Final Workplan for

Implementation of the Year 2001 Napa River Fisheries Monitoring Program

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Prepared by

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With assistance from

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and

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This Work Plan provides detailed information about the proposed tasks during the first year of the Napa River Fisheries Monitoring Program.

1.0 Meetings and Presentations

Meetings and presentations associated with the Napa Fisheries Monitoring Program are outlined in Table 1. The meetings will be attended by the Project Manager, the Field Leader, Fisheries Technician, and/or a Computer Technician (Database/Web specialist). The Fisheries Technician will record detailed notes during the meetings, and electronic copies of the notes will be provided to the Corps.

Table 1. Meetings and Presentations associated with the Napa Fisheries Monitoring Program.

MEETING and/or PRESENTATION	DATE	ATTENDING
Kick-off Meeting	4/2/2001	Project Manager (PM), Field Leader (FL), Fisheries Technician (FT), Computer Technician (CT)
Work Plan and QA/QC Plan Presentation	4/13/2001	PM, FL, FT, CT
Status Meeting #1 and Presentation	TBD	PM, FL, FT
Status Meeting #2 and Presentation	TBD	PM, FL, FT
Status Meeting #3 and Presentation	10/7/2001	PM, FL, FT

In order to make the meetings as efficient and meaningful as possible, the Project Manager or Field Leader will coordinate with the Corps representative prior to each meeting to develop an agenda and schedule. These materials should be circulated by the Corps to the various meeting participants prior to the meeting, to ensure efficient use of the meeting time and appropriate preparation for the discussions and presentations.

Presentations on the work plan and at the periodic status meetings will be made using MS PowerPoint. It is assumed that the meetings will be held at the Sacramento District office, and that the Corps will provide a video projector for these presentations.

2.0 Field Sampling and Data Collection

This work plan has been prepared to detail the methods, schedule, and various logistical arrangements for the study. This work plan is the primary "guidance document" for how the field studies and various analyses will be conducted and includes the following information:

- Sampling sites, data collection and analysis
- Detailed specifications of sampling gear (mesh, size, material, etc.)
- Dates of proposed sampling, scheduled with consideration of tidal conditions
- Levels of sampling effort (duration, frequency, number of sets, length of trawls, etc.)
- Equipment logistics (storage areas, type of equipment, number of days of use)

- Larval fish processing details (level of effort, lab facilities, etc.)
- Fish handling protocols
- Scientific collection techniques
- Itemized deliverables
- Safety measures and environmental pollution prevention measures

2.1 Field Sampling Methods

Sample Sites

The FMP Implementation Team will locate and permanently mark 13 sample sites in the Napa River project area, as discussed at the April 2, 2001 kickoff meeting. The locations of the sites will be documented using standard survey techniques, to be accurate within 1-foot tolerance for latitude and longitude, and 6 inches in elevation. The survey will be conducted by Chaudhary and Associates of Napa, California. Chaudhary and Associates are licensed surveyors in the State of California. The FMP Implementation Team will then plot selected sample sites on maps of the project area. General locations of the 13 sampling sites are shown in Figures 2–1a and 2–1b. Some preliminary surveys may be required to assess accessibility and feasibility of sampling newly flooded areas during various tidal conditions.

The 13 proposed survey sites, gear types, and sampling dates for the 2001 program are listed below in Table 2. As discussed in the Statement of Work, CDFG is responsible for collecting the larval fish in the 20mm townet.

Table 2. 2001 Monthly Sampling Schedule and Gear Type.

Site	Location	Jul 14–19	Aug 12–17	Sep 10–15	Oct 8–12	Nov 7–11 or 21–24	Dec 7–10 or 22–25
1A-1	Open Water (River)	20mm	Otter	Otter	N/A	Otter	N/A
1A-2	Open Water (HB)	Otter	Otter	Otter	N/A	Otter	N/A
1A-3	Marsh Plain Terrace	Fyke	Fyke	N/A	N/A	Fyke	N/A
1A-4	Flood Plain Terrace	Beach	Beach	Beach	Beach	Beach	Beach
1A-5	Emergent Marsh	Fyke	Fyke	N/A	N/A	Fyke	N/A
1A-6	SWOA Slough	Fyke	Fyke	N/A	N/A	Fyke	N/A
1A-7	SWOA Marsh	Fyke	Fyke	N/A	N/A	Fyke	N/A
1A-8	SWOA Marsh	Fyke	Fyke	N/A	N/A	Fyke	N/A
1A-9	SWOA Levee Breach	Purse	Purse	Purse	N/A	Purse	N/A
1A-10	SWOA HB Marsh	Fyke	Fyke	N/A	N/A	Fyke	N/A
1B-1	Open Water (River)	20mm	Otter	Otter	N/A	Otter	N/A
2-1	Open Water (River)	20mm	Otter	Otter	N/A	Otter	N/A
3-1	Open Water (River)	Otter	Otter	Otter	N/A	Otter	N/A

