

# **NMFS RESPONSE TO THE ISRP PRELIMINARY REVIEW OF FISCAL YEAR MAINSTEM AND SYSTEMWIDE PROPOSAL: 35048**

**Note: Review comments are in italics**

*Review Comment: The proposed work is difficult to review because the objectives and tasks and methods are not organized in a clear and systematic way in this long rambling proposal.*

Proponent Response: We hope our response is clearer and meets your needs.

*Review Comment: The proposal should be reviewed within NMFS before resubmission.*

Proponent Response: The proposal has been reviewed by NMFS prior to this resubmission.

*Review Comment: There is some description of the NMFS Salmon Data Management (SDM) program, but no specific list of objectives with associated tasks. A list of “general tasks” has no associated methods. Methods are embedded in longer narratives that do not clearly relate to specific tasks or objectives....The proponents should rewrite the section f. Proposal objectives, tasks and methods, carefully listing specific tasks and detailed methods to accomplish each task.*

Proponent response: Section f. is rewritten below:

## **NWFSC SALMON DATA MANAGEMENT PROGRAM (SDM) OVERALL GOALS AND STRATEGY:**

The NWFSC SDM program is proceeding in a planned, standardized and structured manner and has been operational for the past 18 months. It consists of a small group of information system specialists with the following goals:

For NWFSC scientists and external customers:

- Promote collaboration, communication, and coordination using e-gov principles and enterprise-wide architecture framework to share and access internal and external information and data;
- Provide and maintain corporate data, metadata and applications;
- Support analysis and project management services; and,
- Respond in a timely manner.

The SDM Strategy is:

- Apply a Rapid Application Development (RAD) approach to solving information system development problems. Bottom up and Top down;
- Leverage currently available systems, applications and data where possible;
- Adopt Standards and Best Practice Guidelines;
- CIO Enterprise Architecture, FGDC Metadata, 508 Accessibility, NOAA web site development, Oracle Information CASE methodology and Marc and other standards and policies; and
- Leverage partnership and joint funding opportunities.

**OVERALL SDM METHODOLOGY: THE RAPID APPLICATION DEVELOPMENT (RAD) APPROACH TO INFORMATION SYSTEM DEVELOPMENT:**

RAD is one proven information system technology development methodology well described in the literature. For example see Barker and Clegg, 1994<sup>1</sup>. Projects are approached in a structured iterative manner as detailed below. GO/NOGO decisions, testing and validation and verification (monitoring and evaluation) are essential parts of the process. A feature of RAD is the development of a working prototype to meet user needs, the testing of the prototype by the users and then the modification and retesting of prototype. To reach project objectives and meet user needs RAD developers may cycle more than once through stages I-III of the methodology.

Stage I

Task 1. Awareness. Involves detailed understanding of the problem as users experience it:

Task 2. Assessment. Understanding the data, the amount of work involved in developing the application and the data migration:

Task 3. Preliminary Strategy/Analysis:

Task 4. Prototype and prototype testing (for user feedback):

Task 5. GO/NO GO:

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<sup>1</sup> Barker, R and Clegg, D. 1994. Case Method Fast-Track- A RAD Approach. Oracle Press, Addison-Wesley.

## Stage II

Task 1. Detailed Project plan: (The time line for the project plan depends greatly on the necessary degree of consultation with system users and stakeholders and the complexity of the tasks).

Task 2. Strategy, Analysis, Design:

Task 3. Development/Documentation/Testing:

## Stage III

Task 1. Transition/ Training:

Task 2. Deployment:

Task 3. Maintenance:

Task 4. Independent Validation and Verification (Monitoring and Evaluation):

## **DETAILED RAD TASKS FOR EACH OF THE COLUMBIA BASIN MAINSTEM FUNDING OBJECTIVES 1-7**

### **Objective 1. Provide Access to All Program Data, Tools with an RPA (Reasonable and Prudent Alternative) Tracking Pilot.**

#### Stage I

Task 1. Awareness: The NMFS Northwest Regional Office expressed to the NWFSC it's frustration with the tools and technologies available to it to track progress on RPA action items for required reporting for annual, three-year, 5 year and 8 year reports. Currently the Regional office works with the Action Agencies to develop these reports with the data being assembled by each Action Agency on spreadsheets, which are then compiled and recompiled and eventually forwarded to NMFS for overall coordination. The problem is that there is no single location where all of the Action Agencies can contribute progress information and maintain the information in an online database. The current task of assembling this information is difficult, repetitive and time consuming. A considerable amount of time is spent in preparing and compiling and updating spreadsheets that are then e-mailed between users.

SDM Web is an existing NMFS prototype that, with modification, can meet this need by providing a shared work environment for groups of users from different organizations and agencies needing to work on a common set of information. SDM Web can maintain information in reports, spreadsheets and other formats in a single database. For example, all records relating to a project, in this case, the preparation of progress reports required under the 2000 FCRPS Biological Opinion would be maintained in a single shared web and GIS enabled repository. Particular data sets or reports in the repository that are being developed by agency officials could be password protected. Entire sets of documents, email discussions, meeting reports, data, maps and images would be organized in a coherent project and people focused manner. All of the data would be searchable via ad-hoc query tools, for those who have access privileges, and it all sits on a scalable Oracle database.

Task 2. Assessment: An initial assessment of the problem and the application suggests that the problem of the Regional Office may be solved through fine-tuning of SDM Web and web enablement. Demonstrations of SDM web have been made to the NMFS Regional Office and to other interested groups.

Task 3. Preliminary Strategy/Analysis: This is already complete with respect to SDM Web version 1 which is already functioning on the SDM Intranet.

Task 4. Prototype and prototype testing: Testing on the Intranet is ongoing.

Task 5.GO/NO GO decision: Evaluate SDM Web with respect to its ability to meet customer goals and with respect to alternative systems. A working demonstration is currently available for evaluation by the ISRP or others.

