

FY99**Project 96-019-00: Second-Tier Database Support for Ecosystem Focus**

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Project Requirements:

This project provides data management services supporting several Fish and Wildlife Program projects and Endangered Species Act monitoring functions through single-point, interactive, public access to a variety of regionally-distributed historical and current information critical to resource management and hydrosystem operations, particularly during the juvenile and adult migration periods. With respect to the Fish and Wildlife Program, these services are parts of FWP objectives 3.2G - Disseminate Research and Monitoring Information; and 5.0F.4 - Implement adaptive research and monitoring framework. With respect to ESA, they support Federal abilities to independently make and evaluate decisions committing federal resources.

These services have been provided since 1995 through University of Washington's Columbia Basin Research Project 89-108-00 (Monitor and Evaluate Modeling Support). The service includes DART (Data Access in Real Time) which may be viewed at the Internet site <http://www.cqs.washington.edu/dart/dart.html>

DART does not provide analysis of information except as the user interacts to select time series and other constraints on the information to be presented graphically or in tables. DART is intended to compliment, not duplicate, existing historical and in-season database services provided by Project 88-108-04 (StreamNet), Project 94-033-00 (Fish Passage Center), and other regional data services. Data extracts from the database supporting DART are used in BPA analyses of juvenile passage timing and survival through the hydrosystem.

Project Objectives:

1. Foster better resource management and project operation decisions through effective access to historical and recent environmental, fishery, and operational information.
2. Provide single-point, Internet-based, and interactive access to a subset of historical and current fishery, hydraulic, project operation, and environmental information vital to year-round planning and in-season decision-making for operation of the Federal Columbia River Power System. These decisions affect survival of migrating juvenile and adult anadromous fishes and resident fishes.
3. Through DART and other Internet-based information services, federal agencies are meeting federal responsibilities under Executive Order 13011 - "Federal Information Technology" and the Endangered Species Act by restructuring governmental services to provide public access to environmental information and effective information tools to decision makers. On March 11, 1998, BPA and the Corps of Engineers reported to the National Performance Review on "Decision Support and the Management of the Columbia River for Hydro-electrical Power Generation and Endangered Species". The presentation can be accessed at:
<http://www.efw.bpa.gov/Environment/EW/DOCS/OTHER/AccessAmerica/Welcome.html>
4. Services are intended to compliment, not duplicate, existing historical and in-season database services provided by Project 88-108-04 (StreamNet), Project 94-033-00 (Fish Passage Center), and other regional data services but proposals to incorporate these services into StreamNet or FPC have been unsuccessful. The complimentary service is principally the ability to interactively select and graphically overlay (or tabulate) a variety of historical and current information to provide insight to guide planning and in-season decisions. On July 30, 1997, BPA

submitted to the Council a University of Washington document comparing the several systems that constitute the region's information infrastructure for anadromous fish. That document is available at:

<http://www.efw.bpa.gov/Environment/EW/SUBJECTS/Framework/Data/DARTvsFPC/Welcome.html>

5. Generate historical and in-season data sets critical to Projects 91-051-00 (Monitoring and Evaluation Statistical Support) and 89-108-00 (Monitor and Evaluate Modeling Support). The former project generates on-line, Internet-based forecasts of in-season passage timing for ESA stocks considered by the TMT. The latter project forecasts juvenile salmonid survival through the hydrosystem. These independent estimates are critical to BPA's efforts to minimize operational impacts to regional fishes.
6. Reduce user impacts to Project 90-080-00 (PITAGIS) which prioritizes data polling and quality control over data analysis and presentation. DART provides a query interface to a mirror copy of the PITAGIS database.

Rationale for Non-Discretionary Classification

This project addresses several fundamental responsibilities associated with the Endangered Species Act, the Fish and Wildlife Program, and governance. These include 1) providing public access to the "best available" environmental information, 2) providing information management tools to aid decision makers, 3) encouraging adaptive management, and 4) ensuring federal independence in decisions committing federal resources.

