January 5, 2015

Filed via Electronic Submittal (E-File)

The Honorable Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street NE
Washington DC 20426

Subject: La Grange Hydroelectric Project, FERC Project No. 14581
Revised Study Plan

Dear Secretary Bose:

Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts), co-owners of the La Grange Diversion Dam located on the Tuolumne River, herewith file their Revised Study Plan (RSP) in accordance with Federal Energy Regulatory Commission (FERC) regulations at 18 CFR § 5.13.

Pursuant to 18 CFR § 5.11, on September 5, 2014, the Districts filed their Proposed Study Plan (PSP) document with the Commission and distributed the PSP to interested agencies and stakeholders for review and comment. On October 2, 2014, Thomas Terpstra filed comments on the PSP document. On October 6, 2014, pursuant to 18 CFR § 5.11(e), the Districts held a Proposed Study Plan meeting at MID's offices in Modesto, California. Based on discussions at the PSP meeting, the Districts prepared an Updated Study Plan (USP) document and provided this document to licensing participants for review on November 21, 2014. Also on November 21, the Districts provided notes from the PSP meeting to licensing participants. On December 4, 2014, National Marine Fisheries Service, the Conservation Groups, and the California Department of Fish and Wildlife filed comments on the PSP and/or USP documents.

The Districts will make this RSP available to appropriate federal and State of California resources agencies, Indian tribes, local governments, non-governmental organizations and members of the public likely to be interested in the proceeding. In accordance with 18 CFR § 5.13(b), any comments on the RSP must be filed with FERC by January 20, 2015. The Commission's Study Plan Determination is anticipated to be issued by February 4, 2015.

If you have any questions about this filing, please contact the undersigned at the addresses or telephone numbers listed below.

Sincerely,

Steve Boyd
Turlock Irrigation District
P.O. Box 949
Turlock, CA 95381
(209) 883-8364
seboyd@tid.org

Greg Dias
Modesto Irrigation District
P.O. Box 4060
Modesto, CA 95352
(209) 526-7566
gregd@mid.org

cc: Licensing Participants E-Mail List

Attachments: La Grange Hydroelectric Project Revised Study Plan Document

LA GRANGE HYDROELECTRIC PROJECT
FERC NO. 14581

REVISED STUDY PLAN DOCUMENT

Prepared by:
Turlock Irrigation District
Turlock, California
and
Modesto Irrigation District
Modesto, California

January 2015

This Page is Intentionally Left Blank

Table of Contents

Section No.	Description	Page No.
1.0	**INTRODUCTION**	**1-1**
1.1	General Project Description	1-2
1.2	Licensing Activities to Date	1-5
1.2.1	Discussion of Licensing Process with Interested Participants	1-5
1.2.2	FERC's Issuance of Scoping Document 1	1-6
1.2.3	FERC's National Environmental Policy Act Scoping Meetings and Site Visit	1-6
1.2.4	Licensing Participants Filing of Comments and Study Requests	1-6
1.2.5	Districts' Filing of the Proposed Study Plan	1-7
1.2.6	FERC's Issuance of Scoping Document 2	1-7
1.2.7	Proposed Study Plan Meeting	1-7
1.2.8	Study Plan Development Consultation Completed Prior to the Deadline for Filing Proposed Study Plan Comments	1-7
1.2.9	Licensing Participants' Comments on the Proposed Study Plan Document	1-8
1.3	Future Licensing Activities	1-8
1.4	Districts' Ongoing Studies and Data Collection Activities	1-8
2.0	**LICENSING PARTICIPANTS' STUDY REQUESTS AND COMMENTS**	**2-1**
3.0	**SUMMARY OF THE DISTRICTS' STUDY PLANS**	**3-1**
3.1	Cultural Resources Study	3-1
3.2	Recreation Access and Safety Assessment	3-2
3.3	Fish Passage Assessment Study Plan	3-2
3.3.1	Fish Passage Facilities Assessment	3-3
3.3.2	Upper Tuolumne River Basin Habitat Assessment	3-3
3.3.3	Habitat Assessment and Fish Stranding Observations below La Grange Diversion Dam and Powerhouse	3-4
4.0	**DISTRICTS' RESPONSE TO STUDY REQUESTS**	**4-1**
4.1	Study Requests Adopted or Adopted in Part	4-1
4.1.1	Study Requests Related to Passage of Anadromous Fish	4-1
4.1.2	Study Requests Related to Habitat Upstream of Don Pedro Dam	4-2
4.1.3	Study Requests Related to Stranding and Potential Redd Dewatering	4-3
4.1.4	CGs: Recreation Access and Facilities Feasibility	4-5
4.2	Study Requests Not Adopted by the Districts	4-6
4.2.1	USFWS: Juvenile Salmonid Floodplain Rearing Study	4-6
4.2.2	NMFS: Effects of the Project and Related Activities on the Genetic Makeup of Steelhead / Rainbow Trout *Oncorhynchus mykiss* in the Tuolumne River	4-7