Sampling Equipment

The FMP Implementation Team will use a 17'-22' Boston Whaler with a 90-120 hp outboard motor for all survey work. A Boston Whaler provides a stable work platform and also has a shallow draft suitable for beaching and shallow-water work. A 12-volt electric winch may be employed for otter trawling and purse seining. Time of deployment and retrieval will be recorded for each net, trawl or seine to calculate a catch per unit effort (CPUE). Table 3 outlines the gear specifications, storage locations, and sampling effort for each method. A more detailed description of the sampling methods is provided below.

Table 3. Gear Specifications and Sampling Effort.

Gear/ Sampling Technique	Storage Area	Dimensions	Mesh Size	Site Locations	Sampling Duration	Number of Samples
Fyke Nets	Napa Valley Marina or All American Storage	Opening: 3–4 ft Length: 20–30 ft Leads: 10–20 ft	1/4 inch	Marsh Plain Terrace (1A-3), Emergent Marsh (1A-5), SWOA Slough (1A-6), SWOA Marsh (1A-7), SWOA Marsh (1A-8), SWOA HB Marsh (1A-10)	4-6 hours	1 set
Otter Trawl	Napa Valley Marina or All American Storage	Opening: 1 x 2.5m Length: 5.3 m	25 to 3 mm	Open Water-HB (1A-2)	10-15 minutes per tow	2-3 tows at 1-2 knots
Purse Seine	Napa Valley Marinaor All American Storage	Length: 100 ft Depth: 6–8 ft	1/4inch	SWOA Levee Breach (1A-9)	20-30 minutes per set	2-3 sets
Beach Seine	Napa Valley Marina or All American Storage	Length: 100 ft Depth: 4–6 ft Plus bag	1/4 inch	Flood Plain Terrace (1A-4)	20-30 minutes per set	2-3 sets
Light traps	Stillwater Davis office	Aquatic Research Instruments specifications	.25 cm slits, 505: bottom	Open Water-River (1A-1), Open Water-HB (1A-2), Marsh Plain Terrace (1A-3), Emergent Marsh (1A-5), SWOA Slough (1A-6), SWOA Marsh (1A-7), SWOA Marsh (1A-8), SWOA Levee Breach (1A-9), SWOA HB Marsh (1A-10)	60-120 minutes	1 set

Fyke Nets
Fyke nets will be deployed at selected stations during the daytime high tides of each month. Nets will be held in place by wooden or metal posts. We anticipate that all six fyke nets will be fished simultaneously at their individual stations. Each net will be allowed to fish for approximately one ebb tide. If excessive debris is in the water while nets are fishing, hog wire trash racks will be installed in fyke net openings. Fyke nets will be fished beginning at approximately slack water at high tide and end at approximately slack water at low tide. All fyke nets will be removed from the water after each ebb tide sampling is complete.

Otter Trawl
Surface otter trawls will be conducted at predetermined sample sites during slack water at high tide. Trawls will be conducted during daylight hours around the high tides of each month. If some current does exist, trawls will be made into the current. Surface trawls will be used to avoid benthic non-target species (those other than salmonids, splittail, and Delta smelt), debris on the bottom, and mud. Because the time duration of each trawl is short (approximately 10-15 minutes), we will avoid the need for a live box, and will use a typical cod-end instead. The cod-end will use smaller mesh, approximately 1/4 inch, whereas the main net will have a larger mesh.

Purse Seine
The purse seine will be deployed at the levee breach location at Horseshoe Bend. A series of preliminary samples may be required to determine the optimal tide height for purse seine surveys. Horseshoe Bend is reportedly quite shallow. A high tide and slack water may be required for effective purse seining. The volume of water sampled will be estimated using the volume of the pursed seine.