## Stage II

Task 1. Detailed Project Plan: To be completed within four weeks of acceptance of funding. The plan will identify: the project team; all tasks; the estimated costs of each task including the cost of any necessary software and hardware and a detailed budget; any dependencies between tasks such as which task must finish before another can begin; who will complete each task; identification of a probable user group for the project; other needed consultation and participants; the actual deliverables such as code and documentation; the dates the deliverables are due; project team meeting schedule; project team reporting requirements; the project manager; and, the program manager to whom the project manager reports. The plan will be a written document supported with 'Gant' charts or other diagrams that clearly establish a flow of work designed to complete all tasks in a logical and efficient manner based on the overall RAD methodology. It may be completed using project management software, for example Microsoft Project.

Task 2. Strategy, Analysis, Design: We will consult with the NMFS Regional Office and the Action Agencies to fully demonstrate the existing prototype SDM Web, to identify specific customer needs, and, we will identify a technical pathway for web-enabling

SDM. The results of consultation and technical review will be written into a design. We will review the design with the users/customers.

### Task 3. Development/Documentation/Testing:

Build the host platforms as necessary – currently the NMFS has the necessary host system in place at the NWFSC for Intranet use. For Internet use it is necessary to build the Web system platform and load appropriate services including any HTTP and FTP services.

The Web site itself will be developed to establish that the visual design is consistent and meets user needs, that the web site functions in the manner needed by the users and to ensure that necessary security is available.

Develop user guidance for on line use via the web for the user, the System Administrator and for the Documenter/librarian. Define these roles.

Develop system documentation to describe how the system works, the relationship of the web system to the underlying Oracle database, and the actual structure of the Oracle database.

Develop a test plan to test the functionality and performance of the system with user data.

Execute the test plan. Complete any bug fixes.

### Stage III

Task 1. Transition/Training: A transition plan would be developed to allow the deployment of the production system. The plan would identify the software, hardware and level of technical expertise (Application administration, System Administration, Oracle dba, and etc.) necessary to independently stand up and operate the system. Training and training documentation would be developed to meet the needs of the end users. The needed level of training materials would be determined based on the experience of testers using the user guidance.

Task 2. Deployment: Users will be issued user passwords and the Application Administrator will provide access. The transition plan would be executed.

Task 3. Maintenance: System upgrades and fixes are accomplished through the web from the server. Depending on the scope of deployment, some support from a documenter/librarian may be necessary. If the system is only used to track RPA compliance this is unlikely to be necessary, however uses could easily expand to require documenter/librarian support if the system was used more broadly.

Database and web site maintenance on the operational system will be completed as necessary on a routine basis.

Task 4. Independent Validation and Verification (Monitoring and Evaluation): This will be completed after deployment either through peer review or by independent consultants.

**Objective 2. Provide Access to NWFSC Salmonid Database for Users Inside and Outside the NWFSC.**

Stage I

Task 1. Awareness: The awareness evaluation is complete and an existing prototype has been developed. Prior to this prototype effort the Salmonid data (abundance series, age structure series, harvest series, hatchery fraction and artificial propagation) existed in many different locations and in many different formats. None of these historical data were supported by a normalized logical data design.

Task 2. Assessment: Consultation with users was completed to understand the data, the amount of work involved in developing the application and the data migration.

Task 3. Preliminary Strategy/Analysis Design: System design/development standards were adopted and data was migrated to an Oracle 8i environment. Links to spatial data and metadata are being developed.

Task 4. Prototype and prototype testing: Testing is ongoing through multiple users.

Task 5. GO/NO GO: A decision has been made to proceed with this program internally within the NMFS to meet NMFS Status Review requirements. A decision has not been made to support external users as a part of the current Stage I effort.

## Stage II

Task 1. Detailed Project Plan: Complete for Stage I. For Stage II: To be completed within two weeks of acceptance of funding. The plan will identify: the project team; all tasks; the estimated costs of each task including the cost of any necessary software and hardware and a detailed budget; any dependencies between tasks such as which task must finish before another can begin; who will complete each task; identification of a probable user group for the project; other needed consultation and participants; the actual deliverables such as code and documentation; the dates the deliverables are due; project team meeting schedule; project team reporting requirements; the project manager; and, the program manager to whom the project manager reports. The plan will be a written document supported with 'Gant' charts or other diagrams that clearly establish a flow of work designed to complete all tasks in a logical and efficient manner based on the overall RAD methodology. It may be completed using project management software, for example Microsoft Project.

Task 2. Strategy, Analysis and Design: Complete for Stage I.

Task 3. Development/Documentation/Testing:

The next steps include making the Salmonid database web-enabled for external users and to provide for personalized portal technology for each user or research team.

The Web interface through which users navigate to available data will be further developed.

User guidance for on line users will be developed and written including instructions for the use of related metadata.

User guidance for the system administrator will be developed and written.

System documentation will be developed to describe how the system functions, and the actual structure of the Oracle database. A detailed copy of the Oracle Table Definition and the copies of the Entity Relationship Diagram will be provided.

A test plan will be developed to test the functionality and performance of the system and executed.

Bug fixes will be completed.

## Stage III

Task 1. Transition/Training: There are some 40 users within the NWFSC and an estimated 200 potential users outside of the Center. A transition plan would be developed

to allow the deployment of the production system. The plan would identify the software, hardware and level of technical expertise (Application Administration, System Administration, Oracle dba, and etc.) necessary to independently stand up and operate the system. Training and training documentation would be developed to meet the needs of the end users. The needed level of training materials would be determined based on the experience of testers using the user guidance.

Task 2. Deployment: Deployment will be staged, first to users in the Center and then to users outside of the Center.

Task 3. Maintenance: Will be undertaken by the NWFSC. The database will be updated on a routine basis. Database updates will be made according to scheduled needs for Analysis and reporting to meet deadlines in the BO. The schedule will be identified in the project plan.

Task 4. Independent Validation and Verification (Monitoring and Evaluation): Will be completed as peer review or by independent consultants after deployment.

### **Objective 3. Develop and Provide Access to Needed Spatial Data Layers.**

#### Stage I

Step 1. Awareness: A Spatial Data Team (SDT) at the NWFSC has completed a detailed Spatial Needs Assessment to identify the needs of all Salmonid researchers. The researchers identified priority needs for some 30 spatial data layers.

Step 2. Assessment: GIS specialists at the NWFSC reviewed the status and availability of already completed data sets. Copies of the draft report were distributed to others with an interest in GIS data layers such as StreamNet.

