
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

FY 1997 Annual Report: StreamNet

Period Covered:

October 1, 1996 - September 30, 1997

Prepared by:

StreamNet Project Team

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
U.S. Forest Service
Washington Department of Fish and Wildlife

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
P.O. Box 3621
Portland, OR 97208-3621

Project Number: 88-108-04
Contract Number: 95 BI 65130

Contents

Summary	1
Data Development	3
Data Management	9
Library / Reference Services	12
River Reach System / Hydrologic Referencing	15
Data Delivery / Information Systems	18
Project Management / Coordination	26
Appendix A. Primary StreamNet Participants in FY 1997	30
Appendix B. StreamNet FY 1997 Abbreviated Work Plan	32

Summary

This document constitutes the annual report of the StreamNet project. It identifies tasks undertaken during fiscal year 1997 (hereafter FY 97) and presents a summary of project accomplishments.

StreamNet's primary goal is to promote exchange and dissemination of aquatic information in a standardized electronic format throughout the Columbia River Basin and the Pacific Northwest. StreamNet is a principal means for the compilation and distribution of data related to the Fish and Wildlife Program of the Northwest Power Planning Council (Council). The project 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 97 included:

1. **Data Development.** The data included in the StreamNet system was significantly enhanced, both by updating existing datasets and incorporating new datasets on water quantity, Council Protected Areas, and Pacific Northwest Rivers Study final ratings. StreamNet data exchange formats were also updated, with several new data types added such as barriers and fish distribution.
2. **Data Delivery via the Internet.** A comprehensive enhancement of the StreamNet Internet capability was initiated, including preparation of a development strategy, purchase and installation of new hardware and software, and partial port of data to the new system. Several new features were added to the StreamNet web site, including a Fish and Wildlife Program project tracking feature, a feature providing access to the 1:100,000-scale River Reach File, and a greatly enhanced links feature. Access to documents produced by the project, meeting agendas and minutes, and other materials related to management of the StreamNet project were also provided through a "project management" feature. Query reports were enhanced by the addition of a summary format and a short list option. A new geographic scope filter were also added to the query system.
3. **Library.** A new, fully functioning library facility was opened. Nearly 4,000 books and technical reports were cataloged. With these, the StreamNet library now approaches 6,000 catalogued publications.
4. **River Reach File.** A regionally consistent 1:100,000-scale river reach system was completed including stream routes and the stream identification standard. This system has been integrated into the StreamNet web site.

5. **Services.** Project participants responded to nearly 2,000 data and information requests during the fiscal year.
6. **Reports.** Reports and other written products prepared during fiscal year 1997 included:
 - Procedures for Compilation of Resident Fish Hatchery Data
 - Strategy for Development of a Project Database
 - Strategy for Future Handling of Data on the NWPPC VAX Computer
 - Strategy for Providing Access to Library Materials via the Internet
 - Library Status Report
 - Recommendation on Integration of the Northwest Hydrosite Database into StreamNet
 - Technical Applications Strategy Final Report (plus 3 interim reports)
 - Data Exchange Formats, Version 97-1
 - Project Data Exchange Formats
 - Briefing Paper on PNW Reach File and Stream ID Methodology
 - Strategy for Transfer of Information Between GIS Layers with Different Scales
 - Strategy for Long-term Maintenance of the 1:100K River Reach System
 - Proposal for StreamNet Assistance with Fish and Wildlife Program Project Tracking
 - StreamNet Brochure
 - StreamNet Power Point Show
 - Updated StreamNet Library Access Guide
 - Quarterly Reports (Oct-Dec 1995, Jan-March 1996, April - June 1996)
 - StreamNet FY 1996 Annual Report

Perhaps the major accomplishment for FY 97 was the extent to which StreamNet activities were integrated into the overall Fish and Wildlife Program. Considerable effort went to the evaluation of StreamNet data development and library service priorities in light of Program needs. StreamNet participated in several Program coordination activities, including the development of a Fish and Wildlife Program project tracking database and the preparation of data, maps, and reports aimed at improving effectiveness of Program monitoring and evaluation. The StreamNet team also made significant advancements in providing services to other Fish and Wildlife Program projects and in facilitating coordination among projects.

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 Delivery/Services	19%
Objective 6: Management	9%

Objective 1. Data Development

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.

Task 1.1 Prepare and maintain standardized data on salmonids and other anadromous fish.

Trend data were added to the following datasets:

- adult abundance (spawner escapement, redd counts, trap counts, dam counts)
- harvest (ocean, freshwater)
- natural production (spawner recruit numbers)
- hatchery production (release numbers, and return rates)
- age composition.

Spatial data depicting distribution and use type for six salmonid species were compiled and field checked. Work on integrating these data with the new 1:100,000-scale hydrography was initiated. The results will be available in late fall 1997. Spawner recruit data from the Process for Analyzing and Testing Hypotheses (PATH) project was integrated into the StreamNet system.

Table 1 summarizes StreamNet anadromous fish data holdings as of December 1997. (Version 97.2 includes data delivered by StreamNet participants during FY 97 but not actually added to the system until October-December of 1997.)

Table 1. Anadromous Fish Data Contents (Version 97.2, 12/1/97)

Geographic Area	Adult Abundance Data						
	Species	Mainstem Dam Counts	Weir / Dam Counts	Redd Counts	Peak Spawn. Counts	Est. of Spawn. Pop.	Spawn - Recruit Est.
Alaska	Salmon		1986-1995 (48)				
	Steelhead		1936-1995 (13)				
California	Salmon		1925-1996 (27)	1980-1994 (11)	1962-1993 (10)	1940-1996 (40)	
	Steelhead		1923-1996 (14)		1964-1994 (28)		
Idaho Col. Basin	Salmon		1928-1997 (34)	1952-1996 (78)			1957-1995 (5)
	Steelhead			1987-1997 (34)			
Oregon Coastal	Salmon		1942-1996 (19)		1946-1996 (367)		
	Steelhead					1967-1993 (162)	
Oregon Col. Basin	Salmon	1960-1996 (36)	1950-1996 (33)	1949-1996 (75)	1948-1996 (70)	1946-1996 (21)	1938-1995 (8)
	Steelhead	1938-1996 (6)	1950-1995 (22)	1959-1997 (147)	1951-1997 (16)		
Washington Coastal	Salmon				1952-1991 (44)	1967-1992 (80)	
	Steelhead					1972-1995 (27)	
Washington Col. Basin	Salmon	1960-1996 (107)	1950-1989 (10)	1948-1992 (45)	1944-1995 (120)	1945-1996 (107)	1955-1995 (5)
	Steelhead	1938-1996 (14)				1962-1995 (42)	
Washington Puget Sound	Salmon		1926-1991 (10)		1951-1992 (44)	1953-1992 (224)	
	Steelhead					1977-1995 (55)	

Table 1. Anadromous Fish Data Contents (Version 97.2, 12/1/97) (continued)