Through DART and other Internet-based information services, federal agencies and their contractors are meeting federal responsibilities under Executive Order 13011 - "Federal Information Technology", the Endangered Species Act, and the Fish and Wildlife Program by restructuring governmental services to provide public access to environmental information and effective information tools to decision makers. These services redefine what is "best" and "available", effectively raising the standard for the Fish and Wildlife Program's often cited mandate to use the "best available" information.

BPA needs and uses the support provided by this project to plan, perform, monitor, and evaluate operation of the hydrosystem and its impact on natural resources. With its emphasis on timely, open, and equal access to information, these services facilitate independent inquiry, analysis, imagination, adaptive management, and effective monitoring and evaluation by all interested parties. In this manner, BPA protects its ability to make independent and informed decisions while extending those benefits to the general Public.

FY99 Project Description Criticisms from Appendix A of ISRP Comments on Proposals:

CBFWA Evaluation: Tier 3.

"The fish managers believe that project #9601900 potentially duplicates efforts of the Fish Passage Center and StreamNet, and that the specific products of such a proposal should be developed by all the involved entities. The AFM understand that these same products can potentially be developed largely from the existing geographically-distributed databases on the InterNet." (CBFWA, June 2, 1998)

ISRP Evaluation (Appendix A, pg. 21): *Adequate proposal; Moderate support*

"This is an adequate proposal rated in the upper midrange of the set. The proposal does not clarify why the problems inherent in the primary databases are not fixed instead of adding a second tier (this proposal). There is little explanation of how the 2nd tier is done. The objectives are not the same in table and text. The work is not so much collaborative as competitive, but this is all laid out and stated in terms of the need to cooperate. This project seems to be the result of frustration with other projects not doing what was expected."

Criticism: *The proposal does not clarify why the problems inherent in the primary databases are not fixed instead of adding a second tier.*

Response: The proposal states (Section 6 Abstract) that the "Corps of Engineers, Fish Passage Center, StreamNet, and other primary data centers separately provide a variety of high-quality fishery, hydraulic, project-operation, and other data but the integration of that information into useful products is essential for effective monitoring and evaluation. Lack of co-location and a diversity of data access protocols and data formats complicates and increases the costs of data integration needed by many efforts funded by the FWP or required under ESA.". Two problems were unstated. First is a lack of planned and coordinated development of the regional information system. Second is a lack of support for the integration of primary observations for planning, monitoring, and evaluation in general and for hydrosystem operations and their impacts in specific. Project 9601900 attempts to provide integration of diverse and physically-separated information into products that facilitate and monitor resource management efforts.

The ISRP recognizes part of the first problem in identifying (pg. 33) an inadequacy in justification of multiple databases associated with smolt monitoring. The ISRP also recognized (pg. 90) a lack of demonstration of "how the vast amount of information acquired each through the FWP is used to improve the program". These two criticisms apply generally to regional information management, not just to smolt monitoring.

The ISRP recommended (pg. 33) a review focused on three separate components of information management - data collection, data storage and retrieval, and data analysis. Such a review will need to provide for effective and flexible monitoring and evaluation.

The second unstated problem - lack of support for integration for monitoring and evaluation - is a consequence of the first - lack of coordinated development. The StreamNet, FPC, Corps, UW and other regional information services have developed separately and primarily to serve the interests of the host agent - respectively the Council, the states and tribes, the Corps, and BPA. Despite best efforts, suspicions persist that the political interests of the host bias the available information, either in content, analysis, or presentation. These suspicions need to be addressed in the ISRP recommended information management review.

Project 9601900 is itself the consequence of regional resistance to BPA efforts to improve public access to FWP and operational information. Resistance is couched in fiscal arguments or in territorial statements about "duplication". What Project 9601900 provides is equal public access to a broad range of historical and near real-time fishery, environmental, and operational information and the tools with which to independently and efficiently investigate cause and effect. An actual example illustrates its utility. During TMT meetings, discussions during summer focus on current water temperature and flows as important determinants of late summer juvenile migrant survival. Comparison to prior years migration patterns, flows, and temperatures can quickly and easily be prepared through DART with presentation in graphic form for visual comparison and discussion. Patterns, trends, and future possibilities can be recognized. The tabular data can also be saved and analyzed locally. This process takes only a few minutes, an appropriate time scale for the decisions being made. Such production is not practical using other regional information resources which present static "paper images" of reports and which do not provide access to corresponding information for more than the current year. This capability would seem to apply to all FWP efforts that address cause and effect relationships.