Step 3. Preliminary Strategy/Analysis Design: The strategy at the NWFSC is to maintain a single copy of each of the layers within a corporate structure, on a server available to users, with attached metadata records. Where sets of needed quality and quantity are known to already exist they will be obtained from existing sources. High priority has been given to base layers that are repeatedly used by many researchers. The SDT determined that for most research purposes the spatial data layers need to be created at a 1:24,000 scale rather than the more common 1:100,000 scale.

Step 4. Testing: Available spatial data layers have been placed on a Center server and are undergoing testing by multiple users.

Step 5. GO/NO GO: A decision has been made to proceed with this effort internally within the NWFSC.

## Stage II

Step 1. Detailed Project Plan: To be completed within four weeks of acceptance of funding. The plan will identify: the project team; all tasks; the estimated costs of each task including the cost of any necessary software and hardware and a detailed budget; any dependencies between tasks such as which task must finish before another can begin; who will complete each task; identification of a probable user group for the project; other needed consultation and participants; the actual deliverables such as code and documentation; the dates the deliverables are due; project team meeting schedule; project team reporting requirements; the project manager; and, the program manager to whom the project manager reports. The plan will be a written document supported with 'Gant' charts or other diagrams that clearly establish a flow of work designed to complete all tasks in a logical and efficient manner based on the overall RAD methodology. It may be completed using project management software, for example Microsoft Project.

Step 2. Strategy, Analysis, Design: Since the information on the needed layers is spread across many different agencies and jurisdictions it is most efficient for one agency to take a lead in preparing the status information by establishing a cross agency reference team. The NWFSC is proposing to lead in this task. Using the recently completed Spatial Data needs report as a starting point. NMFS proposes the establishment of a cross agency reference team to lead the interagency effort. Coordination is necessary to avoid duplicate efforts and to take advantage of many individual mapping efforts that are currently being completed and planned. Other data centers such as StreamNet, IRICC, DART, BPA, states and tribes could be potential partners in joint delivery of data and the NWFSC will consult with these groups.

The main design task is to develop a program to systematically acquire the needed spatial data layers and to make them available within the region.

### Step 3. Development/Documentation/Testing:

The major development task is to obtain or create the necessary layers, tasks that in every case that will involve GIS specialists.

As each layer is obtained GIS specialists will test the layer against available metadata information for that layer.

Where new layers are created it will be necessary to develop and execute a test plan to validate the accuracy of the information. FGDC compliant metadata records will be created for any new layers.

A directory of available layers and status will be developed and made available via the web.

### Stage III

Step 1. Transition/ Training: Transition and Training are not a substantial component in this proposal. Depending on the outcome of Stage II, training may be necessary.

Step 2. Deployment: Data Layers will be loaded onto and maintained on a single server. Metadata describing each data layers will be loaded at the same time and associated with the each layer. Generally the metadata will originate from the developer of the data layer.

Step 3. Maintenance: It will be necessary to update maps based on an as needed basis and in relation to the availability of updated source material. A need for a particular data layer in a particular area could stimulate a request for an update for that area. In other cases there may be multiple requests for updated data over wide areas and it would be necessary to complete an update of an entire layer. These requests will be managed on a case-by-case basis.

Step 4. Independent Validation and Verification (Monitoring and Evaluation): Will be completed as peer review or by independent consultants.

### **Objective 4. Provide Urgently Needed Research Monitoring and Evaluation Data Management.**

### Stage I

Step 1. Awareness: There have been numerous administrative and scientific calls for a comprehensive monitoring and evaluation (M&E) program to provide consistent, region-wide information about the status of salmon populations. The 2000 Biological Opinion on the Federal Columbia River Power System requires the development and implementation of a coordinated monitoring and evaluation program. (Actions 180-184, 188, 190, 191, 193, and 195-7). While there is no consensus on RME data needs for the Columbia basin as a whole, and any top down consensus could be years away from completion, there is a willingness by the NMFS and other agencies to proceed with a pilot RME project.

There are several current proposals to build parts of a comprehensive RME Program within the NMFS: 1) Developing and Implementing a Pilot Status and Trend Monitoring Program for Salmonids and their Habitat in the Wenatchee and Grande Ronde River Basins - contact - Chris Jordan, NWFSC; 2) A Pilot Study to Test Links Between Land Use / Land Cover Tier 1 monitoring data and Tier 2 and 3 monitoring (currently being rewritten) – contact - Blake Feist, NWFSC; and 3) Regional Project Effectiveness Monitoring Program for Columbia River Basin Listed Anadromous Salmonids – Contact - Steve Katz, NWFSC. There is also a monitoring effort being undertaken in the John

Day river system that involves the Bureau of Reclamation, the Oregon Department of fisheries and Wildlife, and the Oregon Department of Environmental Quality.

Step 2. Assessment: The agencies involved in collecting the above RME data believe that they already have a good understanding of the actual data collection requirements. The SDM team proposes to work with the agencies involved in these proposals (if and when approved for funding) to develop a pilot RME information system. The SDM team has already developed database applications with this potential and has demonstrated a prototype using restoration data from the OWEB and PRISM databases.

Step 3. Preliminary Strategy/Analysis Design: The architecture would be capable of functioning as a common repository for all monitoring and evaluation data. Note that it would not replace existing information collection agencies, but rather would function to consolidate monitoring and evaluation program data from multiple sources into a single web and GIS enabled environment. The SDM team considers that rapid and effective progress on information system development can be made by developing prototypes because they allow all details to be considered and solutions created within distinct development cycles and that because of the urgency of need to collect RME data there are few realistic alternatives to rapid prototyping.

Step 4. Prototype and prototype testing: For the OWEB and PRISM database testing is complete.

Step 5. GO/NO GO. A decision to proceed with the SDM prototype has not been made.

## Stage II

Step 1. Detailed Project Plan: To be completed within eight weeks of acceptance of funding. The plan will identify: the project team; all tasks; the estimated costs of each task including the cost of any necessary software and hardware and a detailed budget; any dependencies between tasks such as which task must finish before another can begin; who will complete each task; identification of a probable user group for the project; other needed consultation and participants; the actual deliverables such as code and documentation; the dates the deliverables are due; project team meeting schedule; project team reporting requirements; the project manager; and, the program manager to whom the project manager reports. The plan will be a written document supported with 'Gant' charts or other diagrams that clearly establish a flow of work designed to complete all tasks in a logical and efficient manner based on the overall RAD methodology. It may be completed using project management software, for example Microsoft Project.