		Hatchery Data		Harvest Data				
Geographic Area	Species	Releases	Returns	FW Sport	FW Comm.	Marine Sport	Marine Comm.	Marine Treaty
Alaska	Salmon			1977-1995 (201)		1977-1995 (138)		
	Steelhead			1977-1995 (12)		1977-1995 (11)		
California	Salmon	1973-1996 (197)				1962-1990 (10)	1952-1990 (24)	
	Steelhead	1975-1996 (27)						
Columbia R	Salmon			1969-1994 (33)	1938-1995 (57)			
	Steelhead			1963-1994 (42)	1939-1995 (6)			
Idaho Col. Basin	Salmon	1976-1996 (150)	1961-1997 (35)					
	Steelhead	1975-1995 (156)	1965-1996 (30)	1954-1995 (38)				
Oregon Coastal	Salmon	1970-1995 (372) ^A	1962-1994 (59)	1956-1994 (307)		1967-1994 (66)		
	Steelhead	1981-1995 (247) ^A	1983-1993 (24)	1957-1993 (173)		1972-1981 (20)		
Oregon Col. Basin	Salmon	1971-1996 (503) ^A	1945-1995 (91)	1956-1994 (204)				
	Steelhead	1977-1995 (274) ^A	1966-1995 (39)	1956-1993 (157)				
Washington Coastal	Salmon	1960-1996 (1830)	1961-1991 (18)			1950-1994 (59)	1950-1994 (124)	1972-1994 (51)
	Steelhead	1973-1996 (201) ^B		1962-1994 (183)		1962-1994 (78)		
Washington Col. Basin	Salmon	1960-1996 (1326)	1948-1995 (211)	1980-1994 (101)	1970-1995 (79)			
	Steelhead	1973-1996 (212) ^B	1957-1995 (12)	1962-1994 (263)				
Washington Puget Sound	Salmon	1960-1997 (3540)	1938-1991 (47)					
	Steelhead	1974-1996 (201)		1962-1994 (450)				

Task 1.2 Prepare and maintain standardized data on resident fish and other aquatic species.

Spatial data depicting distribution for native resident salmonid species were compiled and field checked for the states of Montana and Idaho. Similar bull trout (char) data were compiled from existing maps in Oregon and Washington. Work on integrating these data with the new 1:100,000-scale hydrography was initiated. The results for the State of Montana will be available in late fall 1997. Others will be available in early 1998.

A paper was prepared concerning the development of a resident fish hatchery dataset and reconnaissance work completed on the availability of data for such a dataset. StreamNet also sponsored a workshop on resident fish data standards in Spokane, WA attended by fish managers from each state. Staff also consulted with the Kalispel tribe concerning development of a resident fish data system for the Upper Columbia region.

Task 1.3 Prepare and maintain standardized data relating to fish and aquatic habitat.

Work on habitat data centered on coordination with others involved in collection of these types of data and the securing of habitat data available through other sources. StreamNet was an active participant in the 1996 Report of the IRICC Fish/Hydrography Strike Team on Common Data Standards for Aquatic Inventory and Stream Identification. During FY 97 StreamNet participants promoted use of these standards. StreamNet also played a support role to the US Forest Service in the preparation of a GIS dataset that will locate, display, and allow analysis of electronic field sample data. These data will be added to StreamNet during FY 98.

StreamNet secured a copy of all habitat data generated through the Forest Service/Bureau of Land Management Interior Columbia Basin Management Plan, spatial coverages of critical habitats for listed fish species, ESU coverages for listed and proposed species, and land ownership region-wide. USGS stream gauge data were also incorporated into the StreamNet system.

StreamNet addressed ocean habitat by creating a web product that contains links to all available web sites that provide ocean data applicable to the range of Pacific Ocean salmonids.

Task 1.4 Prepare/maintain standardized data relating to facilities affecting fish/aquatic habitat.

StreamNet participants prepared a strategy paper that discussed the issue of integrating the Northwest Hydrosite Database into StreamNet. The existing StreamNet dams dataset was maintained and enhanced. An anadromous hatchery facility dataset was prepared and - as referenced above in task 1.2 - a strategy was prepared for future initiation of a resident fish hatchery dataset. A reconnaissance of irrigation diversion data and blockage data was undertaken but no formal product produced.

Task 1.5 Secure an annual update of natural heritage program data.

This was handled directly between BPA and state heritage programs. StreamNet's role was limited to securing subcontracts with the Idaho and Oregon heritage programs. Subcontracting was not necessary in Washington. The Montana heritage program chose to not enter into a subcontract.

Task 1.6 Prepare and maintain standardized data on sensitive riparian-based vertebrate species.

The identification of point locations and buffers for sensitive riparian species was prototyped in Montana. Idaho also prepared a spatial coverage of these data.

Task 1.7 Prepare and maintain standardized data relating to fish and aquatic management.

The Northwest Power Planning Council's Protected Area and Pacific Northwest Rivers Study Final Value datasets were ported to the StreamNet system. A 1:100,000-scale dataset on federal wild and scenic rivers and state equivalents was not prepared as this information is currently available at a 1:250,000-scale and little would be gained by creating the 1:100,000 coverage.

A paper was prepared that identified a strategy for development of a comprehensive project tracking data system. A prototype was developed by IDFG for the Clearwater Basin in Idaho. A draft data exchange format was also prepared. Based on these products, a proposal for StreamNet to participate in development of a Fish and Wildlife Program project tracking system was prepared.

StreamNet also prepared a web site product that displays FY 97 Fish and Wildlife Program projects and presented the Columbia Basin Fish and Wildlife Authority's (CBFWA) recommendations for the FY 98 Annual Implementation Work Plan. The product includes electronic maps of each subbasin, region, and the entire Columbia Basin. A geographic query system was incorporated that allows the user to select data associated with a given area by clicking on a map. The product also includes links to appropriate documents, project descriptions, and explanations. Fundamental to this product was the preparation of a dataset of Fish and Wildlife Program projects, including rectifying differences among the data maintained by BPA and CBFWA.

Task 1.8 Document data incorporated into StreamNet with reference number and source, collect applicable source documents and provide same to the StreamNet Library.

Following accepted project procedures, all data incorporated into StreamNet is accompanied by references and source documents. 540 references were added to the system during FY 97.

Task 1.9 Compile available historic data on mainstem hydro and storage dam operations.

Work on this task has been postponed pending the development of an agreement among BPA and agency fish managers regarding how this work should proceed. BPA was informed by letter that StreamNet would not be involved in this activity pending further guidance.

Task 1.10 Prepare a recommended approach for incorporating available in-season fishery, hydrologic, water quality, and dam operations data.

As with task 1.9, work on this task has been postponed pending the development of an agreement among BPA and agency fish managers regarding how this work should proceed.

Table 2 summarizes StreamNet non-fisheries data holdings as of the end of the December 1997 (includes data developed during FY 97 but not incorporated into the system until after the end of the contract period).