The proposal did not address implementing the services under the Corps of Engineers or BPA's own data services without cost impact to the FWP direct program. To do so does not satisfy federal responsibilities under Executive Order 13011 and the need for this generic capability for all FWP efforts addressing cause and effect relationships. However, such an arrangement should be considered during the recommended reviews.

Criticism: There is little explanation of how the 2nd tier is done.

Response: Section 7e of the proposal outlined system and processing characteristics. There are several elements involved: administrative, procedural, and technological. The administrative element involves written or consensual agreements between data managers on exchange of information between separate data servers. The agreement recognizes the responsibility of the primary server for quality control and for providing a specified set of information in a specified format and at specified frequencies. The recipient agrees to include identification of the source and to reflect changes in the primary data as it is communicated to the second tier. The objective of the agreement is to encourage data stewardship at the primary level and concurrency at higher levels.

Procedures and technology are interrelated. Implementation to date has utilized the Unix operating system and proven "open-system" software tools to automate and enhance the reliability of information retrieval, integration, and service. The objective of this implementation is to minimize human involvement and cost. Automation of processes uses the cron and make software tools which allow unattended controlled execution of data transfer, database loading, graphing, etc. cron is a software tool that uses the computer's internal clock to schedule program execution according to a user-specified scheduling plan (the cron table). For example, exchange files are transferred at night when internet traffic is low using either File Transfer Protocol (FTP) or the scripted command-line web browser (i.e. a non-interactive WWW access tool). The transfer and update process itself is accomplished using shell scripts and makefiles. make is a Unix-based utility that checks dependencies of specified files, and executes perl and Unix shell scripts to update any files that are determined to be out-of-date, including graphical or tabular products for public viewing. The data manager's involvement centers on confirming these transfers and updates and addressing unexpected events.

The UW database utilizes the Ingress database management system. All received data is loaded into the DBMS and certain graphical and tabular products automatically prepared from the updated database to facilitate public viewing. Interactive public access is provided to the entire database through a user-friendly web-browser interface that permits the user to specify the years and date ranges and parameters to be retrieved. It also allows some control of the presentation format for graphical products. The data comprising graphical products are also available for downloading and inspection. Generation of these products result from a mixture of database services and appropriate Unix-based software tools.

Modifications of the services and products are accomplished through direct cooperation between customers and data manager. BPA Fish and Wildlife staff (Pat Poe) has communicated requests for changes from both NMFS and BPA to the data manager. Changes have been accomplished within a week of the request. Examples of this coordination include the addition of steelhead information, over wintering headwater conditions, and refinement of PIT-tag and ESU groupings to reflect annual tagging efforts.

Criticism: The objectives are not the same in table and text.

Response: Table 4 (Objectives and Tasks) addressed both the specific services of providing data extracts to individual projects and the more generic issue of providing monitoring and evaluation through regional information services. The text focused on the specific implementation in monitoring and evaluation of hydrosystem operations. This difference of emphasis reflected the desire to invoke discussion of information management issues identified by the ISRP review but previously ignored by the region.

Criticism: The work is not so much collaborative as competitive, but this is all laid out and stated in terms of the need to cooperate. This project seems to be the result of frustration with other projects not doing what was expected.

Response: There is a great deal of "history" that has resulted in estrangement of parties that need to work cooperatively and synergistically. Rather than focus on such history, the region needs Council and ISRP assistance in reorienting and integrating our constructive efforts to better serve adaptive management and species at risk. BPA is prepared to participate in cooperative efforts that meet its obligations under Executive Order 13011, ESA, the FWP, and other obligations.