Beach Seine
The beach seine will be fished from the bank at predetermined stations during the survey. The seine will be deployed by first securing one end on the beach. The net will then pay out as the boat first backs away from shore and then returns to the beach with the other end. The two ends will then be retrieved by hand until the seine bag reaches shore. Beach seining will be conducted during the day, near slack water at high tide each month. The volume of water sampled will be estimated.

Light Traps
Light traps, manufactured by Aquatic Research Instruments, will be deployed at each of the 12 stations in Table 3. The light traps will be set at night, prior to high tide slack water. Traps will be retrieved after 60-90 minutes or after the tide begins to ebb. Fish larvae will be preserved in 10 percent formalin, as outlined below under *Larval and 20-mm Sampling and Processing.*

2.2 Data Collection

Site Location
The site survey data will be imported into ArcInfo, resulting in a sample site GIS layer. Sample sites will be represented both as areas (polygons) and points, depending on the

characteristics of the sample location and method. The FMP Implementation Team members have already developed and acquired GIS data for this portion of the Napa River under a previous project.

Fish Sampling Data

All fish specimens will be collected, processed, and returned to the water as soon as possible. Fish specimens will be removed from the various sampling gear and placed in buckets with water. Bucket water will be changed frequently. Fish will be retained in buckets until processed. Fish will be kept wet during processing, and gloves used where necessary and practical to minimize injury to fish. If necessary, an anesthetic such as MS222 or CO_2 will be used. Processing will occur as soon as possible after each gear is hauled. Fish will be quickly returned to the water once processing is complete.

All fish sampling data (non-larval) will be collected and recorded in the field. The volume of water sampled in the trawls and seines will be estimated to extrapolate fish densities. The following data will be recorded for fishes collected at the sampling site locations:

- Identification of all fish captured to species level;
- Fork length (mm), for all non-larval fish (if excessive numbers of a non-listed fish species are captured [e.g., threadfin shad], then fish will be counted and a representative sample of size ranges will be measured);
- A random sub-sample of weight (delta smelt and splittail);
- Reproductive state or how close to spawning (delta smelt and splittail); and,
- Noticeable lesions.

Environmental Parameter Sampling

Several biologically relevant environmental parameters will be measured prior to conducting sampling at each sampling site on each individual sampling day. Selected measurements will be depth stratified. The natural hydrograph will be monitored for flood events. Flood plain water velocity (from one point at each flood plain sample station) will be sampled on a receding hydrograph after the flood peak. In addition to these parameters, digital photographs will be taken at each site to describe vegetation conditions, site conditions and examples of captured fishes. These digital photographs will be catalogued and linked with associated data. The following data will be collected at each site and input into the project database (see Section 5.0):

- Dissolved oxygen will be measured with a YSI Model 85 D.O./conductivity/salinity/temperature meter , following manufacturer's specifications (YSI 1998)
- Water temperature will be measured with a YSI Model 85 D.O./conductivity/salinity/temperature meter at the surface and at the bottom of each site, following manufacturer's specifications (YSI 1998)
- Salinity will be measured with a YSI Model 85 D.O./conductivity/salinity/temperature meter at the surface and at the bottom of each site, following manufacturer's specifications (YSI1998)
- Turbidity will be measured using a secchi disk. The disk will be lowered into the water column on a cable or rope, and the greatest depth (cm) at which the disk can be observed will be recorded
- Tidal elevation will be read off of a gage established near the site
- Water depth will be measured off of demarcations on the YSI Model 85 sensor cable, or via marks on a depth or stadia rod, depending on depth
- Photos will be taken with an Olympus D-460 digital camera (resolution 1280x960), using manufacturer's specifications (Olympus 2000)
- Vegetation (presence/absence will be noted)

Larval and 20-mm Sampling and Processing

According to Section C-2b (1)(b) of the RFP and Attachment 2, CDFG will conduct the 20-mm tow-net surveys, collecting samples from three sites (Contracts 1A, 1B, and 2) for each of 3 tows in each of 4 months, for a total of 36 samples in the first year. The FMP Implementation Team will obtain the larval fish samples from the Stockton office of the California Department of Fish and Game following each 20-mm survey, and process them as soon as practical. All specimens in the samples other than Delta smelt, Sacramento splittail, and listed salmonids will be ignored. Delta smelt and Sacramento splittail will be preserved and separated from the rest of the sample.

The samples will be processed using existing lab facilities at the Jones & Stokes office in Sacramento. The lab includes stereomicroscopes for larval fish identification, and the necessary processing and safety equipment for analyzing the samples, including new fume hoods to provide adequate ventilation when using formalin. Chemical sink traps are installed for appropriate disposal of formalin and other chemicals.