Table 2. Non-Fisheries Data Contents (Version 97.2, 12/1/97)

Data Category	Description / Status
Dams Facilities	Complete for hydropower and dams 10ft and over in size for states of ID, MT, OR, and WA.
Hatchery Facilities	Complete for anadromous fish production facilities, partially complete for resident species for states of ID, MT, OR, and WA
Reference Library	8,644 references as of 12/97, includes bibliographic citations from Northwest Power Planning Council.
Mean Monthly Tributary Flow Data (USGS)	Complete through 1994 for most USGS gauging stations, daily data available from Regional Data Manager
Mainstem Dam Flow Data	Daily Flow and spill data by project from 1960-1993.
Protected Areas Data	Complete protected areas listings by stream from Northwest Power Planning Council Rulemaking in 1989.
Rivers Study Final Value Classes	Complete listings by reach of final values classes from Pacific Northwest Rivers Study.
Nearshore Ocean Upwelling Indices	Monthly Mean data for 11 west coast stations from 1946-1997, Request data from Regional Data Manager
Sea Surface Temp and Pressure	Complete temperature, pressure, and wind speed from 1854 - 1992, entire Pacific Ocean, , Request data from Regional Data Manager.

Objective 2. Data Management

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. Tasks associated with data management undertaken during FY 97 include:

Task 2.1 Design, develop, and maintain standard codes and data exchange formats for StreamNet data.

Maintenance of codes and exchange formats was a daily activity throughout FY 97. New data exchange formats were developed for fish distribution and barrier data, spawner-recruit data, map catalog information, and mitigation project data.

The issue of integrating StreamNet data exchange formats into Fish and Wildlife Program contract terms and conditions was not resolved in FY 97. Rather, StreamNet staff promoted use of these formats through providing assistance to other projects. This is an area that warrants further discussion in FY 98.

Task 2.2 Update the existing data exchange format report.

An updated version of the StreamNet Data Exchange Formats (Version 97-1) was released in April 1997 (available on the Project Management portion of the project's web page).

Task 2.3 Provide database management and administration necessary for accomplishing StreamNet objectives.

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. Each state team included a database specialist and a GIS specialist. Late in the fiscal year CRITFC hired a database specialist to work half time with the four CRITFC tribes to integrate tribal fisheries data into StreamNet. Frequent communication occurred between

regional and agency level data managers. The hiring of a new regional GIS manager helped to facilitate a much closer working relationship among state-level GIS staff. These staff collectively spent considerable time and effort on the development of the 1:100,000-scale hydrography to be discussed later under objective 4, and fish distribution data discussed earlier under objective 1.

Task 2.4 Evaluate Fish and Wildlife Program data currently stored on the Council's VAX computer and determine data sets to be stored, maintained, and/or enhanced. Port applicable files to StreamNet.

In consultation with the Council, a decision was reached to port Protected Area files and Pacific Northwest Rivers Study Final Value files from the Council VAX and make these available through the query system. This was accomplished in January 1997. BPA elected to maintain the NWHS data on the VAX.

Task 2.5 Establish a protocol for compilation of a regional catalog of spatial data and compile a regional/state catalog of applicable and available data.

The regional GIS manager acquired basic geographic data layers such as land ownership and political jurisdictions that are necessary for the production of regional maps. Each participating agency also prepared a catalog of coverages that they maintain. It was decided that maintaining a comprehensive set of data layers at the regional StreamNet office was unnecessary as electronic data transfer allows for prompt access to files maintained by others. StreamNet maintains a policy of free access to non-copyright data and believes that this will help promote reciprocal free access. Sharing of spatial data between BPA and StreamNet is working well.

Task 2.6 Establish and implement procedures for coordinating GIS activities among participants.

During FY 97 StreamNet regional staff sponsored one general coordination meeting of GIS staff from participating agencies. At least one meeting was also held with each state GIS program. Meetings and conference calls were also held regarding specific GIS-related topics, principally the river reach system, distribution data, and creation of a StreamNet map gallery. The objective of all of these activities was to promote consistency, both in the identification of priorities and the creation of datasets and products.

Task 2.7 Establish procedures for managing important non-standardized datasets.

During FY 97 StreamNet established a project management section to the StreamNet web site. This feature provided a means to deliver important information to project participants. It also provided an opportunity to experiment with different data delivery scenarios. Based on this experience, a conceptual plan was developed for providing access to non-standardized data. Essentially this would involve cataloging files according to StreamNet query system protocol and storing these in a variety of forms (html and pdf for viewing on the screen as well as various download options), and making files available through the StreamNet web server. A prototype is

planned for FY 98. While this form of data delivery holds great promise, StreamNet staff will give highest priority to integrating data with StreamNet's regionally consistent data exchange formats.

Task 2.8 Store and make available current and select historical version of state River Information Systems.

Each state secured copies of important versions of their River Information System and archived these. In addition, the final values from the Pacific Northwest Rivers Study were integrated into the StreamNet data delivery system.

Task 2.9 Prepare and maintain a project data plan.

A project data plan was prepared and is available through the project management page of the StreamNet web site. Included are both a long-term data plan and a list of priorities for FY 97. In FY 98 the data plan and data priorities will be integrated into a more comprehensive data priority and data tracking system.

Objective 3. Library/Reference Services

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. In FY 97 the library moved into a new facility and became a fully functioning reference library. The library collection continued to grow and significant progress was made on cataloging of documents. The number of users also continued to grow. As a result, the StreamNet Library is now considered a primary source for both print and electronic information about the region's fish resources. The FY 97 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 applicable to the mission of StreamNet.

As a part of the data compilation and standardization efforts described in Objective 1, each StreamNet data item is referenced as to its source. A hardcopy version of each source document is sent to the StreamNet Library for cataloging and shelving. The StreamNet Library received and cataloged 276 reference documents in FY 97. All cataloged materials are made part of the StreamNet library and are available for use by the public.

Another task during FY 97 was to continue to acquire and catalog reports prepared through Fish and Wildlife Program projects funded by BPA. A process was established whereby BPA would provide new reports as they are published. All Fish and Wildlife Program reports published in FY 97 were secured and catalogued. The library also sought to secure copies of available older reports.

The library continued to collect appropriate materials through direct acquisition and donation. In all, 812 new items were added. Included were books, journals, agency reports, gray literature, and research reports. A map collection was also initiated.

Library staff continued to improve the physical durability of StreamNet documents by binding with covers the many documents that were sent as unbound photocopies.

Task 3.2 Provide improved user access to the materials described in Task 3.1.

