Workplan for Implementation of the 2003 Napa River Fisheries Monitoring Program

Prepared by

U.S. Army Corps of Engineers

1325 J Street
Sacramento, CA 95814
(916) 557-6742

With assistance from

Stillwater Sciences

and

Jones & Stokes

March 2003

TABLE OF CONTENTS

List of Tables

List of Figures

This Work Plan provides detailed information about the proposed tasks during the third year of the Napa River / Napa Creek Fisheries Monitoring Program (FMP).

1 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 (type of equipment and number of days of use);*
- *Fish handling protocols;*
- *Scientific specimen collection techniques;*
- *Itemized deliverables;*
- *Safety measures and environmental pollution prevention measures.*

1.1 Field Sampling Methods

Sample Sites

General locations of the sampling sites for the FMP are shown in Figures 1-4. Thirteen sampling sites were established in 2001. The 2003 contract proposes two new sites (Site 2-2 and Site 2-3) be established at new project features. Site 2-3 was not established because it is proposed in an area where reconstruction is not complete.

Site 1A-5, 1A-8, and 1A-9 will not be sampled in 2003 as the effort will be redistributed to increase sampling in late March and late April. These sites were discontinued in 2003 because they are duplicated by other sites or were ineffective at capturing fish. Site 2-2 is discontinued after February to increase sampling effort in late March and late April.

The proposed survey sites, gear types, and sampling dates for the 2003 program are listed below in Table 1. The proposed sampling program for 2003 is subject to change based on the availability of funds and the Napa River / Napa Creek Flood Protection Project priorities.

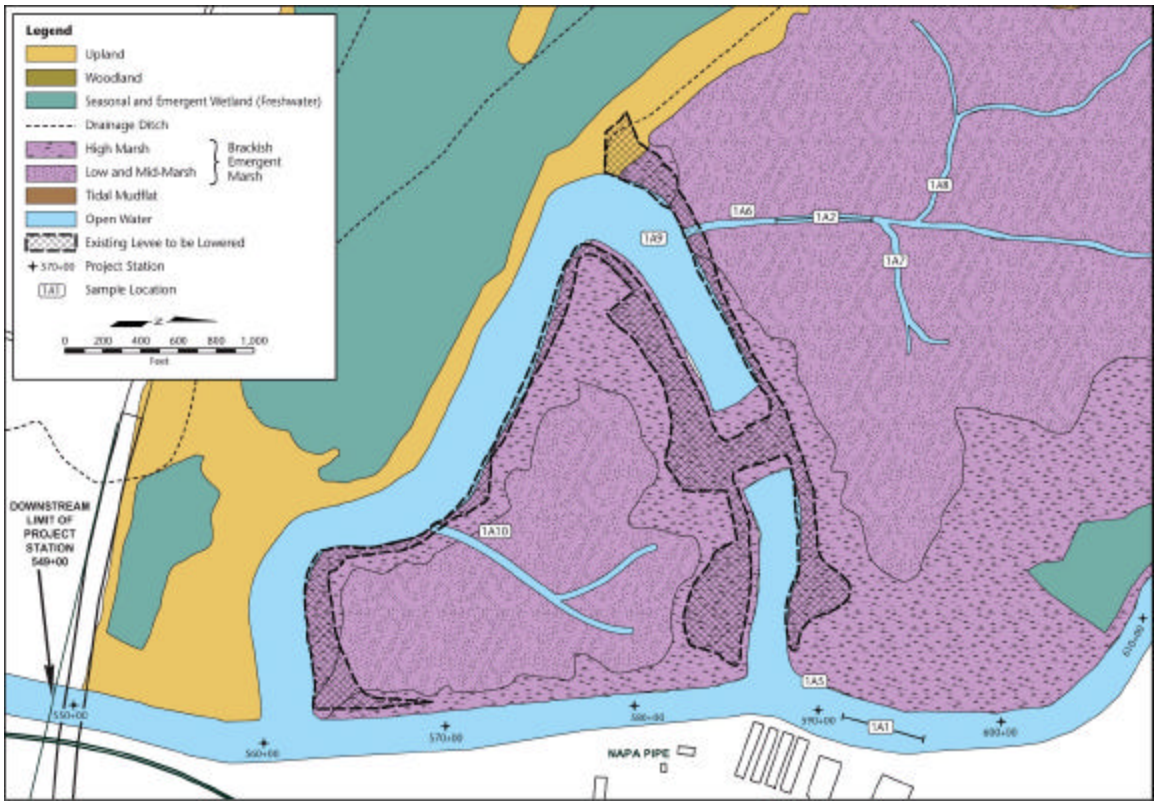

Figure 1. Napa River Fish Monitoring Program Sample Locations.