Step 2. Strategy, Analysis, Design: The SDM team would meet with the agencies who are involved in the RME monitoring pilots and create an RME Pilot Data Team to identify the details of necessary data collection. Specifically, to identify what data will be collected, what metadata will be collected, how data will be delivered to the database, and what data outputs are required.

The project team will then build an Oracle database and needed data entry mechanism to accommodate the needed data, create a pilot RME data system design and present it to the RME Pilot Data Team. When there is agreement that the system design meets the needs of the users the project will proceed to Step 3.

### Step 3. Development/Documentation/Testing:

Development will follow a conventional path using Oracle CASE Designer tools.

Build the data system repository and configure the oracle repository on that platform

Build the web site utility to access the database. Implement security on the web.

Complete documentation including user documentation, table definitions, entity relationship diagrams and any Web related documents including web help.

Complete testing based on a written testing plan using real-world data sets provided by the user community.

### Stage III

Step 1. Transition/Training: A transition plan would be developed to allow the deployment of the production system. The plan would identify the software, hardware and level of technical expertise (Application Administration, System Administration, Oracle dba, and etc.) necessary to independently stand up and operate the system. Training and training documentation would be developed to meet the needs of the end users. The needed level of training materials would be determined based on the experience of testers using the user guidance.

### Step 2. Deployment:

Following testing the pilot RME data system will be deployed to gather data and to allow the user community to test its sampling design and monitoring and evaluation statistics.

It is possible that there may also be a parallel top down effort to develop a region wide RME program. In this case it would be appropriate, after perhaps 6 months of deployment using the pilot system, to evaluate performance against the needs of a region wide RME program.

Step 3. Maintenance. In the short term routine web and database maintenance would be completed by the NWFSC. In the longer term the maintenance role would fall to the host of the RME database.

Step 4. Independent Validation and Verification (Monitoring and Evaluation): Will be completed as peer review or by independent consultants following deployment.

**Objective 5. Provide Electronic Access to Currently Inaccessible Paper Records for Columbia Estuarine Juvenile Data.**

Stage I

Step 1. Awareness: An extensive archive of sampling data has been collected for juvenile Salmonids in the Columbia estuary that is not available in electronic format but is (with the exception of a few selected data sets) preserved in hand written cards<sup>2</sup>. The studies began in the 1960's and continue intermittently. The lack of data for use as a baseline for ongoing sampling efforts and for helping to form management decisions is severely limited.

Step 2. Assessment: In recent years representatives from other agencies have come to Point Adams and retrieved portions of the historic data. These data include length frequency, recapture, Salmonid catch, and Pit-tag re-trawling information. Those data that are in electronic formats are in DBase, Excel and Access. There are also reports and manuscripts in WordStar and WordPerfect.

Step 3. Preliminary Strategy/Analysis Design: Develop a data migration program for these data, relate these data to the Salmonid database and web enable the information. Review potential data migration technologies including key entry and Optical Character Recognition (OCR).

Step 4. Prototype and prototype testing: Test the database structure for integrity and reliability and to ensure that the quality control and quality assurance are completed at prototype level.

Step 5. GO/NO GO: Depends on funding.

Stage II

Step 1. Detailed Project Plan: To be completed within two weeks of acceptance of funding. The plan will identify: the project team; all tasks; the estimated costs of each task including the cost of any necessary software and hardware and a detailed budget; any dependencies between tasks such as which task must finish before another can begin; who will complete each task; identification of a probable user group for the project; other needed consultation and participants; the actual deliverables such as code and documentation; the dates the deliverables are due; project team meeting schedule; project

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<sup>2</sup> Memorandum from Richard Ledgerwood, Fisheries Research Biologist, NWFSC to Richard Kang Supervisory Computer Specialist NWFSC dated April 1<sup>st</sup> 2002.

team reporting requirements; the project manager; and, the program manager to whom the project manager reports. The plan will be a written document supported with 'Gant' charts or other diagrams that clearly establish a flow of work designed to complete all tasks in a logical and efficient manner based on the overall RAD methodology. It may be completed using project management software, for example Microsoft Project.

#### Step 2. Strategy, Analysis, Design:

Complete a design for a new database or, more probably, expand the Salmonid Database.

Identify a method to efficiently migrate the data into the database to provide for ongoing addition of new data and to ensure that the data is available for analysis.

Work with the NWFSC user group to validate that the design will meet user needs

#### Step 3. Development/Documentation/Testing:

Modify the web resources/interface for the Salmonid database to provide access to the Data. Mount an inventory of the migrated data.

Provide for recording of metadata.

Create documentation for database table definitions, and entity relationship diagrams. Some training documentation may be necessary.

Testing will need to show, database integrity, data extraction, and accuracy of data migration effort.

Complete any bug fixes.

### Stage III

#### Step 1. Transition/Training:

A transition plan would be developed to allow the deployment of the production system. The plan would identify the software, hardware and level of technical expertise (Application Administration, System Administration, Oracle dba, and etc.) necessary to independently stand up and operate the system. Training and training documentation would be developed to meet the needs of the end users. The needed level of training materials would be determined based on the experience of testers using the user.

#### Step 2. Deployment:

The actual migration of data, whether by keyed entry, OCR technology or other means is expected to be the major task in reaching this objective.

### Step 3. Maintenance:

Database maintenance will be completed under Objective 2, in conjunction with the Salmonid database maintenance.

Step 4. Independent Validation and Verification (Monitoring and Evaluation). Will be completed as peer review or by independent consultants following deployment.

### **Objective 6. Improve Spatial Data Analysis Tool (SDAT).**

Note: The proponents have modified objective 6 to emphasize that the purpose of the proposal is to develop a tool that can be used by SWAM and for other analytical purposes rather than to develop SWAM itself which the previous proposal suggested.