Library Facility. The library moved to a new, larger, and more accessible location early in FY 97. The library is still located in the same building but is on street level at the front of the building. The building is strategically located for easy access from several federal, state, and tribal offices. The facility is approximately twice the size of the older location and includes both public and private spaces. The public space includes a reception area, stacks, a computer

terminal, study tables, and a room for photocopying and viewing microformats and video. The private space provides room for staff offices and a work area. Prior to the move, the new space was remodeled to meet the library's needs and necessary furniture and equipment were acquired. Software appropriate to the management and mission of the library was also ordered and installed. Software acquired for the library included an integrated library program, aquatic biology and fisheries reference databases, a government information access program, and others. Since moving to this location, library staff have organized the collection and made it available for on-site use. The new space, equipment, software, and organization now allows the library to serve as a full-function resource library.

Electronic Access. A strategy paper was also prepared that recommended means for providing access to the Library Catalog and documents via the Internet. A prototype of an improved library query system was prepared and will be included in the new features to be added to the StreamNet web site in December 1997. A plan for the construction of an improved keyword thesaurus/subject heading list was also prepared.

Task 3.3 Catalog, index, and abstract materials acquired in Task 3.1.

A total of 4,000 documents were cataloged into the References database this year, bringing the total to 5,842 cataloged titles. Included were 276 StreamNet dataset source documents. With this effort, approximately 85% of all documents held by the library that warrant cataloging have been cataloged.

The library conducted an intensive review of the Northwest Power Planning Council's collection in anticipation of moving that collection to the library in FY 98. The purpose of this review was to gain familiarity with the Council's collection, assess its applicability to the library's mission, and identify overlaps with the current StreamNet collection. An agreement was also drafted to facilitate the move of the Council collection.

Library staff actively participated in the IAMSLIC duplicate exchange program. 495 journal issues and technical reports were received through this program during FY 97.

Task 3.4 Manage the StreamNet Library and provide library services to the StreamNet user community.

During FY 97 the library handled 181 interlibrary loan and 254 reference requests and circulated 299 copies of materials. While the library is normally staffed during normal business hours, the small size of the staff necessitates having the flexibility to close the library at times. The library is officially open by appointment though the public is welcome to use the facility at any time that the library is open. The number of users served who are not StreamNet project participants increased significantly during the year. The library now serves the needs of a range of Fish and Wildlife Program participants as well as other fish and wildlife agency personnel, universities, tribes, consultants, environmental organizations, and the general public. All told, 58 different organizations made use of the library in FY 97.

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

The StreamNet Librarian maintained active contact with agency and regional libraries. Agency contacts included visiting applicable libraries to learn about their collections and services and establish cooperative working agreements. Included was a visit to the Montana State Library in Helena, MT in conjunction with attendance at the July StreamNet Steering Committee meeting. When appropriate the librarian provided consultations to other libraries on ways to coordinate catalogs and services. The StreamNet Library convened and hosted the 7th Annual NRIC Conference in August 1997. StreamNet library staff also attended a range of professional library meetings and training sessions.

Objective 4. River Reach System/Hydrologic Referencing

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 97 focused on 1) creating an accurate and functional 1:100,000 Pacific Northwest River Reach System (referred to as the 100K PNW), 2) using the 100K PNW to compile fish distribution data, and 3) coordination with the National Hydrographic Dataset (NHD) project. The eight river reach system tasks that constituted the FY 97 were as follows:

Task 4.1 Monitor progress of the National Hydrographic Dataset. Incorporate the completed national product.

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.

Task 4.2 Establish graphic links and provide regionally consistent unique numbers for lakes and reservoirs. Prepare a recommendation regarding integration of high mountain lakes.

This task was dependent on the NHD being released during FY 97. Work on this has been postponed pending release of the NHD.

Task 4.3 Complete a "visual pass" and make corrections to the National Hydrographic Dataset.

Completion of the visual pass is dependent on release of the NHD. StreamNet did take all practicable steps to initiate the visual pass. Funds were secured through the EPA and subcontracts negotiated with ODFW and WDFW. Staff from those agencies attended two national training sessions. StreamNet also prepared technical coordination documents and a status report for each state. These products are available through the StreamNet web site's project management feature. ODFW has undertaken those components of the visual pass that were available, namely eastern Montana.

Task 4.4 Complete routing and establish a unique stream ID for 100K streams.

This task was completed through a cooperative effort among state and regional GIS staff. A regionally consistent GIS hydrography data set was compiled from work performed by the states and the USGS covering an area of 220,000 square miles. Consisting of over 280,000 lines, each with 48 attributes, this data set utilizes a dynamic segmentation model to allow for its use in referencing a wide range of information in an efficient and standardized manner. In addition to being the basis of StreamNet's fish distribution data, it is also used by the BPA, BLM, EPA, USFS, USGS, state fish and wildlife agencies, and other Pacific Northwest agencies.

Task 4.5 Establish maintenance procedure for the 100K river reach system.

A paper entitled "Strategy and Procedure for Long-term Maintenance of the 1:100K River Reach System Within the Pacific Northwest" was drafted, reviewed by the Steering Committee, and released in September 1997. Implementation of the steps proposed in that paper will commence in FY 98.

Task 4.6 Maintain the 100K river reach system.

While full implementation of the strategy identified in task 4.5 will begin in FY 98, StreamNet has taken initial steps to maintain the 100K PNW. In conjunction with stream routing and designating LLIDs (task 4.4 above), considerable effort was expended to error check the 100K coverage. Correction of errors continues as the 100K PNW is populated with fish distribution data. Documentation of the 100K PNW was also prepared. Both detailed and summary versions are available through the StreamNet web site's project management feature.

In addition, StreamNet established a 100K PNW feature on the StreamNet web site. Steps undertaken to accomplish this included: 1) compiling a regionally consistent hydrographic layer based on prior work by the four states (including reviewing for accuracy and error correction); 2) establishing a dynamic segmentation structure for this hydrography to allow for portrayal of event-based tabular data compiled by StreamNet participants and others adhering to IRICC protocol; and 3) assembling an html interface for distribution and support of hydrographic data via the Internet. The results may be found on the StreamNet home page under the heading PNW Reach File. This product provides Internet access to all 100K PNW LLID files in a variety of formats. Also included are documentation and instructions for users. This product represents a major accomplishment and one that will be of great benefit to fish and wildlife managers throughout the region.

Task 4.7 Acquire computerized coverages that provide a means for referencing StreamNet data to hydrologic units and geographic referencing systems.

StreamNet's regional GIS data manager has acquired coverages of counties, Council sub-regions and sub-basins, other hydrologic units, and NMFS ESUs. These are being integrated into the new StreamNet query system in order that data might be retrieved for any of these units.

Additional geographic units that will likely be added in FY 98 include national forest, BLM district, tribal ceded land, and state fish and wildlife regional boundaries.

Task 4.8 Establish protocol for linking data collected at other scales to the 1:100,000-scale system.

A paper entitled “Transfer of Information Between GIS Layers with Different Scales” was prepared, reviewed, and release in April 1997. The methods outlined in the paper had previously been tested through a joint Forest Service-WDFW effort on the Olympic National Forest. The concepts enumerated in the paper have subsequently been integrated into the IRICC procedures and are being implemented.