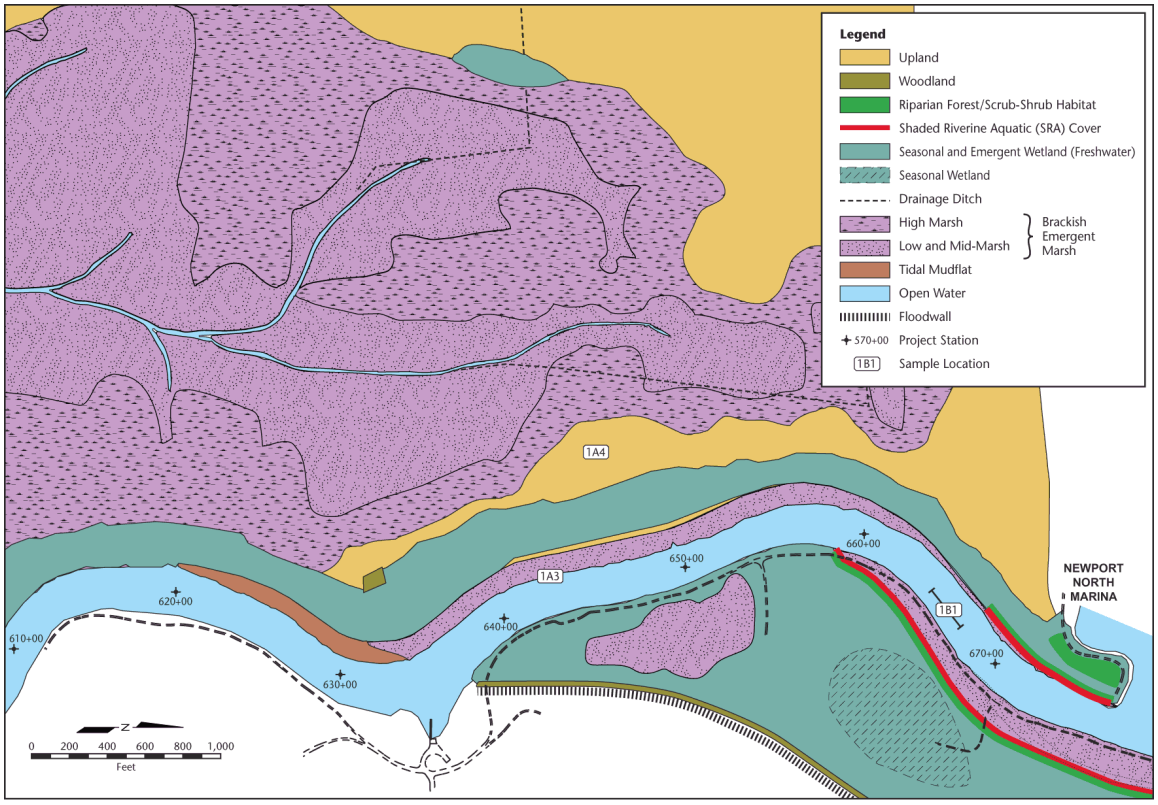

Figure 2. Napa River Fish Monitoring Program Sample Locations.