4.2.3 NMFS: Effects of the Project and Related Activities on the Losses of Marine-Derived Nutrients in the Tuolumne River 4-8
4.2.4 USFWS: Chinook Salmon Egg Viability 4-9
4.2.5 USFWS: Juvenile Chinook Salmon Survival 4-10
4.2.6 USFWS: Genetics of Chinook Salmon in the Upper Tuolumne River 4-11
4.2.7 CGs: Hyacinth Study 4-12
4.2.8 Study Requests Not Adopted by the Districts Because Study Criteria Were Not Addressed 4-13
5.0 REFERENCES 5-1

List of Figures

Figure No.	Description	Page No.
Figure 1.1-1.	La Grange Hydroelectric Project location map.	1-3
Figure 1.1-2.	La Grange Hydroelectric Project site plan.	1-4

List of Tables

Table No.	Description	Page No.
Table 1.2-1.	Entities providing study requests and/or comments on SD1 and PAD.	1-6
Table 1.2-2.	Entities providing comments on the Districts' PSP and USP documents.	1-8
Table 1.4-1.	Studies performed by the Districts during the current license term of the Don Pedro Hydroelectric Project.	1-9
Table 1.4-2.	Studies completed by the Districts as part of the Don Pedro Hydroelectric Project relicensing process.	1-13
Table 1.4-3	Studies in the Don Pedro Hydroelectric Project yet to be completed.	1-14
Table 2.0-1.	Study plan modifications and study requests filed with FERC by LPs.	2-1
Table 2.0-2.	ILP study plan criteria	2-2
Table 3.0-1.	Districts' study plans	3-1
Table 4.1-1.	Districts' response to fish passage study requests.	4-1
Table 4.1-2	Districts' response to upstream habitat study requests.	4-2
Table 4.1-3	Districts' response to stranding and redd dewatering study requests.	4-4
Table 4.1-4	Districts' response to CGs recreation access and feasibility study request.	4-5

List of Appendices

Appendix A	Districts' Response to LP Comments on PSP and USP
Appendix B	Cultural Resources Study Plan
Appendix C	Recreation Access and Safety Assessment Study Plan
Appendix D	Fish Passage Assessment Study Plan

List of Acronyms

ac .....acres
ACHP .....Advisory Council on Historic Preservation
ACOE.....U.S. Army Corps of Engineers
APE .....Area of Potential Effects
BAWSCA .....Bay Area Water Supply and Conservation Agency
BLM.....U.S. Department of the Interior, Bureau of Land Management
CCIC .....Central California Information Center
CCSF.....City and County of San Francisco
CDA .....Canadian Dam Association
CDFA.....California Department of Food and Agriculture
CDFG.....California Department of Fish and Game
CDFW .....California Department of Fish and Wildlife
CDPR .....California Department of Parks and Recreation
CEQA.....California Environment Quality Act
CESA .....California Endangered Species Act
CFR.....Code of Federal Regulations
CG.....Conservation Groups
CNDDB.....California Natural Diversity Database
CORP .....California Outdoor Recreation Plan
Districts.....Turlock Irrigation District and Modesto Irrigation District
DOI .....Department of Interior
EPA.....U.S. Environmental Protection Agency
ESA.....Endangered Species Act
FERC.....Federal Energy Regulatory Commission
FLA.....Final License Application
ft .....feet
GLO .....General Land Office
GPS .....Global Positioning System
HPMP.....Historic Properties Management Plan
ICR.....Incident Consequence Rating
IFIM .....Instream Flow Incremental Methodology

ILP	Integrated Licensing Process
ILR	Incident Likelihood Rating
ISR	Initial Study Report
LGDD	La Grange Diversion Dam
LP	Licensing Participants
M&I	municipal and industrial
MID	Modesto Irrigation District
MOA	Memorandum of Agreement
MW	megawatts
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
O&M	operation and maintenance
PA	Programmatic Agreement
PAD	Pre-Application Document
PM&E	Protection, Mitigation and Enhancement
POAOR	Public Opinions and Attitudes in Outdoor Recreation
Project	La Grange Hydroelectric Project
PSP	Proposed Study Plan
RM	river mile
RSP	Revised Study Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SHPO	State Historic Preservation Officer
SRMP	Sierra Resource Management Plan
SWRCB	State Water Resources Control Board
TID	Turlock Irrigation District
TLP	Traditional Licensing Process
USDC	U.S. Department of Commerce

USFWS .....U.S. Department of Interior, Fish and Wildlife Service
USGS .....U.S. Geological Survey
USP……Updated Study Plan
USR.....Updated Study Report
UTM.....Universal Transverse Mercator

1.0 INTRODUCTION

Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts) are public agencies with headquarters located in Turlock and Modesto, California, respectively, organized under the laws of the State of California to provide water and retail electric service to their respective service territories. Together, the Districts own the La Grange Diversion Dam (LGDD) located on the Tuolumne River in Stanislaus County, California. TID owns and operates the La Grange powerhouse.