#### Stage I.

Step 1. Awareness: Spatial data analysis tools are used to derive summary statistics from spatial data layers for use in scientific decision making and modeling, for example in SWAM (Salmon Watershed Assessment Model). Currently there are limits to the amount of analysis that can be completed because the analysis is labor intensive. A SDM Team developer has created a prototype automated tool (SDAT) that significantly reduces the amount of labor needed by allowing batch processing of data analysis. The spatial tool will produce several outputs, including points per unit area, area weighted mean, slope gradient threshold, stream reach channel gradient, stream reach network distance, and method for summarizing polygons, grids, and line data sets for an area of interest. In addition while spatial data tools are currently run in ArcView GIS 3.2 most GIS users are now moving to the ARC GIS 8.x environment.

Step 2. Assessment: The task of making the spatial data analysis tools available in ARC GIS 8.x requires a migration from the ArcView GIS 3.2 platform. The addition of further functions would allow SDAT to be used on any type of spatial feature. Currently SDAT is limited to assessing data that relates to specified stream reach sections. A user manual is necessary for the new tools. Considerable benefits are anticipated, for example prototype users have noted that some data analysis task that would have taken two days can now be completed in less than half a day.

Step 3. Preliminary Strategy/Analysis Design: Preliminary analysis suggests that there is a clear pathway for migrating to ARC GIS 8.x, that SDAT can be extended to provide the needed functionality and that there is considerable potential for use of the tool once it is developed. Considerable use beyond SWAM is expected. Outputs can be made available in formats used by common statistics software.

Step 4. Prototype and prototype testing: The prototype has been tested on ArcView GIS 3.2.

Step 5. GO/NO GO: Depends on funding.

## Stage II

Task 1. Project plan: To be completed within two weeks of acceptance of funding. The plan will identify: the project team; all tasks; the estimated costs of each task including the cost of any necessary software and hardware and a detailed budget; any dependencies between tasks such as which task must finish before another can begin; who will complete each task; identification of a probable user group for the project; other needed consultation and participants; the actual deliverables such as code and documentation; the dates the deliverables are due; project team meeting schedule; project team reporting requirements; the project manager; and, the program manager to whom the project manager reports. The plan will be a written document supported with 'Gant' charts or other diagrams that clearly establish a flow of work designed to complete all tasks in a logical and efficient manner based on the overall RAD methodology. It may be completed using project management software, for example Microsoft Project.

### Task 2. Strategy, Analysis, Design:

Demonstrate SDAT prototype to users and assess user needs

Identify and complete design of necessary improvements.

Validate the ARC GIS 8.x upgrade path.

### Task 3. Development/Documentation/Testing:

Migrate SDAT from ArcView GIS 3.2 to the new ARC GIS 8.x environment.

Complete SDAT development according to design.

Write user documentation.

Develop test plan and execute plan.

Repair any bugs.

## Stage II

### Task 1. Transition/ Training:

Demonstrate new tool to users and evaluate training needs. Develop training documentation if necessary.

Task 2. Deployment:

Make new tool available to users.

Task 3. Maintenance: To be determined.

Task 4. Independent Validation and Verification (Monitoring and Evaluation): will be completed as peer review or by independent consultants.

**Objective 7. Provide Access to the NWFSC Genetic and Evolution Database for Users Inside and Outside the NWFSC.**

Stage I

Task 1. Awareness: The NWFSC currently receives numerous requests for genetic data from the TRTs, and from other agencies working on salmon recovery. Genetic and evolution data are particularly important because it forms the foundation of scientific knowledge defining ESUs and because genetics provides the ability to track not only discrete populations but also individual fish. These data are also important for applications in hatchery science to create Hatchery and Genetics Management Plans.

Task 2. Assessment: The NWFSC genetic and evolution database is being used more often by more users, a trend that is only expected to grow. The end users of this database would primarily be salmon scientists inside and outside of the NWFSC working on salmon recovery, management, and conservation issues. Currently the data is in Filemaker Pro and SQL Server databases and is not web enabled.

Task 3. Preliminary Strategy/Analysis Design: Develop a prototype database system that would store the "raw" data generated by the genetics laboratories, the sample data and processed genotype data and make it easily accessible to end users. The database would be Web and GIS enabled for entry and extraction of data and contain sample and genotype information. It is expected that the processed end user data would be updated initially on an annual basis. Data subject to processing and current analysis would be separated from the processed data. Typical data queries for the current data would include query by species, location, run time and other attributes. Sample and genotype data would need to be available in different formats including maps of sample locations. Migration into the SDM Oracle environment is necessary.

Task 4. Prototype and prototype testing: To be completed when prototype is developed.

Task 5. GO/NO GO: Depends on success of prototype and funding.

## Stage II (necessary but depends on completion of stage I above)

Task 1. Project plan: To be completed within two weeks of acceptance of funding. The plan will identify: the project team; all tasks; the estimated costs of each task including the cost of any necessary software and hardware and a detailed budget; any dependencies between tasks such as which task must finish before another can begin; who will complete each task; identification of a probable user group for the project; other needed consultation and participants; the actual deliverables such as code and documentation; the dates the deliverables are due; project team meeting schedule; project team reporting requirements; the project manager; and, the program manager to whom the project manager reports. The plan will be a written document supported with 'Gant' charts or other diagrams that clearly establish a flow of work designed to complete all tasks in a logical and efficient manner based on the overall RAD methodology. It may be completed using project management software, for example Microsoft Project.

### Task 2. Strategy, Analysis, Design:

### Task 3. Development/Documentation/Testing:

Build the host platforms: the web system with appropriate services including HTTP, the data system platform with configured Oracle repository, the development environment to allow for structured management of development and production instances.

Build the Web system platform and load appropriate services such as HTTP or FTP.

Develop user guidance for on line use via the web for the user and the System Administrator. Define and describe roles.

Develop system documentation to describe how the system works, the relationship of the web system to the underlying Oracle database, and the actual structure of the Oracle database.

Develop and write a test plan to test the functionality and performance of the system.

Test the system against real data. Complete any bug fixes.

## Stage III

### Task 1. Transition/ Training:

A transition plan would be developed to allow the deployment of the production system. The plan would identify the software, hardware and level of technical expertise (Application Administration, System Administration, Oracle dba, and etc.) necessary to independently stand up and operate the system. Training and training documentation would be developed to meet the needs of the end users. The needed level of training

materials would be determined based on the experience of testers using the user guidance during testing. Develop a transition and training plan based on experience during testing and knowledge of users.