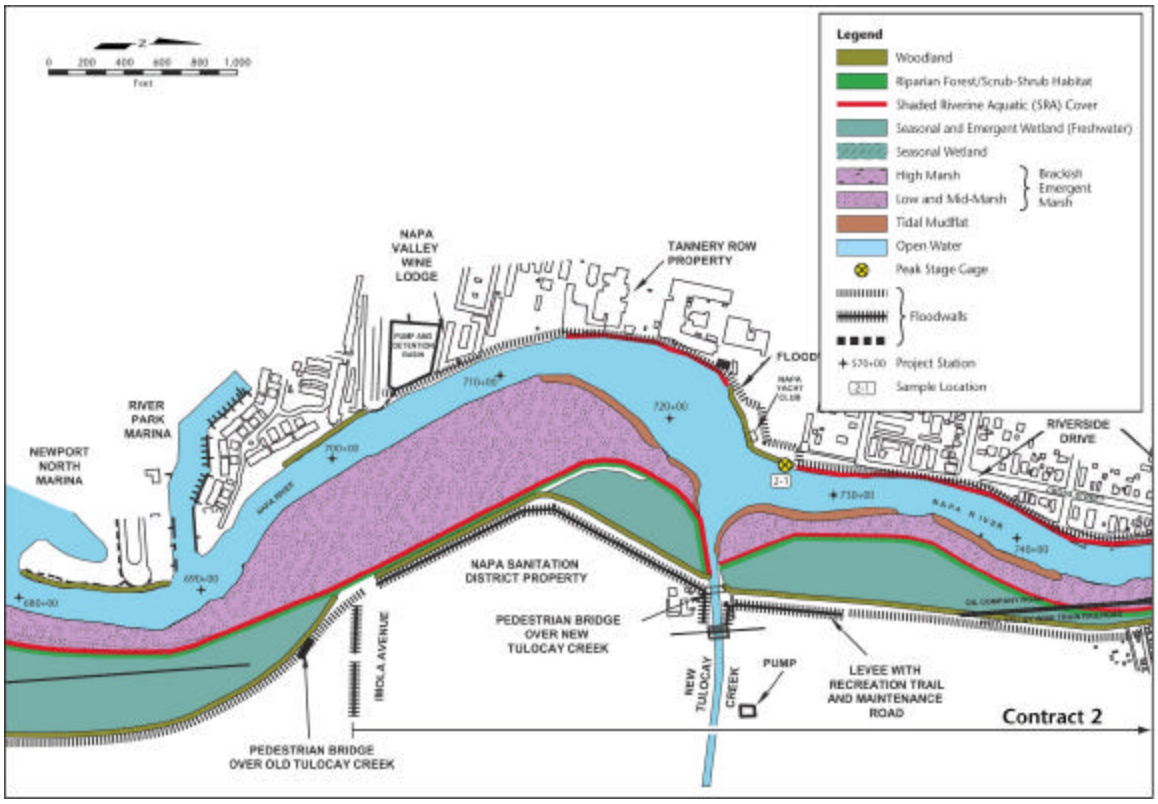

Figure 3. Napa River Fish Monitoring Program Sample Locations.