Two technicians will process the samples. Johnson Wang will provide staff supervision, additional training, and oversight for this task. Mr. Wang is the recognized leader in larval fish identification for Delta species, having published taxonomic keys and other landmark technical documents on this subject (Wang, 1986)[1]. Mr. Wang will process a number of samples himself, creating a reference collection with which future samples can be compared.

[1] Wang, Johnson C. S. 1986. Fishes of the Sacramento-San Joaquin Estuary and Adjacent Waters, California: A Guide to the Early Life Histories. Prepared for the Interagency Ecological Program for the Sacramento-San Joaquin Estuary.

To begin processing, 200 larval fish will be removed from each sample and set aside in vials for identification to species. If after reaching 200 fish it is estimated that there are less than 400 total fish in the sample, the entire sample will be processed. If it is estimated that more than 400 total fish are present, then 200 fish will be set aside in vials and the remainder of the sample will be stored for future reference.

Larval fish will be separated from samples by pouring one sample at a time through a strainer and depositing the strained contents into a light colored pan. Water will be added to cover and evenly distribute the sample and will reduce the severity of formalin fumes. Forceps will be used to extract individual fish and place them in labeled, formalin filled vials. To promote random sampling, technicians will work back and forth through the contents of the pan and will not remove fish from only one area.

To key larval fish to species, fish will be removed from the vials one at a time and placed under a dissecting microscope. Wang's key (Wang, 1986) will assist in the identification of Delta smelt, Sacramento splittail, and listed salmonids with only these fish being counted. Species being considered in this project will be returned to their vials after identification.

3.0 Analysis of Results

Collected data will be analyzed and interpreted using several statistical techniques. An index of catch per unit effort (CPUE) will be constructed for each sample site and sample date and combined for all similar habitats and gears. The CPUE will be displayed monthly on the website 10 days following analysis. An index of abundance will be calculated and presented in the annual program report following each sampling season.

Additional statistical analysis of the data will include Analysis of Variance (ANOVA) and standard regression. Regression will be used to determine if correlations exist between collected fish species and environmental parameters at each site. ANOVA will be used to compare data for delta smelt and splittail among the sample sites. ANOVA and regression results will be presented in the yearly program report.

The yearly program report will contain results of the analysis with explanations and conclusions supported by text and graphs.

4.0 Collecting Permits and Reporting Requirements of Listed Species

Sampling Permits

The FMP Implementation Team will have a California Department of Fish and Game Scientific Collection Permit in order to sample non-listed fish populations that may be present during the sampling year at the sampling locations. In addition, FMP Implementation Team members will be added to the Corps' existing permits with the CDFG / NMFS / USFWS for any endangered species collections. The FMP Implementation Team will contact John Emig of CDFG at 707-944-5567 24 hours prior to sampling.

National Marine Fisheries Service

On December 5, 2000 NMFS issued an incidental take permit allowing unquantified take of the California coastal steelhead under the Fisheries Monitoring Program because there are so few specimens expected. The FMP Implementation Team will notify NMFS (contact: Maura Eagan at 707-575-6092) within 24 hours if one or more steelhead are killed or injured as a result of the Fisheries Monitoring Program. Subsequent notification will also be made in writing to NMFS (Maura Eagan, National Marine Fisheries Service, Southwest Region, Protected Resources Division, 777 Sonoma Avenue, Room 325, Santa Rosa, California 95404) within five days of noting dead or injured steelhead. The written notification will include the date, time, and location of the carcass or injured specimen, a color photograph, cause of injury or death, and name and affiliation of the person who found the specimen.

U.S. Fish and Wildlife Service

A permit for the incidental of 500 Delta smelt and 500 splittail was obtained from the USFWS by the Corps prior to the initiation of fieldwork. The FMP Implementation Team will notify the Service within 24 hours of finding any injured or dead listed or proposed species, or any unanticipated harm to their habitat. Notification will include the date, time, and precise location of the specimen/incident, and any other pertinent information. The Service contact person is the Chief, Endangered Species Division, in the Sacramento Fish and Wildlife Office (916-414-6600). Any dead or injured specimen will be preserved according to standard museum practice and deposited at an appropriate academic institution approved by the Service, or with the Service's Division of Law enforcement. Any killed delta smelt and splittail that have been taken will be preserved in accordance with the Natural History Museum of Los Angeles County's policy of accessioning (10 percent formalin in a quart jar for freezing). Information concerning how the fish was taken, length of the interval between death and preservation, water temperature and outflow/tide conditions, and any other relevant information will be written on 100 percent rag content paper with permanent ink and included in the container with the specimen.