Develop a plan for loading legacy data.

Task 2. Deployment: Make the system fully operational.

Task 3. Maintenance: Complete database and website maintenance on at least a two-monthly basis.

Task 4. Independent Validation and Verification (Monitoring and Evaluation): Will be completed as peer review or by independent consultants following deployment.

**REVIEW COMMENTS CONTINUED:**

*Review Comment: There must be a monitoring and evaluation section. It is not appropriate for one of the most quantitative proposals to not have a quantitative monitoring and evaluation plan for it's own effectiveness.*

Proponent Response: NMFS did not ignore the need for monitoring and evaluation, it proposed to complete “Independent Validation and Verification” for each of the objectives 1-7. The difference here is semantic, with NMFS using “validation and verification” as a synonym for “monitoring and evaluation”. Nevertheless the revised section f (above) includes the term “Monitoring and Evaluation” for each objective.

*Review Comment: The proponent should clarify if the primary objective of this project is to: 1) be a part of a distributed database system providing NMFS primary data to the region, 2) develop a second tier database in the spirit of DART to analyze primary data for NMFS and the region, or 3) do both 1) and 2).*

Proponent Response: Whether the primary objective is 1) or 2) or 3) as defined above depends on each objective. The table below defines the primary objective for each task together with some comments.

Project Objective	Primary Objective	Comment
Objective 1. Provide Access to All Program Data, Tools with an RPA (Reasonable and Prudent Alternative) Tracking Pilot.	3	Off the shelf software options could be considered if SDM Web does not meet requirements.
Objective 2. Provide Access to NWFSC Salmonid Database for Users Inside and Outside the NWFSC.	3	Not all needed Salmonid data is available through StreamNet, FPC, DART and etc. Some data is

		still in hard copy or not available except through person-to-person contact.
Objective 3. Develop and Provide Access to Needed Spatial Data Layers.	3	
Objective 4. Provide Urgently Needed Research Monitoring and Evaluation Data Management.	2	
Objective 5. Provide Electronic Access to Currently Inaccessible Paper Records for Columbia Estuarine Juvenile Data.	1	
Objective 6. Improve Spatial Data Analysis Tool (SDAT).	2	
Objective 7. Provide Access to the NWFSC Genetic and Evolution Database for Users Inside and Outside the NWFSC.	3	A considerable volume of genetic data originates within NMFS.

*Review Comment: This proposal is potentially for an important and needed project to provide access to NMFS primary data and make available second tier analyses available via the Internet on listed salmon (and steelhead, we assume) related data and metadata sources in the Columbia Basin. The ISRP believes that the objective to “consolidate” data is overstated and a better description of the intended activity is to analyze data from NMFS and other sources according to certain assumptions. Those assumptions and other metadata for the analysis must be made available with the “consolidated” data. The proponent should make it clear that responsibility for and long-term storage of primary data from other agencies rests with other database programs elsewhere in the region, otherwise more than one version of primary data will exist.*

Proponent Response: This comment probably represents a difference of understanding concerning the actual work NMFS considers necessary to satisfy its obligations under the ESA. NMFS must employ best available science and this means that NMFS must use both the best and most recently available data. Current arrangements for provision of data to NMFS do not fully meet NMFS needs. Issues concern the timeliness of data – in some instances NMFS must go directly to original sources of data, such as the states or to individual researchers, to get needed data because it is not yet available through existing data sources. In other instances, because available metadata is inadequate, NMFS must independently validate data to understand the quality of these data in order to determine the extent to which it can be used. Most important however, from NMFS perspective, is the difficulty of actually locating all of the available data: the task that NMFS has referred to as the consolidation of data. This task occurs before analysis. The ability to consolidate these data from many different primary and secondary and other sources into a coherent database structure is an essential task. Currently it is not a task being provided

in the region<sup>3</sup>. In the absence of the region providing consolidated information NMFS considers that it is obligated to complete the task itself.

In proposing data consolidation NMFS does not discount the importance of data quality. It is critical and NMFS is committed to supporting all data quality improvement efforts including standardization. However since NMFS has primary responsibility for only a small proportion of primary data collection the effort of improving quality also needs to be directly applied to data collection agencies and individual researchers, probably through efforts by the current regional data collection organizations, to ensure that the quality assurance and quality control occurs as data throughout the data collection system.

*Review Comment: It would be helpful in evaluating the potential for overlap of efforts if letters of support are provided from other database projects in the region, including StreamNet, the Fish Passage Center, Data Access in Real Time (DART), the Columbia Basin PIT-Tag Information System (PTAGIS), and from other agencies outside the NWFSC.*

Proponent Response: NMFS is concerned with this comment and in particular the suggestion that NMFS should get permission from other regional agencies for prior approval of funding. It appears that NMFS is the only organization being asked to provide letters of support. NMFS fully understands that the method for obtaining Fish and Wildlife funding is competitive. Why would NMFS expect approval from competitive agencies in a competitive application program? The ISRP noted<sup>4</sup> in its “Review of Databases Funded through the Columbia Basin Fish and Wildlife Program” noted that: “No Organization is presently taking responsibility for comprehensive design of data collection in the basin”. Because no organization is in place there is no overall regional design or information architecture available for proponents to respond to. NMFS and the NWPPC are currently attempting to address this deficiency through an agreement for Cooperative Information System Development Project in the Columbia. This Columbia Basin Cooperative Information System (CBCIS) initiative is underway with a current needs assessment by Science Applications International Corporation (SAIC). SAIC is expected to provide a preliminary report to the NWPPC in December 2002, including results of surveys, focus group sessions and workshops on regional needs and alternatives for information system development<sup>5</sup>.

*Review Comment: The proposal is for partial support of a program that the NWFSC is already pursuing with limited funding. It embraces the NWFSC vision about the future of data sharing through multiple data portals, and of groups of individuals from different*

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<sup>3</sup> “No single agency or program, however, can gather all the information needed to effectively fulfill its mission.” Schmidt, Bruce et al., Draft Data Management in Support of the Fish & Wildlife Program Summary, Feb. 22, 2002.