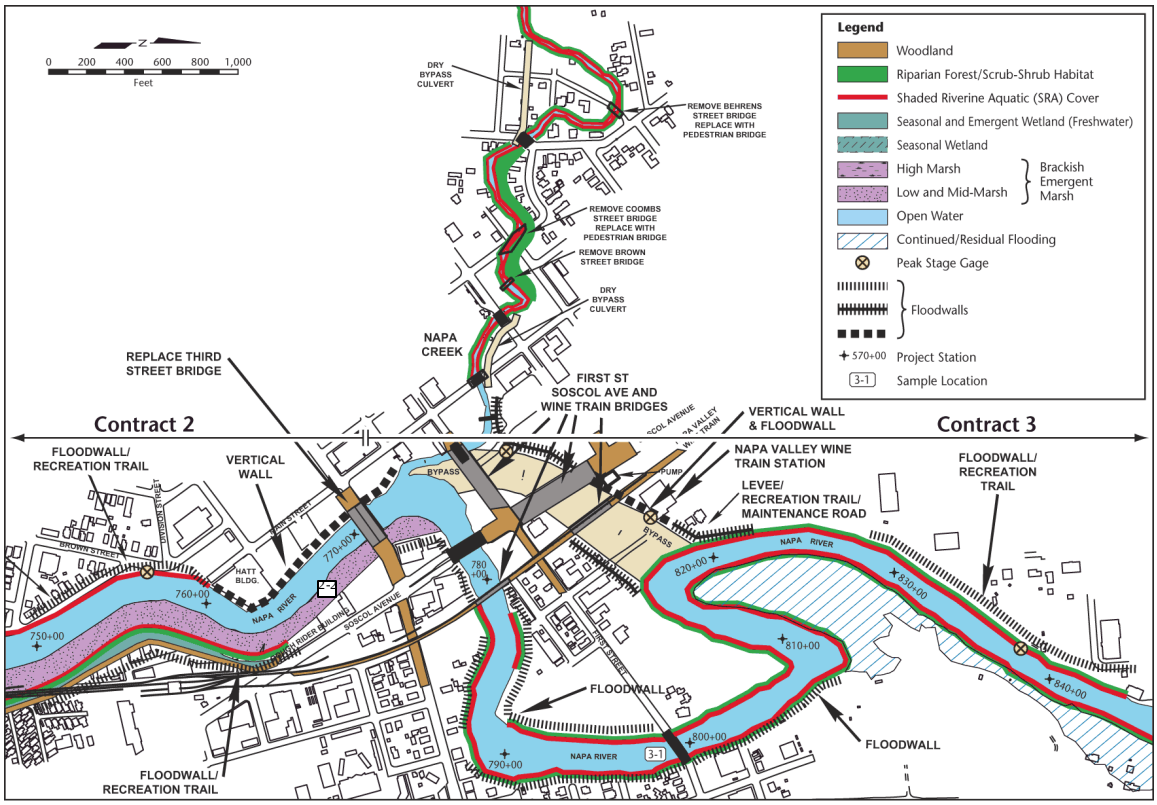

Figure 4. Napa River Fish Monitoring Program Sample Locations.

Table 1. 2003 Monthly Sampling Schedule and Gear Types.

Site	Location	Sampling Dates (Alternate Dates)								
		Jan 29-31	Feb 25-27	March		April		May 10-12 (22-25)	June 8-11 (21-24)	July 7-9 (20-23)
				12-15	26-29	9-12	23-26			
1A-1	Open Water (River)	O	O	O	O	O	O	O	O	O
1A-2	SWOA Slough	O	O	O	O	O	O	O	O	O
1A-3	Marsh Plain Terrace	BS	BS	BS	BS	BS	BS	BS	BS	BS
1A-4	Floodplain Terrace	BS	BS	BS	BS	BS	BS	BS	BS	BS
1A-5	Emergent Marsh	--	--	--	--	--	--	--	--	--
1A-6	SWOA Marsh	--	--	F	F	F	F	F	F	F
1A-7	SWOA Marsh	--	--	F	F	F	F	F	F	F
1A-8	SWOA Marsh	--	--	--	--	--	--	--	--	--
1A-9	SWOA Levee Breach	--	--	--	--	--	--	--	--	--
1A-10	SWOA HB Marsh	--	--	F	F	F	F	F	F	F
1B-1	Open Water (River)	O	O	O	O	O	O	O	O	--
2-1	Open Water (River)	O	O	O	O	O	O	O	O	O
2-2	Marsh Plain Terrace	BS	BS	--	--	--	--	--	--	--
2-3	Floodplain Terrace	--	--	--	--	--	--	--	--	--
3-1	Open Water (River)	P	P	P	P	P	P	P	P	P

*F = fyke net; P = purse seine; O = otter trawl; BS = beach seine

Sampling Equipment

The FMP Implementation Team will use a 21' aluminum work boat for all survey work. Table 2 outlines the gear specifications and sampling effort for each method. The time of deployment and retrieval will be recorded for each fyke net, trawl, or seine to calculate a catch per unit effort (CPUE). A more detailed description of the sampling methods is provided below.

Table 2. Gear Specifications and Sampling Effort.