5.0 Database Proposal, Construction, and Maintenance

Implementation of the Napa River Fisheries Monitoring Program will result in the collection and development of large quantities of data and information over a time period that could span 5 years or more. The data will be used to perform analyses and generate tables, figures, and maps necessary to create annual monitoring reports. The proposed database system will support the entry, storage, analysis, and access of the data and related information.

The FMP Implementation Team proposes to base the Napa River database design on the environmental monitoring data management system developed by Jones & Stokes for the Guadalupe River Flood Control Project Mitigation and Monitoring Implementation Plan for the Corps Sacramento District. The proposed Napa River FMP database will link Microsoft Access field monitoring data, GIS data, and digital site photographs into an integrated database.

Upon acceptance of this database proposal, the FMP Implementation Team will prepare a detailed database design document. This document will include system overview, system requirements (hardware, software, network), data table definitions, look up tables, and quality control procedures. The database design document will be submitted for Corps review and comment. The Corps will provide the team with written comments and requests for changes. These changes will be implemented prior to entering data into the database.

Figure 5-1 shows an overview of the data management plan for the Napa River project. The proposed Napa River fisheries monitoring data will include the following components.

- *Microsoft Access Version 2000* will be used as the relational database, which will include electronic forms for data entry and data tables for storage. Separate data tables are proposed for:
  - fish sampling data,
  - larval fish laboratory data,
  - sample site environmental parameter data,
  - listed species take log, and
  - sample site photo log data.

- *GIS data* will be used to show sample site locations, as well as to map environmental site parameter data. This will assist in the understanding monitoring data analysis results. If GPS data is collected, it will be processed into GIS data, linked to the sample site ID numbers.

- *Sample site photographs,* which will be acquired for sample site locations each time fish sampling is performed. Although photographs are an important type of monitoring data, their value is greatly diminished unless both the photographic images and the information about the photographs are properly stored and maintained. The digital photos file names will be a concatenation of sample site identification number, date, and frame number so that the photos will have unique file names that can be easily linked to the correct sample site location ID number. In this way, the photos can be linked to both the Access database as well as the GIS data. The photo log will be stored as a data table in the relational database portion of the system.

Data Flow

Field data and laboratory data will be collected using a double-entry system. First, monitoring data will be recorded on paper data collection forms. Second, the data from the completed data collection forms will be entered into the database with a data entry screen, called a form in Microsoft Access. Electronic data entry forms are used to improve efficiency and quality by assisting the user in entering repeated information, using standard codes or values, and checking data validity (for example, ranges and values). Data will be entered into the Microsoft Access database in a timely manner (e.g., within 3 days after completion of sampling), except for larval fish data, which will be entered as soon as possible after the sampling period. Data for a one month will be entered into a data tables named by data type, month, and year.

Digital photos will be transferred from the digital camera to a project subdirectory on a computer back in the office. Photos names will be edited as needed to the standard *sample site ID + date + frame number* convention.

Once per month, the Microsoft Access and digital photo updates will be sent by email or FTP to the database administrator. Upon receipt, the database administrator will perform a quality control check of the monthly update. The check will include mandatory fields, data format, numeric range, duplicate record, and missing records checks.

Analysis

While some analysis can be done in the relational database software, some of the analysis can best be performed with specialized software, including statistical software packages such as SAS, SPLUS, and GIS software such as ArcInfo. By basing the Napa River fish monitoring system on Microsoft Access, which is Object Database Connectivity (ODBC)-compliant, the monitoring data can easily be used by these statistical-analysis and GIS software systems. Copies of the updated master database will be provided to the team analyst. Results from the analysis will be imported back into the Microsoft Access database, to provide more convenient access on the project Internet site.

6.0 Internet Web Site Proposal, Construction, and Maintenance

The purpose of the Internet site is to disseminate information collected for the Napa River Fisheries Monitoring Program. This information will include project history, database query function, analyzed data (such as tables, charts, graphs, maps), map images, documents in PDF format, and sample site photographs. The primary audience for the web site is the U.S. Army Corps of Engineers, the California Department of Fish and Game, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service. The secondary audience is other organizations and the general public.