On December 19, 2012[1], the Federal Energy Regulatory Commission (FERC or Commission) issued an order from the Director of the Division of Hydropower and Administration finding that the La Grange Hydroelectric Project (Project) was subject to FERC's licensing jurisdiction under Part I of the Federal Power Act. On January 18, 2013, the Districts filed a timely request for rehearing and stay of the jurisdictional order. FERC granted rehearing on February 19, 2013, and subsequently issued on July 19, 2013[2] an order affirming the original December 19, 2012 jurisdictional order. On September 13, 2013, the Districts filed an appeal of this decision in the Court of Appeals for the District of Columbia Circuit.

FERC did not grant the Districts' request for a stay to the licensing proceeding. Therefore, the Districts began the multi-year licensing process for the La Grange Hydroelectric Project by filing a Pre-Application Document (PAD) with FERC on January 29, 2014. The filing of the PAD formally initiated the licensing process under Title 18 of the Code of Federal Regulations (CFR) Part 5, which provides FERC's regulations governing the Integrated Licensing Process (ILP). The Districts' PAD included descriptions of the La Grange Hydroelectric Project facilities and operations. It also contained a summary of the extensive amount of information available on water resources; fish and aquatic resources; terrestrial and wildlife resources; rare, threatened, and endangered species; recreation and land use; cultural resources; and socioeconomic resources relevant to the La Grange Hydroelectric Project. A preliminary assessment of the resource effects of the La Grange Hydroelectric Project operations was provided in the PAD.

The Districts filed their Proposed Study Plan (PSP) document on September 5, 2014, in response to study requests submitted by licensing participants (LPs) by July 22, 2014. On October 6, 2014, the Districts held a study plan meeting. Based on discussions with LPs at the study plan meeting, the Districts significantly expanded their original Fall-Run Chinook Salmon Migration Barrier Study Plan. On November 21, 2014, the Districts issued this updated study plan (USP), now titled Fish Passage Assessment Study Plan. LPs filed comments with FERC on the Districts' PSP and USP on December 4, 2014. The Districts herein file with FERC their Revised Study Plan (RSP) pursuant to 18 CFR § 5.13. The RSP contains the following elements:

- summary of study requests submitted by licensing participants (LPs) and the Districts' response;
- Districts' response to LP written comments on the PSP and USP; and

[1] 141 FERC ¶ 62,211 (2012)
[2] 144 FERC ¶ 61,051 (2013)

- Districts' three proposed studies, updated and expanded to reflect LP comments received and discussion during the PSP meeting on October 6, 2014.

In accordance with ILP regulations, the RSP is being filed with FERC and simultaneously distributed to federal and state resource agencies, local governments, affected Indian tribes, non-governmental organizations, and members of the public. This RSP is also being made available on the Districts' licensing website (http://www.lagrange-licensing.com/).

1.1 General Project Description

The Districts own the La Grange Diversion Dam (LGDD) located on the Tuolumne River in Stanislaus County, California (Figures 1.1-1 and 1.1-2). LGDD is 131 feet high and is located at river mile (RM) 52.2 at the exit of a narrow canyon, the walls of which contain the pool formed by the diversion dam. Under normal river flows, the pool formed by the diversion dam extends for approximately one mile upstream. When not in spill mode, the water level above the diversion dam is between elevation 294 feet and 296 feet approximately 90 percent of the time. Within this 2-foot range, the pool storage is estimated to be less than 100 acre-feet of water.

The drainage area of the Tuolumne River upstream of LGDD is approximately 1,550 square miles. Tuolumne River flows upstream of LGDD are regulated by four upstream reservoirs: Hetch Hetchy, Lake Eleanor, Cherry Lake, and Don Pedro. The Don Pedro Project is owned jointly by the Districts, and the other three dams are owned by the City and County of San Francisco (CCSF). Inflow to the La Grange pool is the sum of releases from the Don Pedro Project (FERC No. 2299), located 2.3 miles upstream, and very minor contributions from two small intermittent streams downstream of Don Pedro Dam.