Gear/ Sampling Technique	Dimensions	Mesh Size	Site Locations	Sampling Duration	Number of Samples per Sampling Event
Fyke Nets	Opening: 0.9-1.2 m Length: 6.1-9.2 m Leads: 3.1 m	0.64 cm	SWOA Slough (1A-6), SWOA Marsh (1A-7), SWOA Marsh (1A-8), SWOA HB Marsh (1A-10)	4-6 hours	1 set
Otter Trawl	Opening: 1 x 2.5 m Length: 5.3 m	Variable: 0.64cm – 3.8cm	Open Water-HB (1A-2), Open Water (1A-1), Open Water (3-1), Open Water (2-1), Open Water (1B-1)	10-15 minutes per tow, at 1-2 knots	2-3 tows
Purse Seine	Length: 30.5 m Depth: 1.8 m	0.64 cm	SWOA Levee Breach (1A-9), Open Water (3-1)	20-30 minutes per set	2-3 sets
Tow-net	Opening: 1.51 x 1.51 m Length: 5.4 m	1600:	Open Water (1A-1), Open Water (1B-1), Open Water (2-1)	10 minutes	3 tows
Beach Seine	Length: 30.5 m and 15.24 m Depth: 1.2 m Plus bag	0.64 cm	Floodplain Terrace (1A-4), Marsh Plain Terrace (1A-3) Marsh Plain Terrace (2-2) Flood Plain Terrace (2-3)	20 minutes per haul	2-3 hauls

Fyke Nets

Fyke nets will be deployed at Site 1A-6, Site 1A-7, and Site 1A-10. The nets will be deployed during the daytime flooding tides of each month. Nets will be held in place by metal posts. All four fyke nets will be fished simultaneously at their individual stations. Each net will be allowed to fish for approximately one ebb tide. Fyke nets will be fished beginning at approximately slack water at high tide and end at approximately slack water at low tide. Fyke nets will be typically removed from the water after each ebb tide sampling is complete. In some locations, fyke nets will be fished through two tide cycles to facilitate access at high tide during the following cycle.

Otter Trawl

Surface otter trawls will be conducted at Site 1A-1, Site 1A-2, Site 1B-1, and Site 2-1. Trawls will be conducted during daylight hours near slack water at the high tide of each month. If some current does exist, trawls will be made into the current. Surface trawls may 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 tail, or "cod" end of the net is 0.64 cm (¼ inch) mesh, and the mouth opening is 1 x 2.5 m. The length of the net is approximately 5.3 m. The volume of water sampled will be calculated by using a General Oceanics flow meter that will be towed along the side of the boat.

Purse Seine

The purse seine will be deployed at high tide at Site 3-1, downstream of the First Street Bridge in the Napa River. The volume of water sampled will be calculated using an estimate of the area of water sampled by the seine at each site.

Beach Seine

The beach seine will be fished throughout Site 1A-4, the South Wetlands Opportunity Area (SWOA) and from the riverbank at Site 1A-3 and Site 2-2. In the SWOA, two individuals will pull the seine between 50-100 meters. The bag will be retrieved onto the boat or a high point on land. At Site 1A-3 and Site 2-2 the seine will be deployed similar to Site 1A-4 or from the river bank by first securing one end on the beach. The net will then pay out as the boat backs away from shore and then returns to the beach with the other end. The two ends are retrieved by hand until the seine bag reaches shore. Beach seining is conducted during the day, near slack water at high tide each month. The volume of water sampled will be estimated.

1.2 Data Collection

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 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., inland silversides], then all fish will be counted and a representative sample of 100 fish will be measured);
- Weight (g) of listed species;
- Reproductive state or how close specimens of listed species are to spawning; 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. Floodplain water velocity (from one point at each floodplain 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 4.0):

- 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 an 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 an YSI Model 85 D.O./conductivity/salinity/temperature meter at the surface and at the bottom of each site.
- 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 recorded daily from the gage near the Horseshoe Bend confluence. The tide elevation during each sampling event will be calculated with the use of a nautical software tidal chart for the Napa River.
- Water depth will be measured off of a depth finder, or via marks on a depth or stadia rod, depending on depth.
- Photos will be taken with a Cannon A40 digital camera (resolution 1024x768).
- Vegetation presence and/or absence will be noted.

2 Analysis of Results

Collected data will be analyzed and interpreted using several statistical techniques. An index of catch per unit effort (CPUE) for smelt and splittail will be constructed for each sample site and sample date and combined for all similar habitats and gear types. The CPUE will be displayed monthly on the website 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) or Generalized Linear Model (GLM), and standard regression. Regression will be used to determine if correlations exist between collected fish species and environmental parameters at each site. ANOVA or GLM will be used to compare data for delta smelt and splittail among the sample sites. The statistical 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.