The FMP Implementation Team will design, construct, and update the Internet site, as specified in the Request for Proposal and consistent with CESPK OM 25-1-17. The Napa River project web site will be located on the Jones & Stokes client web server. The design and development of the web site will be based in part on Jones & Stokes' prior work in designing, developing, installing, and maintaining similar Internet sites. The FMP Implementation Team will also provide assistance to coordinate with and link to the IEP web site during this project, as well as consultation at the conclusion of the project to assist the Corps in changing the web site host location.

Proposed Design and Development

Figure 6-1 shows the proposed Internet site design. The project web site will include project information, data, and documents including:

- project history,
- annual monitoring reports and other project documents in PDF format,
- analyzed data as tables, graphs, figures, maps, and photos as separate files,
- pre-set database search and viewing function, using pull-down menus or lists, and
- a function to request a copy of the Microsoft Access database.

The project history text and documents not created as part of this contract will be provided by the Corps in electronic format. The function for users to request a copy of the monitoring Microsoft Access database can be developed in one of the following ways, as directed by the Corps:

- **Self-service.** Users click on a button on the web page to download a copy of the database. No record of who gets a copy is kept.
- **Self-service, recorded.** Users click to get a copy, but information about who is getting the copy is recorded.
- **Corps control.** Users click on a button to generate an email request to the Corps contact person, who reviews the request and, if approved, forwards it to the database administrator for processing.

Users will never have access to the master database. The self-service alternatives require more frequent updates to the web site than specified in the RFP scope of work.

The web site will be developed primarily using HTML and Javascript for all the static elements of the web site. Active Server Pages (ASP) technology will be used to develop the dynamic, database-driven portion of the web site. The site will conform to the standards and guidelines listed in Appendix D of CESPK OM 25-1-17.

The site will be hosted at Jones & Stokes, with links from the Corps' main web site and the IEP web site (www.iep.ca.gov). The site will be hosted on a Microsoft NT computer running Microsoft Internet Information Server (IIS) 5.0 web server. This platform is proposed because the Corps currently supports at least one server running IIS and expects to continue to upgrade this system over the years. This design will facilitate a smooth transition at the conclusion of the project to move the web site from the Jones & Stokes' web server to a server at the Corps.

The site will be designed to be functional on Microsoft Internet Explorer and Netscape Navigator, versions 4.0 and above. The site will be designed to accommodate users who access the site with 28.8kps connections or faster. The site will include portable document format (PDF) documents, which require the use of the Adobe Acrobat Reader plug-in. A link to the Adobe site will be included on the home page to assist users that do not have the PDF reader software. The PDF documents will include the Mitigation Monitoring Plan, the Fisheries Monitoring Plan, and annual reports.

Once the Internet proposal is approved, the team will begin development of the web site. The team will provide the Corps with access to the draft version of the web site. The Corps will provide the team with written comments and requests for changes. These changes will be implemented prior to making the web site available to the public. Fish monitoring data will be loaded into the master database and onto the site as it becomes available during the project.

Web Site Access

Site visitors will have read-only access. Only the web site administrator will have write access to the Napa River FMP web site. Copies of documents, site photographs, map images, etc. will be stored on the web server. For security, the master database will be stored behind the firewall, which will be updated monthly. The database viewing function

on the web site will allow visitors to view data based on selection criteria. The database will include links to electronic tables, graphs, figures, maps, and photos. This will allow users to view updated monitoring data without changing the web site. Users will be able to request copies of the database by the method selected by the Corps.

Web Site Maintenance

After initial development of the web site, there will be two updates to the static portion of the web site, such as PDF documents, during the first year of the project. Updates to the database, results of analysis and photos will be posted monthly. PDF forms of listed species take events will be posted periodically, as needed. The team will provide documentation on the web site maintenance to the Corps at the end of project when the site is transferred to the Corps' server.

7.0 Reports and Deliverables

The reports and deliverables associated with the Napa River Fisheries Monitoring Program are outlined in Table 4. The final version of this document (Work Plan) and the QA / QC Plan will be approved prior to any fieldwork.