Objective 5. Data Delivery / Information Systems

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 97 the project addressed eight 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.

During FY 97 data and information requests were received and responded to at both the regional and state levels. A total of 1,849 data/information requests were responded to during the year, compared to 1,702 in FY 96 and 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 97

	Qtr 1	Qtr 2	Qtr 3	Qtr 4	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
	TOTAL				1,849

Task 5.2 Maintain and distribute the existing windows-based distributed system (DS) as needed.

The most recent version of the DS was released in June 1996. It has not been upgraded since that time. StreamNet continues to provide access to the DS via diskette and Internet download. During FY 97 14 copies of the DS were distributed via diskette and 33 via Internet download (Approximately 100 copies of this DS version were distributed in FY 96). Given the success of the StreamNet home page, including the flexibility of the on-line query, the ease with which the StreamNet on-line feature can be updated, and the significant increase in users having access to the Internet, it was determined that release of an FY 97 version of the DS was not warranted. Project staff continue to believe that a "stand-alone" product has merit, both to serve as archival

documentation and to serve the needs of users who either do not have Internet access or have specialized needs. The potential for “cloning” the new Internet query system scheduled for release in December 1998 is being actively explored. If this proves possible, a CD version of the StreamNet on-line system will be released in FY 98.

Task 5.3 Continue to develop, test, and document a functional client-server system to provide platform independent access to StreamNet data products through the Internet.

Development of a strategy for providing access to StreamNet data via the Internet constitutes one of the year’s major accomplishment. The Internet strategy was initiated in FY 96 with the release of a “Technical Applications Strategy Report” in July 1996. That report proposed a four step process by which a recommended approach to Internet access would be developed. The strategy was to provide platform-independent access to both tabular and spatial data. The strategy consisted of four major phases:

1. provide an interim system to make StreamNet tabular data available over the WWW before evaluating and purchasing new hardware and software,
2. evaluate several strategies for making spatial (GIS) data available over the WWW
3. based on prototyping and experience from phases 1 and 2, make recommendations for the system hardware and software, and purchase such upon approval and,
4. acquire necessary equipment and software, port all StreamNet data to the new system, and create a new system interface.

During FY 97 a series of status reports were prepared that summarized progress in this regard. The first two reports dealt with phases 1 and 2.. The third and final report, released in February 1997, contained a detailed recommendation regarding platform, hardware specifications, and software. All three reports are available through the project management page of the StreamNet web site.

Based on these recommendations, and following approval by BPA, hardware and software were purchased and system setup commenced. The hardware was installed in July 1997. The remainder of the fiscal year was spent developing new query systems, configuring the underlying database, and porting StreamNet data. A prototype query system developed during this time is available through the project’s internal web site. The majority of the data was ported during FY 97. The exceptions were data categories where new data were being delivered by the states in October 1997. A report on the status of data porting is also available through the internal site. Completion of the new system is scheduled for December 1997.

Task 5.4 Maintain and enhance components of the StreamNet home page

The StreamNet web site underwent extensive improvement during FY 97. Virtually all components of the site were improved. Following is a synopsis of the major enhancements:

Site Organization. A new site structure was created, with the site's various features re-organized under more meaningful headings. These headings were then incorporated into a new menu system, including two bars at the top of the page that are repeated on each page throughout the site and allow quick access to the site's most frequently used features. Also included on the home page are a list of site features that are used less frequently. This was accomplished by September 1997 and released to the public on October 6.

Site Graphics. Along with the new site structure came a new graphic presentation. The home page graphic was changed and a standard color scheme instigated. Figure 1 shows the graphics and layout of the new home page.

Figure 1. StreamNet home page.



On-line Query. Data added to the system was described under Objective 1. In October 1996 background materials were added to the on-line data description. These included data holdings, a data dictionary, and upgraded help features. In January 1997 the on-line query system was enhanced by adding a short list option and new geographic scope filters.

Map Gallery. A map gallery was added (see task 5.7 below). A link was provided to the BPA map builder. An introductory narrative was written that provided background on the map gallery and map builder.

Library. Several new links were added, namely to journals and other libraries.

Fish Facts. This feature was completely revised. A biological glossary was added that contains definitions of over 300 terms. A query system was provided that allows the user to access terms

related to specific subjects. A species database was developed that lists every native species known to exist in the Pacific Northwest. Each species having special federal, state, or agency status was identified and tagged in the database. Information on species status was not incorporated into the web product in FY 97 but will be in FY 98. A new “Kids Pics” feature was initiated. The “life history” feature was expanded to include more species and color graphics. A new feature was added that provides links to web sites offering data on ocean conditions.

PNW Reach File. A new feature was added that provides access to the newly released PNW 100K reach file. This was described in task 4.6 above.

Fish and Wildlife Program. A new feature was established that displays information associated with the Fish and Wildlife Program project selection process. Two products were prepared. First, a listing of FY 97 projects, and second, a similar list that depicts CBFWA’s recommendations for the FY 98 Program. The products include geographic interfaces and links to applicable documents and information. Summary statistics were provided. This product has since been replaced by an updated product but can be viewed by clicking on the Fish and Wildlife Program button and scrolling to the last entry on the contents page.

StreamNet Project Management. This new feature was established to provide access to documents, spreadsheets, and graphic products associated with management of the StreamNet project. Both public and internal versions were established. The internal version serves as a “file drawer” and distribution tool for working documents and other internal draft products. The public version affords the public and project participants with a means to access a wide range of materials produced through the StreamNet project. The public version is organized around the following topics: 1) work plan; 2) coordination; 3) white papers; 4) technical reports; 5) data development; 6) NMFS contract; 7) PNW 100K; 8) briefing papers; 9) published reports; and 10) presentation materials. 52 individual items were posted to the public site as of the end of FY 97. This project management feature proved to be an effective and efficient mechanism for both communicating with project participants and providing information to those not directly involved with the project. (When requested, StreamNet also provides paper copies of any document posted to the project management page. While little used, this does ensure access to project materials for those not having access to the Internet.)

Links. A “links” feature was added that includes approximately 120 links to other web sites associated with fish and wildlife management. These links were organized into 14 separate headings according to subject matter. StreamNet took a systematic approach to creating the links feature. Web sites were only included if they had direct relevance and were of high quality. A specific procedure was established for reviewing potential links, with the StreamNet librarian designated as the person in charge of making decisions regarding new links. Existing links are checked on a regular basis to ensure that they are still active and appropriate for the StreamNet customer base..

What’s New. 12 new entries were made into the what’s new feature during FY 97.

Project Description. A new project description was prepared as described later in task 6.3.

About this Site. This feature was reorganized for FY 97, with new narratives for each heading.

Project Contacts. A directory of all StreamNet participants was established and updated on a regular basis.