3 Collecting Permits & Reporting Requirements of Listed Species

Sampling Permits

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

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 FMP. 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 take 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 delta smelt and splittail that are unintentionally killed 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, time 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.

4 Database Construction and Maintenance

Implementation of the Napa River FMP 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 database system will support the entry, storage, analysis, and access of the data and related information.

The Napa River FMP database links field monitoring data saved in Microsoft Access, GIS data, and digital site photographs into an integrated database. The database includes electronic forms for data entry and data tables for storage.

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

- *Sample site photographs* acquired at each sample site location each time fish sampling is performed will be used to document site conditions. The digital photo file names will be entered into the database by a concatenation of sample site identification number, date, and frame number.

Data Flow

Field data and laboratory data will be collected by 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. Data will be entered into the Microsoft Access database in a timely manner (e.g., within 3 days after completion of sampling). Data from each sampling period will be entered into data tables named by data type. Each month's data will be checked for quality control (mandatory field completion, data format, numeric range, duplicate records, missing records checks, etc.) before being sent to the database administrator for upload to the web site.

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

Analysis

While some analysis will be done in the relational database software, other analyses will 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.

5 Internet Web Site Construction and Maintenance

The purpose of the Internet site is to disseminate information collected for the Napa River FMP. This information includes project history, database query function, analyzed data (such as tables, charts, graphs, and maps), map images and documents in PDF format. 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 Napa River project web site is located on the Jones & Stokes client web server at *http://www.napariverfishmonitoring.org.*

Website Design

The project web site includes project information, data, and documents including:

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

Web Site Access

Site visitors have read-only access to the web site. Documents and map images can be viewed based on selection criteria including date, site, or fish species. Users will also be able to request copies of the database by the method selected by the Corps.

Web Site Maintenance

Updates to the database and results of analysis are posted monthly. Take events of listed species will be posted periodically (in PDF format), as needed.

6 Reports and Deliverables

The reports and deliverables associated with the Napa River Fisheries Monitoring Program are outlined in Table 4. Adjustments in deliverable dates for the Draft and Final Reports will need to be adjusted to include results of sampling through December 2003.

Table 4. Schedule of Deliverables.

Status Reports	
Monthly Status Reports	February 7, 2003 March 7, 2003 April 7, 2003 May 7, 2003 June 7, 2003 July 7, 2003 August 7, 2003
Program Reports	
Table of Contents Napa River / Napa Creek FMP Report	October 1, 2003
Administrative Draft Napa River / Napa Creek FMP Report	November 1, 2003
Draft Napa River / Napa Creek FMP Report	December 1, 2003
Final Napa River / Napa Creek FMP Report	December 31, 2003

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 2003" following the 2003 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 appendices and illustrations, and bindings that facilitate removal and insertion of pages. Electronic copies 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 will undergo a peer review prior to delivery to the Corps. Other senior scientists from Stillwater Sciences (who are not currently involved in the project research) may provide an independent internal review of the document. In other cases, a third party peer review may be sought from the academic community or other senior scientists with appropriate technical expertise whose comments may also be included in the final report.

7 Safety Measures and Pollution Prevention Measures

In order to reduce the risks of accidents involving personnel or equipment, safety measures will be followed by the FMP Implementation Team. During field sampling and data collection, the FMP Implementation Team will follow safety measures outlined in Berry et al. (1983).[1] Safety measures will include: the availability of life vests, signal flares, and first aid kits on the boat. In addition, crew members will be trained in first aid and CPR.

[1] Berry, C.R., W.T. Helm, and J.M. Neuhold. 1983. Safety in fishery fieldwork. In: Fisheries Techniques, eds. L.A. Nielson and D.L. Johnson, Chap. 3, Southern Printing Company, Inc., Virginia.

The FMP Implementation Team will also employ pollution prevention measures to reduce the chances of any potential environmental pollution. Pollution prevention measures include:

- Proper maintenance of outboard motors to increase fuel efficiency and reduce the risk of oil / gas leakage from engine.
- Maintenance of sampling chemicals (formalin, etc.) in sealed containers inside the boat to avoid possible spillage into the river.