<sup>4</sup> Coutant, C.C. et.al. 2000. Review of Databases Funded through the Columbia River Basin Fish and Wildlife Program. ISRP 2000-3. Northwest Power Planning Council, Portland, OR.

<sup>5</sup> <http://www.nwcouncil.org/fw/cbcis/Default.htm>

*agencies sharing common project data. This appears to complement some projects (35016, 35019, 35020) but perhaps duplicates other efforts (35033).*

Proponent Response: The duplication of some effort, for example with respect to proposal 35033 may simply be unavoidable given NMFS responsibility for making statutory Endangered Species decisions and administration of the Magnuson-Stevens Act. NMFS is obligated to make the decisions on best available data and in doing so decide what data to rely on and what data to reject. Since NMFS must make these decisions it must also be prepared to defend the decisions in courts and if necessary provide the entire record of decision, including the entire chain of data control. To avoid duplication NMFS will rely on existing data sources when they meet NMFS needs.

***Action Agency/NMFS RME Group Comments:***

*DATA MANAGEMENT SUBGROUP -- The NWFSC RME proposal is designed to make it possible for researchers to query the data, which will be collected from multiple regional databases, through a single portal. The NWFSC currently has a prototype that has been demonstrated using data from OWEB and PRISM databases.*

*The project is not designed to ensure that agencies that submit the data have a quality control and quality assurance program that would meet the RME requirement. Hence data may be insufficient for the needs of the [Biological Opinion] BO if the data collecting agencies have not used consistent, rigorous protocols as defined by the RME program.*

Proponent comment. While this is not a part of the NMFS proposal the next step that could be taken to develop collection protocols would be to evaluate the applicability of existing collection protocols such as those identified by David Johnson et.al., 2001<sup>6</sup>. Assuming applicability the next logical step would be to make the protocols accessible in a computer assisted framework via the Internet.

*The proposal anticipates however that there will be concurrent improvements in data quality through implementation of other elements in a regional RME program and the benefits of those improvements will roll up to the RME repository.*

*The Action Agencies' RME program calls for the systematic, rigorous and directed collection and maintenance of data for status and effectiveness monitoring as defined by the framework. The framework implicitly distinguishes data and information. Information is developed from data through the use of analytical and decision tools. Preferably one develops the tools, and then one seeks the data for the tools. Sometimes there is feedback in that the data suggest new tools. The NWFSC has developed tools such as SWAM which direct the collection of data. However it is unclear how the Council's subbasin planning process and the Action Agencies' RME program would use SWAM and other NWFSC analytical tools. The appropriateness of the tools for the RME program needs resolution before the required data layers can be identified.*

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<sup>6</sup> Johnson D.H. et.al. 2001. Inventory and Monitoring of Salmon Habitat in the Pacific Northwest. Washington Department of Fish and Wildlife, Olympia, WA.

Proponent Response: The intention of Objective 6 was to improve tools that support SWAM and not to make direct improvements to SWAM itself. It is, however, expected that the new data tool (SDAT) will be used by SWAM and by many other researchers inside and outside the NWFSC. The proposal has been changed to reflect this emphasis on development of basic spatial data analysis tools.

*RPA 180.*

*The NWFSC proposed pilot proposal provides a solution to a part of the challenge of “development and implementation of a basinwide hierarchical monitoring program”, it does not propose the “ground truthing of regional databases” or a “draft program including protocols for specific data to be collected”. The proposal offers a way to bring together the RPA data from many different RPA databases and provide access to it through a single web and GIS environment. It is a basinwide repository of all monitoring and evaluation data.*

*RPA 198.*

*The NWFSC proposal does propose to be repository for regional RME data. It also proposes to use a development called SDM web for an RPA tracking pilot at the Regional Office of NMFS.*

*Pros:*

- 1. The proposed pilot RME database would be helpful to assess the potential problems in developing a larger database. The OWEB database for the coastal salmon restoration program most likely represents the best example of data that was collected consistently with the RME guidelines. Since the NWFSC has previously collected this data, the NWFSC pilot project could assess the OWEB data and database, and propose changes to the OWEB project that would satisfy a BO data management program.*
- 2. The proposal extends badly needed, recently-developed corporate data / information management system.*
- 3. The proposal consolidates fish data collected from numerous sources and tied to metadata.*
- 4. It provides on-line access to NWFSC data and information; it will apply prototype systems technology to allow web access to databases used and needed inside and outside NWFSC.*
- 5. It is a distributed data system, with broad selection capabilities.*
- 6. The data are closer to some of the key regional researchers;*
- 7. The Salmonid Data Management (SDM) Web allows researchers to share all project information and includes a project tracking utility.*
- 8. The project may be consistent with SAIC recommendations if data access tools are the same; it promises to incorporate SAIC findings.*
- 9. It will model similar capabilities without duplicating DART;*
- 10. It will use FPC smolt data.*

11. *It obtained StreamNet backup files in March 2002.*
12. *It will develop tools to enhance distribution of data and other info.*
13. *It proposes linking and making available via the web the Center's Genetic and Evolution Database and the centers Salmonid database.*
14. *It includes substantial in kind services (approximately 40%).*