StreamNet Web Site Use in FY 97

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. Plans are underway to customize this to allow for increased ability to more accurately discriminate among users and site use. 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 97.¹ As shown in the table, monthly use significantly increased during the year. 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 work week 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 (both academic and Fish and Wildlife Program- related), impact analysis, policy, and education.

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

Oct-96	898
Nov-96	1,358
Dec-96	1,794
Jan-97	1,381
Feb-97	1,476
Mar-97	1,699
Apr-97	1,995
May-97	2,090
Jun-97	2,839
Jul-97	2,740
Aug-97	2,421
Sep-97	<u>3,180</u>
total	23,871

¹ 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.

During September 1997 alone, the site was visited by users from at least 55 universities. Among these, Oregon State University was the top user (850 requests), followed by the University of Washington (320 requests).

Among government agencies the Northwest Power Planning Council and the Bonneville Power Administration were the top users with 830 and 740 requests respectively during September 1997. 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 will each make between 100 and 300 requests per month. Relatively little Montana data has been delivered through the StreamNet site. This will begin to change in FY 98 and the site will likely see a corresponding rise in Montana use. Foreign use comes principally from Canada, and within Canada, principally from British Columbia.

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. After Canada, European countries and Australia are the major foreign users.

Within the StreamNet site the principal use area is the query system (50% of use). The StreamNet map gallery is the next highest with 20%. Fish Facts, a more general educational feature that would appeal to the general public, receives approximately 10% of total use. The library receives 7% of the use. The 100K Reach File, a more specialized feature, accounts for only 3% of total use, though those who do use it rely heavily upon it.

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

Given the emphasis on delivery of products via the Internet, as opposed to the DS, the emphasis on training has shifted from in person and telephone assistance to on-line assistance. This takes three forms:

First, and most important, considerable effort has gone into designing on-line query systems to be user-friendly. All products are tested prior to release. A record of use issues is maintained and modifications are made when appropriate. As examples, in January of 1997 the on-line query system was modified by adding a geographic filter that allows the user to quickly narrow a query to a specific state, region, or subbasin. Also, a "short list option" was incorporated that allows the user to view a summary of the query before displaying the underlying details.

Second, the various features of the web site are equipped with “help” features that assist the inexperienced user. The on-line query is the major area where help of this type is provided. Another example is the project management feature, which includes a help button that guides the user through the procedures needed to view or download documents.

Third, the StreamNet web site contains a “feedback” feature that allows users to electronically forward comments and questions. Such e-mail messages go to four StreamNet team members - project manager, database manager, librarian, and programmer. In this way someone with the knowledge to answer the question is certain to receive it. Responses are always made within 24 hours, either by e-mail or phone. The feedback receives relatively light use - no more than one per week. Those who use the feedback are typically casual users. Users who make more extensive use of the system, and therefore have more complex questions, will typically use the telephone rather than the feedback feature. During FY 97, no question raised by either phone or e-mail was left unanswered.

Task 5.6 Prepare an annual salmon and steelhead report for the Columbia Basin.

A StreamNet Salmon and Steelhead Report was prepared in FY 96. That report included data compiled through 1995. The report was prepared under the direction of the Fish and Wildlife Program and was to be used as a supplement to a proposed Council monitoring report which, for a variety of reasons, was not produced. During FY 97 the monitoring concept was undergoing significant revision as the Council was preparing a program framework document and the agencies were preparing a multi-year implementation plan.

Given these developments, guidance was sought from both the Council and CBFWA on the advisability of producing a new salmon and steelhead report. Through this it was determined that a new report was probably not warranted pending clarification on future directions for Program monitoring. Nonetheless, StreamNet staff proceeded to develop a series of report options and outlines. These were developed to determine if a report would be worthwhile aside from the Council’s monitoring needs. The issue of whether or not to prepare this report was subsequently discussed at the April Steering Committee meeting. It was determined that at this time the value of such a report did not warrant the effort necessary to produce it. The Committee did, however, conclude that such a report has merit and recommended that the report be re-considered once more specific policy direction is available.

Task 5.7 Prepare map products (e.g., map atlases) in hardcopy and/or electronic format that depict the distribution and (potentially) other features associated with anadromous and resident salmonids.

After considering the available alternatives, it was determined that - at least for FY 97 - providing access to map products via the Internet was the most effective and efficient way to distribute StreamNet map products. To this end, StreamNet staff prepared a data exchange format that could be used to catalog map products. A query function was then created whereby the user could select the types of maps that they might wish to view. StreamNet partner organizations were each asked to submit selective samples of map products produced through the project. These were posted to the StreamNet web site. Users were given the option of viewing maps on screen or downloading for their own applications. Approximately 100 maps were posted. The majority of these depicted fish distribution. ESUs, hatchery locations, and other features were also represented.

In addition, MFWP created a series of paper atlases depicting wildlife distribution. MFWP's product will be used as a model should it be determined that additional paper atlases are warranted.

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

This task was included in the work statement to allow for the potential preparation of reports that could document new datasets. The Steering Committee did not identify any instances where a report of this type was necessary and none were prepared. All data sources were noted and incorporated into the StreamNet reference system. Dataset content was incorporated into the data dictionary.

Objective 6. Project Management / Coordination

Project management involves the oversight of the variety of activities involved in the project. Management is particularly important in a multi-agency effort of this nature. Project management involves both overall project management at the regional level and management within each of the participating agencies. The project employed a management team consisting of a project manager and regional data manager at PSMFC and a steering committee consisting of the project managers from each of the participating agencies and the BPA COTR. The following tasks constituted the focus for FY 97 project management activities:

Task 6.1 Organize, facilitate, and/or participate in essential coordination meetings.

The principal project coordination meetings held during FY 97 included:

1. Quarterly steering committee meetings

Steering committee meetings were held in October (Boise at IDFG), January (Gladstone at PSMFC), April (Portland at CRITFC), and July (Kalispel at MFWP). Meetings were each two days in length. Topics typically included project status and budget, data needs and protocols, technical issues, and work statement development and implementation. Agendas and minutes were posted to the StreamNet web site.

2. GIS coordination meeting

This meeting, held in June 1997 at PSMFC, brought together GIS specialists from all participating agencies to discuss coordination and technical issues.

3. River reach system coordination meeting

This meeting, held in April 1997 at PSMFC, brought together GIS and database specialists working on enhancement of the 1:100,000-scale hydrography. Topics included the NHD and protocol for the visual pass.

4. Project briefing

StreamNet sponsored a project briefing for NWPPC and CBFWA staff and leadership at PSMFC in December 1996.

Task 6.2 Prepare project administration reports.

Annual Report. This report constitutes the annual report.

Quarterly Reports. Quarterly progress reports were prepared by each organization funded to work on the StreamNet project. Reports were submitted for the periods of: October - December 1996; January - March 1997; April - June 1997; and July - September 1997. Quarterly progress reports are available upon request from PSMFC.