Table 4. Schedule of Deliverables

Plans and Maps	
Draft Work Plan, QA / QC Plan, Database Proposal, Internet Proposal	April 13, 2001
Final Work Plan, QA / QC Plan, Database Proposal, Internet Proposal	May 4, 2001
Workplan Presentation	April 24, 2001
Draft Site Location Map and Report	May 11, 2001
Final Site Location Map and Report	May 18, 2001
Database and Internet Site	
Database Design Document	May 10, 2001
Internet Site	June 7, 2001
Status Reports	
Monthly Status Reports	April 7, 2001 May 7, 2001 June 7, 2001 July 7, 2001 August 7, 2001 September 7, 2001 October 7, 2001 November 7, 2001 December 7, 2001 January 7, 2002
Program Reports	
Table of Contents Napa River / Napa Creek FMP Report	October 1, 2001
Administrative Draft Napa River / Napa Creek FMP Report	November 1, 2001
Draft Napa River / Napa Creek FMP	December 1, 2001
Final Napa River / Napa Creek FMP	December 31, 2001

Site Location Map and Report

This GIS data will be used in conjunction with the newly created sample site location layer to produce the required sample site location map. The map will be in color, showing base reference data along with the sample site locations. The map will include the main map, a location map, title, north arrow, legend, and contact information. This map will be delivered in hard copy, as raster images suitable for use on the Internet, and as GIS data in Microstation and ArcInfo formats.

The FMP Implementation Team will deliver two draft copies of the site location map in Microstation and color GIS format, along with two 24"-by-26" color plots. The draft and final report will include the rationale, methods and materials used to determine sampling sites; locations and elevations of sampling sites in table format; photos of the sampling sites; physical description of the sites including but not limited to vegetation types / amounts, habitat type, dominant physical characteristics; and the mapped site locations on a GIS format. The Corps will review and comment on the draft map and report. The FMP Implementation Team will incorporate the Corps comments into the final map and report.

Database Plan

The data collected during the implementation of the Napa River Fisheries Monitoring Program will be used to perform analyses and generate tables, figures, and maps necessary to create annual monitoring reports. The proposed database system will support the entry, storage, analysis, and access of the data and related information.

The FMP Implementation Team will prepare a detailed database design document. This document will include system overview, system requirements, data table definitions, look up tables, and quality control procedures. The database design document will be submitted for Corps review and comment. The Corps will provide the team with written comments and requests for changes. These changes will be implemented prior to entering data into the database.

Internet Site

The Internet site will be used to disseminate information collected for the Napa River Fisheries Monitoring project, including project history, database query function, analyzed data (such as tables, charts, graphs, maps), map images, documents in PDF format, and sample site photographs.

The FMP Implementation Team will design, construct, and update the Internet site, as specified in the Request for Proposal and consistent with CESPK OM 25-1-17. Once the Internet proposal is approved, the team will begin development of the web site. The team will provide the Corps with access to the draft version of the web site. The Corps will provide the team with written comments and requests for changes. These changes will be implemented prior to making the web site available to the public. Fish monitoring data will be loaded into the master database and onto the site as it becomes available during the project.

Monthly Status Reports

Draft and final monthly status reports that will include a summary of tasks completed for that month and anticipated activities for the next month will be submitted to the Corps. Status reports will include, but are not limited to, materials purchased, samples received from outside agencies, dates, time, and location of sampling activities, species and number of individuals collected, copies of field sheets, and maintenance performed on equipment. Three paper copies and an electronic copy will be submitted to the Corps Program Coordinator.

Program Report

The FMP Implementation Team will prepare a program report entitled "Napa River Fisheries Monitoring Program Report for 2001" following the 2001 sampling season. The report will be structured along the following outline:

- Executive Summary
- Table of Contents
- List of Figures and Tables
- Introduction
- Project Description, Background, Status
- Methods
- Results
- Discussion
- Conclusions
- Literature Cited
- Appendices
- Maps
- QA / QC Procedures
- Following Year Monitoring Plan
- Report on Listed Species

Submittal of the program report will occur iteratively, beginning with the Table of Contents, followed by an administrative draft, draft, and final report. The submittals will comply with Corps requirements, including 10 copies of each report, use of appendixes and illustrations, and bindings that facilitate removal and insertion of pages. Electronic copy of deliverables will be provided as well. Upon Corps acceptance of the final report, 100 additional copies of the final report will be delivered to the Sacramento District office.

As part of the FMP Implementation Team's normal document review procedures, draft documents undergo a peer review prior to delivery to the Corps. Other senior scientists from Stillwater (who are not currently involved in the project research) provide an independent internal review of the document. In some cases, a third party peer review is sought from the academic community or other senior scientists with appropriate technical expertise whose comments may also be included in the final report.