Criteria for Information Dissemination Projects (page 105, ISRP Review)

For projects whose primary function is to transfer information to the public, the ISRP recommends (page 105) that criteria for proposal evaluation include questions about the project, the target audience and its information needs, the importance of the message, and methods for evaluating the impacts of information. The ISRP use of "public" implies non-program participant. It would be better to either be inclusive of program participants or to separately address that body of users who may have significantly different usage patterns from the general public.

The ISRP suggests the following questions, to which responses are provided.

1. *Does the proposal describe sufficiently what is being communicated to the public?*
 The service known as DART (Data Access in Real Time) may be viewed at the Internet site <http://www.cqs.washington.edu/dart/dart.html>
 Included with each data section (fish passage, PIT-tag, and river conditions) are source references, overviews and definitions.
2. *Are the data reasonably current and in a form that can be easily viewed and downloaded?*
 Data are updated nightly or more frequently if needed.
3. *What is the mechanism for assuring quality control over the information/data being given to the public?*
 Data quality is the responsibility of the primary data source. This is to encourage data stewardship of primary data sources. The second tier cites the source and includes disclaimers placing the burden for responsible use on the user and the burden for quality on the primary source. The second tier does perform simple range and other checks as appropriate and monitors correct loading on information.
4. *What has been done to assess the public demand for information? Has an assessment of needs been conducted?*
 Development of Internet services for fish and wildlife issues was coordinated with all interested parties during 1995 and 1996. Since July 1997, an online customer survey has helped document needs and adapt the service. Coordination with NMFS has also allowed modification of services on an annual basis and within season modifications are accomplished as requested.
5. *Approximately how many people will receive the information?*
 An unlimited number of people may access this information from anywhere in the world, any time. An online daily and weekly access statistics are provided at:
<http://www.cqs.washington.edu/map.html>
 Analysis of usage logs for the January 1 - July 15, 1998 provides the following numerical account of effective usage. Query hits are counts of actual graphical or tabular products whereas html counts include both pages of substance - e.g. publications, reports - and pages used for accessing the materials - e.g. forms, welcome, etc. The increase in April reflects access for the inseason management period. These queries and their products are unique and not available elsewhere in the Northwest.

January 1 - July 15, 1998 DART web services at Columbia Basin Research								
Month	Graphics Queries			Composite & Detail Report Queries			HTML	
	River Env.	Adult	Other	River Env.	Adult	Other	pages	
JAN	976	217	69	1414	467	257	3660	
FEB	836	622	202	1258	490	353	3707	
MAR	1326	419	714	1554	1529	455	5139	
APR	2109	918	1700	2137	3369	1223	8507	
MAY	1626	1383	1528	1943	3625	1370	8617	
Jun-July15	2120	2677	2211	2725	4678	1125	10,962	
TOTAL	8993	6236	6424	11031	14158	4783	40592	
Total Graphics Queries			21,653					
Total Comp. & Detail Queries			29,972					
Total Queries			51,625					
Total HTML pages			40,592					

1. *What changes in behavior or outcomes are anticipated to result from the information?*

The interactive nature of the user interface and breadth of information in time span and in topic allows, even encourages, the user to investigate relationships. Hopefully, such investigation will produce wiser recommendations for operation of the hydrosystem or other actions affecting anadromous fish, resident fish and wildlife. Other static services do not provide simple and timely access and presentation of information but act as barriers to consideration of alternatives.

2. *What methods will be used to assess the impacts of the information?*

Measurement of access to information products will be assessed annually as in the above tables. Continuation of the survey and response to Program and ESA coordination will provide responsive service. Actual impact will occur when the region is willing to use and cite the available information to support adaptive management.

3. *Is there an explicit connection between the education project and the goals and objectives of the FWP?*

Within the limits of FWP objectives 3.2G - Disseminate Research and Monitoring Information; and 5.0F.4 - Implement adaptive research and monitoring framework, this project provides the medium (the internet), means (interactive query) and substance (database) for education and for fostering of adaptive management throughout the Columbia Basin.

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File PROPOSALS/AIWP/nondis/1999/9601900.doc