Each quarter these reports were then consolidated into a comprehensive quarterly progress report that was submitted to BPA. Quarterly progress reports for the first three quarters are available through the project management feature of the StreamNet web site. The quarterly report for July - September 1997 was incorporated into this annual report.

Task 6.3 Produce public information materials.

Brochure. A project brochure was prepared in February 1997. It was subsequently revised in June 1997. 1,000 copies of the brochure have been distributed. Venues for distribution included the StreamNet library and project offices within participating agencies. Copies were distributed at all conferences attended by participants. The brochure was also adapted for use in the Project Description section of the StreamNet web site and is available for download through that site.

PowerPoint Presentation. Two versions of a Power Point presentation were prepared. These are available through the Project Management section of the StreamNet web site.

Miscellaneous. A custom brochure was prepared for use at a Council briefing held at the PSMFC office in December 1996.

Task 6.4 Develop and maintain a communication link among StreamNet participants regarding participation in educational and professional conferences.

Regional staff maintained a list of applicable conferences and coordinated with Steering Committee members regarding attendance at these functions.

Task 6.5 Identify mechanisms for StreamNet to maintain and provide information that is critical to the Fish and Wildlife Program and regional endangered species activities.

StreamNet staff made an effort to identify Fish and Wildlife Program data needs through a systematic review of applicable reports and documents including the following:

- Columbia River Anadromous Fish Restoration Plan (CRITFC Tribes)
- Columbia River Basin Fish and Wildlife Program (Council)
- Framework Document (Council, draft)
- Multi-year Implementation Plan (CBFWA, draft)
- Report of the Independent Scientific Review Panel
- Return to the River (ISG)
- Upstream (National Research Council)

StreamNet staff also attended and gave presentations at meetings sponsored by the Forest Service, the State of Oregon, and the National Marine Fisheries Service regarding the development of data for use in endangered species listing and recovery activities.

Task 6.6 Maintain communications between StreamNet and others to identify means for collaboration.

Throughout FY 97 coordination with agencies involved in fish and wildlife management was a daily activity. At the regional level frequent contact was maintained with BPA, CBFWA, the Council, EPA, USFWS, NMFS, and USGS. State participants retained frequent contact with other divisions within their own fish and wildlife agencies as well as with state natural resource, health, and water resource agencies. CRITFC maintained contact with participating tribes. New working relationships were established with upper Columbia Basin tribes that will result in significant collaboration during FY 97.

Task 6.7 Participate in Fish and Wildlife Program advisory groups and other applicable forums.

StreamNet staff participated in a number of meetings concerning Fish and Wildlife program data, including Council-sponsored meetings on monitoring and evaluation and project tracking. The Fish and Wildlife Program project tracking product described in task 5.4 was a direct result of participation on these sessions.

StreamNet staff gave a presentation at the CBFWA-sponsored Fish and Wildlife Program workshop held in Portland during February 1997. StreamNet staff also prepared a briefing paper on a strategy for future Fish and Wildlife Program project tracking that was presented to BPA Fish and Wildlife Program officials. This paper is available through the "project management" section of the StreamNet web site.

Task 6.8 Update the StreamNet strategic plan.

The StreamNet long-term data plan was updated and is available via the "project management" section of the StreamNet web site. StreamNet staff have on several occasions advocated the development of a strategy data plan for the Fish and Wildlife Program, through which a strategic plan for the StreamNet project could also be created.

Task 6.9 Compile a project record from white papers and other significant written materials.

The "project management" section of the StreamNet web site serves as the project record. White papers prepared during FY 97 and available through the web site include:

- Procedures for Compilation of Resident Fish Hatchery Data
- Strategy for Development of a Project Database
- Strategy for Future Handling of Data on the NWPPC VAX Computer
- Strategy for Providing Access to Library Materials via the Internet

- Library Status Report
- Recommendation on Integration of the Northwest Hydrosite Database into StreamNet
- Strategy for Transfer of Information Between GIS Layers with Different Scales
- Strategy for Long-term Maintenance of the 1:100K River Reach System
- Proposal for StreamNet Assistance with Fish and Wildlife Program Project Tracking

Task 6.10 Prepare a proposed work plan and budget for FY 98.

The FY 98 Statement of Work and budget was prepared, submitted to BPA, and approved in November 1997.

APPENDIX A.

Primary StreamNet Participants in FY 1997

Bonneville Power Administration

Steve Gordon
Tom Pansky
John Rowan
Alan Ruger

Columbia River Inter-Tribal Fish Commission

Jonas Greene
Phil Roger
Gretta Seigel
Krista Schauer

Idaho Department of Fish and Game

Evan Brown
Bart Butterfield
Terry Elms-Cockrum
Jerome Hansen
Lawrence Hartpence
Daniel King
Doug Reece

Montana Dept. of Fish, Wildlife & Parks

Lydia Bailey
Janet Decker-Hess
Jeff Hutten
Angie Schmidt

National Marine Fisheries Service

Steve Stone

Northwest Power Planning Council

Chip McConnaha
Peter Paquet

Oregon Department of Fish and Wildlife

Ray Beamesderfer
Gloria Bourne
Cedric Cooney
Brent Forsberg
Milt Hill
Keith Hupperts
Eric Tinus

Pacific States Marine Fisheries Commission

Stan Allen
Duane Anderson
Gary Christofferson
Liza Bauman
Matthew Freid
Drew Parkin

Shoshone-Bannock Tribes

Doug Taki

U.S. Fish and Wildlife Service

Steve Pastor

U.S. Geological Survey

Bruce Fisher

Washington Department of Fish and Wildlife

Larry Brown
Cindy Burns
Brodie Cox
Peter Hahn
Martin Hudson
Bill Kinney
Dick O'Connor
Leslie Sikora
Bob Woodard

APPENDIX B.

StreamNet FY 1997 Abbreviated Work Plan

Goal: Provide the Fish and Wildlife Program, regional Endangered Species Act activities, and related regional and state programs with essential information on the region's fish, wildlife, and related aquatic resources for use in policy, planning, and management.

Objective 1 - Data Development

ANADROMOUS FISH

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

- a) Ocean range and distribution.
- b) Freshwater distribution, use, 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 (release numbers, exploitation, maturation and return rates).
- h) Age (composition at return).
- i) Genetic origin, production type, stock and population identification.
- j) Historic and potential range (areas previously used for spawning/rearing).
- k) Spawner recruit data from Process for Analyzing and Testing Hypotheses (PATH) project.

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, use for native salmonids.
- b) Distribution for sensitive fish and other aquatic vertebrate and invertebrate species.
- c) Distribution for key competitor/predator species.
- d) Hatchery production.
- e) Natural production (survival, production factors, spawner recruit numbers).
- f) Genetic origin, production type, stock and population identification.
- g) Historic range (areas previously used for spawning/rearing).