*Cons:*

1. *It has the potential to be inconsistent with approach of slow-moving SAIC project because of timing differences.* Proponent Response: while this comment may be true it also applies to all the other data management proposals for mainstem funding.
2. *Data / information will be collected but not necessarily standardized. It will be a repository, no guarantee of data integrity.* Proponent Response: Agreed, however the metadata elements being proposed by NMFS will accommodate subsequent adoption of data collection standards.
3. *Its deliverables may lack Data Exchange Formats to make data comparable from State-to-State and agency-to-agency?* Proponent Response: Once a regional data exchange standard has been agreed to NMFS will work to adopt it.
4. *It duplicates part of StreamNet responsibilities without being a part of it. For example, thirty spatial data layers needed (including status information) might duplicate some new StreamNet data layers and will need integration. Will the States and Tribes cooperate?* Proponent Response: Despite StreamNet's best efforts it can only provide a subset of the NMFS regional needs. NMFS also has regional needs outside of the Columbia Basin for example in Puget Sound and in coastal Oregon, California and Washington that it is meeting with resources outside of this proposal. NMFS needs also appear to be different to the current StreamNet effort with respect to scale, being mostly for 1:24,000 scale while the StreamNet effort is for 1:100,000 scale layers. For example NMFS is currently working with the Regional Hydro framework to obtain 1:24,000 hydrographic layer that is not currently available from StreamNet. Regardless of the differences NMFS is prepared to work collaboratively with StreamNet and others to add to Columbia Basin spatial data resources.
5. *SDM prototype tool appears to duplicate StreamNet's (and USFS?) restoration project databases from OWEB and PRISM.* Proponent Response: The OWEB and the PRISM databases operate at a different level of detail from what we have seen at the USFS and Streamnet. Our OWEB and PRISM effort has been to work with the restoration data that is currently available and to make it more useful by consolidating it and by web and GIS enabling it.
6. *It lacks resident fish data that Action Agencies need for other BOs. Not part of agency mission.* Proponent Response. Some resident fish data is of increasing interest to NMFS. For example, data on resident fish species that predate on juvenile Salmon was identified by NMFS as a needed spatial data layer.
7. *How will data be kept up to date? By periodic re-collection or update from sources? Two versions may be on the Web simultaneously.* Proponent Response:

We agree that version control is a critical issue. Initially NMFS would update the data to meet scheduled needs for reporting such as Status reports and reviews under the BO. The system would be operated to ensure that all data is appropriately identified in the metadata as to the version, and including references to the original data source and providers where they are available.

*ISRP Remarks on RME Group Comments: In general the ISRP agrees with the RME comments and specifically, that the project is not designed to ensure that agencies that submit the data have a quality control and quality assurance program that would meet the RME requirement. Hence data may be insufficient for the needs of the BO if the data collecting agencies have not used consistent, rigorous protocols. However, some elements of the comments are very troubling to the ISRP. The comments imply that the consistent, rigorous protocols are to be defined by the RME program and that concurrent improvements in data quality through implementation of other elements in a regional RME program and the benefits of those improvements will roll up to a "...RME repository of data."*

Proponent Response to ISRP remarks on RME Group Comments:

NMFS understands and agrees that there are many data quality control and quality assurance issues within the regional collection system, including the need for "consistent, rigorous protocols" for data collection and that these issues need to be addressed. It is expected that the CBCIS process will address this issue amongst others and it is also anticipated that a regional approach is needed for a solution. While NMFS is hopeful of a regional consensus on collection protocols and other critical issues, and is fully supportive of the regional effort, it is too early to say whether the region as a whole will agree with the need for a regional approach. In practice then, the RME program may or may not begin before "consistent, rigorous protocols" are in place. Whether or not protocols are in place, metadata must be collected to describe what protocols and collection standards were used. We view the application of good metadata to be at least as important at this time as collection protocols, because at least we would know what standard, if any has been applied to data collection. In the absence of "consistent, rigorous protocols" for the region we would want the RME programs in which we participate to adopt common metadata standards. With respect to the roll up of data quality information we would expect that to occur through the metadata regardless of the actual collection protocols used.

*ISRP Remarks on RME Group Comments: The comment that "The proposed pilot RME database would be helpful to assess the potential problems in developing a larger database." indicate to the ISRP that the RME Program participants need to carefully consider and evaluate the roles of: 1) databases for storage of primary data, versus 2) databases for second tier analysis of primary data using various assumptions.*

Proponent Response to ISRP remarks on RME Group Comments: NMFS does not fully understand this comment. From a regional organizational and administrative perspective NMFS agrees that RME Program participants would need to carefully consider and

evaluate the primary and secondary database roles. However from a database development perspective it does not matter whether the data is for storage of primary data or for second tier analysis provided that the database system is designed to recognize and maintain the data distinctions. This is a relatively simple task in an Oracle environment. The NMFS proposal for an RME pilot prototype is in response to a need for database capacity where none currently exists. It is an effort to meet the deadlines specified in the BO that are currently at risk of not being met with other alternatives. While the administrative management of the database after development is arguably an administrative question, the BO requires that a database be developed, deployed and populated with data. In the apparent absence of other viable and timely offerings NMFS is comfortable with its proposal.

*ISRP Remarks on RME Group Comments: In short, the ISRP strongly disagrees with the RME group implication under RPAs 180 and 198 that this project might be "... a basinwide repository of all monitoring and evaluation data." It is not clear to the ISRP that efforts within the Council's FWP to develop consistent, rigorous protocols for monitoring and evaluation and long-term storage of data are well coordinated with the RME program. It seems that the RME program has significant potential for fragmentation and duplication of efforts within the region.*

Proponent response to ISRP remarks on RME Group Comments: NMFS notes that neither the Action Agencies nor the Region as whole has yet adopted "consistent, clear protocols" or an information system structure/design that could address "fragmentation and duplication of efforts" issues. In the absence of such regional information system design/plans, project proponents provide their best solutions. Obviously those assessing the proposals face the same challenge, how to select individual proposals without an overall design or plan.

Without an enabled design/plan for the region the best short-term prospect for managing access to quality information is likely to be through contemporary portal systems. In the longer term, potentially arising from the Council and NMFS Columbia Basin Cooperative Information System (CBCIS) initiative, there may be consensus a regional information system structure/design with "consistent, clear protocols". A structure/design, protocols and other agreements would, in any event, be prerequisites for the type of Distributed Database Management System advocated by the ISRP in the "Review of Databases Funded through the Columbia Basin Fish and Wildlife Program".

To actually achieve existing BO deadlines, what immediate and workable alternatives are available, apart from a pilot – prototype based approach? While RME data would come from many potential sources, including potentially the current fragmented efforts, it would at least all be in one place, web accessible and GIS enabled. Version control would be possible because all the data would exist on a single server (with appropriate backups) and with common metadata standards. The entire RME database would be able to be queried, via the web using industry standard query tools. This speaks more to consolidation in terms of tools and technologies than to fragmentation and duplication. In current information portal technology it seems to matter less where the data is and

under whose control it is than content management, the level of accessibility, the extent of version control, and the metadata, GIS tools and infrastructure that comprises the “system”. Until there is a better solution this is where we are putting our operational effort.