HABITAT

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

- a) Prepare and begin to implement a strategy for interagency collection/compilation of "core variables" describing stream habitat.
- b) Incorporate historic anadromous data from the McIntosh project.
- c) Identify existing GIS layers depicting factors that influence spawning habitat for salmonids
- d) Identify available GAP and National Wetlands Inventory products for states within the region.
- e) Incorporate applicable USFS and BLM eastside (and westside) assessment datasets; determine the long-term role of StreamNet in maintaining these datasets.

- f) Incorporate locations of ESA critical habitats fish and aquatic wildlife.
- g) Prepare a strategy for future compilation of estuary and ocean habitat datasets.
- h) Prepare a strategy for a watershed/aquatic health dataset and for rating habitat.

FACILITIES

- Task 1.4 Prepare/maintain standardized data relating to facilities affecting fish/aquatic habitat.
- a) Integrate data on existing dams from the NWHS and the National Inventory of Dams.
 - b) Develop a strategy for adding data on irrigation diversions. Initiate compilation of relevant data.
 - c) Develop a strategy for adding data on man-made blockages and fish passage facilities
 - d) Develop and maintain a dataset on anadromous and resident hatchery facilities.
 - e) Prepare a recommendation regarding integrating the NWHS into StreamNet..

WILDLIFE AND NATURAL HERITAGE DATA

- Task 1.5 Secure an annual update of natural heritage program data.
- Task 1.6 Prepare and maintain standardized data on sensitive riparian-based vertebrate species.

FISH AND WILDLIFE MANAGEMENT AND ENHANCEMENT PROJECTS

- Task 1.7 Prepare and maintain standardized data relating to fish and aquatic management, to include:
- a) Maintain data that tracks Fish and Wildlife Program enhancement projects.
 - b) Prepare summary data on other habitat restoration, protection, and mitigation projects.
 - c) Identify the location of Fish and Wildlife Program funded and other watershed planning efforts.
 - d) Devise a strategy for maintaining data from Fish and Wildlife Program watershed initiatives.
 - e) Prepare a 1:100,000-scale dataset on federal wild and scenic rivers and state equivalents.

DATA REFERENCE

- Task 1.8 Document data incorporated into StreamNet with reference number and source; collect applicable source documents and provide same to the StreamNet Library.

RIVER SYSTEM OPERATIONS

- Task 1.9 Compile available historic data on mainstem hydro and storage dam operations.
- Task 1.10 Prepare a recommended approach for incorporating available in-season fishery, hydrologic, water quality, and dam operations data.

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. Prepare a recommendation regarding integration of StreamNet data exchange formats into Fish and Wildlife Program contract terms and conditions.
- Task 2.2 Update the existing data exchange format report.
- Task 2.3 At both the regional and state levels, provide database management and administration necessary for accomplishing StreamNet objectives.

- Task 2.4 Evaluate Fish and Wildlife Program data currently stored on the Council's VAX computer and determine data sets to be stored, maintained, and/or enhanced. Port applicable files to StreamNet.
- Task 2.5 Establish a protocol for compilation of a regional catalog of spatial data and compile a regional/state catalog of applicable and available data.
- Task 2.6 Establish and implement procedures for coordinating GIS activities among participants.
- Task 2.7 Establish procedures for managing important non-standardized datasets.
- Task 2.8 Store and make available current and select historical version of state River Information Systems.
- Task 2.9 Prepare and maintain a project data plan.

Objective 3 - Library / Reference Services

- Task 3.1 Continue to develop a collection of materials applicable to the mission of StreamNet. These include:
- a) Documents used as source materials for data compiled in Objective 1.
 - b) Documents published by BPA under the Fish and Wildlife Program.
 - c) Documents from the Council's Fish and Wildlife Program-related collection.
 - d) Documents related to NMFS ESA activities, including administrative records.
 - e) Additional books, journals, agency reports, gray literature, research reports, and documents.
- Task 3.2 Provide improved user access to the materials described in Task 3.1, including:
- a) Provide an appropriate facility for the storage and use of the physical collection.
 - b) Organize and maintain the collection for appropriate on-site use.
 - c) Catalog the materials acquired by the StreamNet Library.
 - d) Develop a strategy for providing access to the Library Catalog and documents via Internet.
 - e) Develop a plan for the construction of a useful keyword thesaurus/subject heading list.
- Task 3.3 Catalog, index, and abstract materials acquired in Task 3.1a; catalog and index materials acquired in Task 3.1b; catalog materials acquired in Task 3.1c.
- Task 3.4 Manage the StreamNet Library and provide library services to the StreamNet user community.
- Task 3.5 Engage in networking activities with other agency and regional library service providers:
- a) Collect information about other library collections/access policies.
 - b) Provide consultations 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 Monitor progress of the National Hydrographic Dataset. Incorporate the completed national product.

- Task 4.2 Establish graphic links and provide regionally consistent unique numbers for lakes and reservoirs. Prepare a recommendation regarding integration of high mountain lakes.
- Task 4.3 Complete a “visual pass” and make corrections to the National Hydrographic Dataset.
- Task 4.4 Complete routing and establish a unique stream ID for 100K streams.
- Task 4.5 Establish maintenance procedure for the 100K river reach system.
- Task 4.6 Maintain the 100K river reach system.
- Task 4.7 Acquire computerized coverages that provide a means for referencing StreamNet data to hydrologic units and geographic referencing systems.
- Task 4.8 Establish protocol for linking data collected at other scales to the 1:100,000-scale 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 Maintain and distribute the existing windows-based distributed system (DS) as needed.
- Task 5.3 Continue to develop, test, and document a functional client-server system to provide platform independent access to StreamNet data products through the Internet.
- Task 5.4 Maintain and enhance other components of the StreamNet home page
- Task 5.5 Provide training and orientation for users of the StreamNet data delivery systems.
- Task 5.6 Prepare an annual salmon and steelhead report for the Columbia Basin.
- Task 5.7 Prepare map products (e.g., map atlases) in hardcopy and/or electronic format that depict the distribution and (potentially) other features associated with anadromous and resident salmonids.
- Task 5.8 Prepare topical reports that describe content, methods used, and sources of select StreamNet datasets.

Objective 6 - Project Management / Coordination

- Task 6.1 Organize, facilitate, and/or participate in essential coordination meetings.
- Task 6.2 Prepare project administration reports.
- Task 6.3 Produce public information materials.
- Task 6.4 Develop and maintain a communication link among StreamNet participants regarding participation in educational and professional conferences.
- Task 6.5 Identify mechanisms for StreamNet to maintain and provide information that is critical to the Fish and Wildlife Program and regional endangered species activities.
- Task 6.6 Maintain communications between StreamNet and others to identify means for collaboration.

- Task 6.7 Participate in Fish and Wildlife Program advisory groups and other applicable forums.
- Task 6.8 Update the StreamNet strategic plan.
- Task 6.9 Compile a project record from white papers and other significant written materials.
- Task 6.10 Prepare a proposed work plan and budget for FY 1998.