LGDD was constructed from 1891 to 1893 to replace Wheaton Dam, which was built by other parties in the early 1870s. The LGDD raised the level of the Tuolumne River to permit the diversion and delivery of water by gravity to irrigation systems owned by TID and MID. The Districts' irrigation systems currently provide water to over 200,000 acres of prime Central Valley farmland and drinking water to the City of Modesto. Built in 1924, the La Grange hydroelectric plant is located approximately 0.2 miles downstream of LGDD on the east (left) bank of the Tuolumne River and is owned and operated by TID. The powerhouse has a capacity of slightly less than 5 megawatts (MW). The La Grange Hydroelectric Project operates in a run-of-river mode. The LGDD provides no flood control benefits, and there are no recreation facilities associated with the La Grange Hydroelectric Project or the La Grange pool.

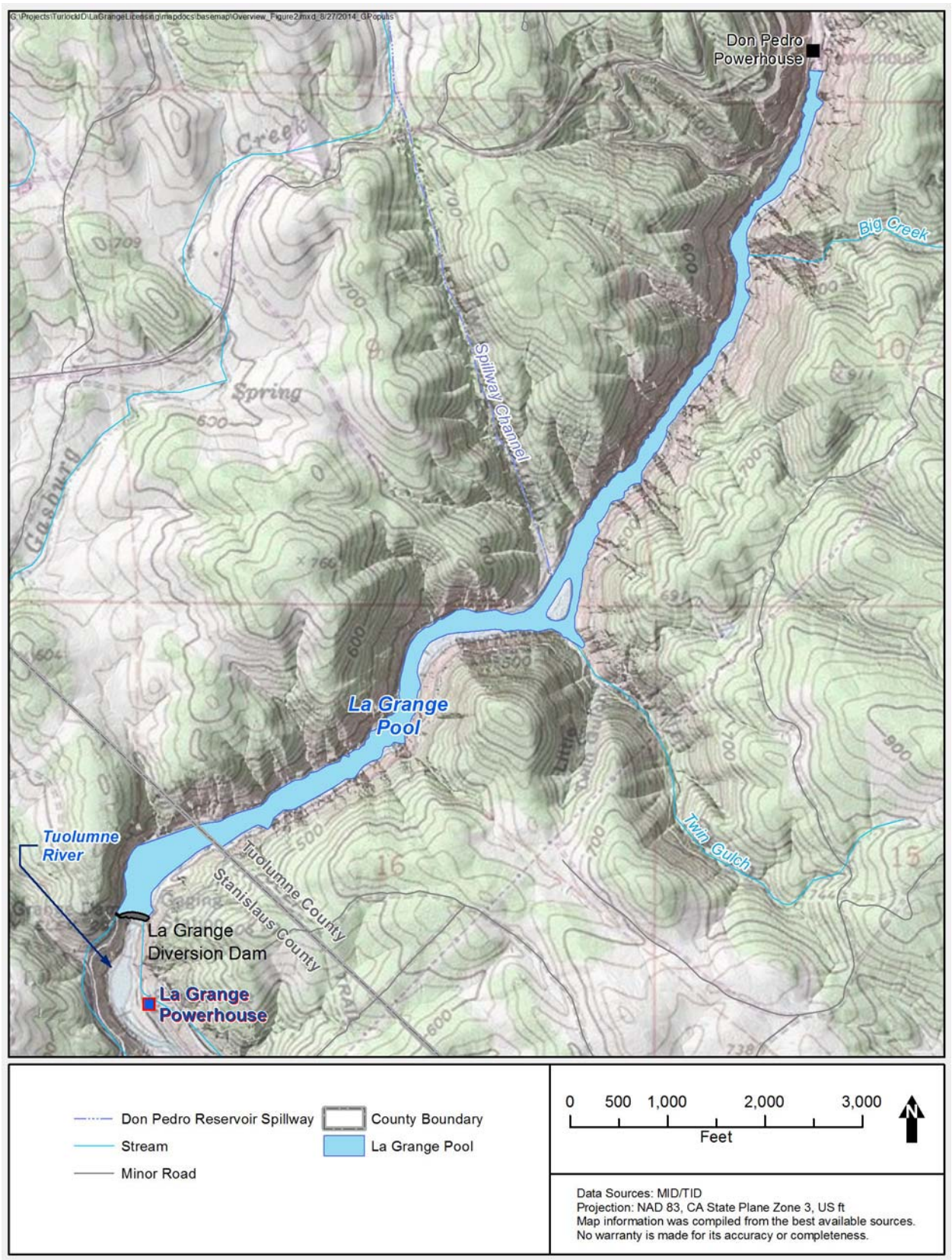

Figure 1.1-1. La Grange Hydroelectric Project location map.

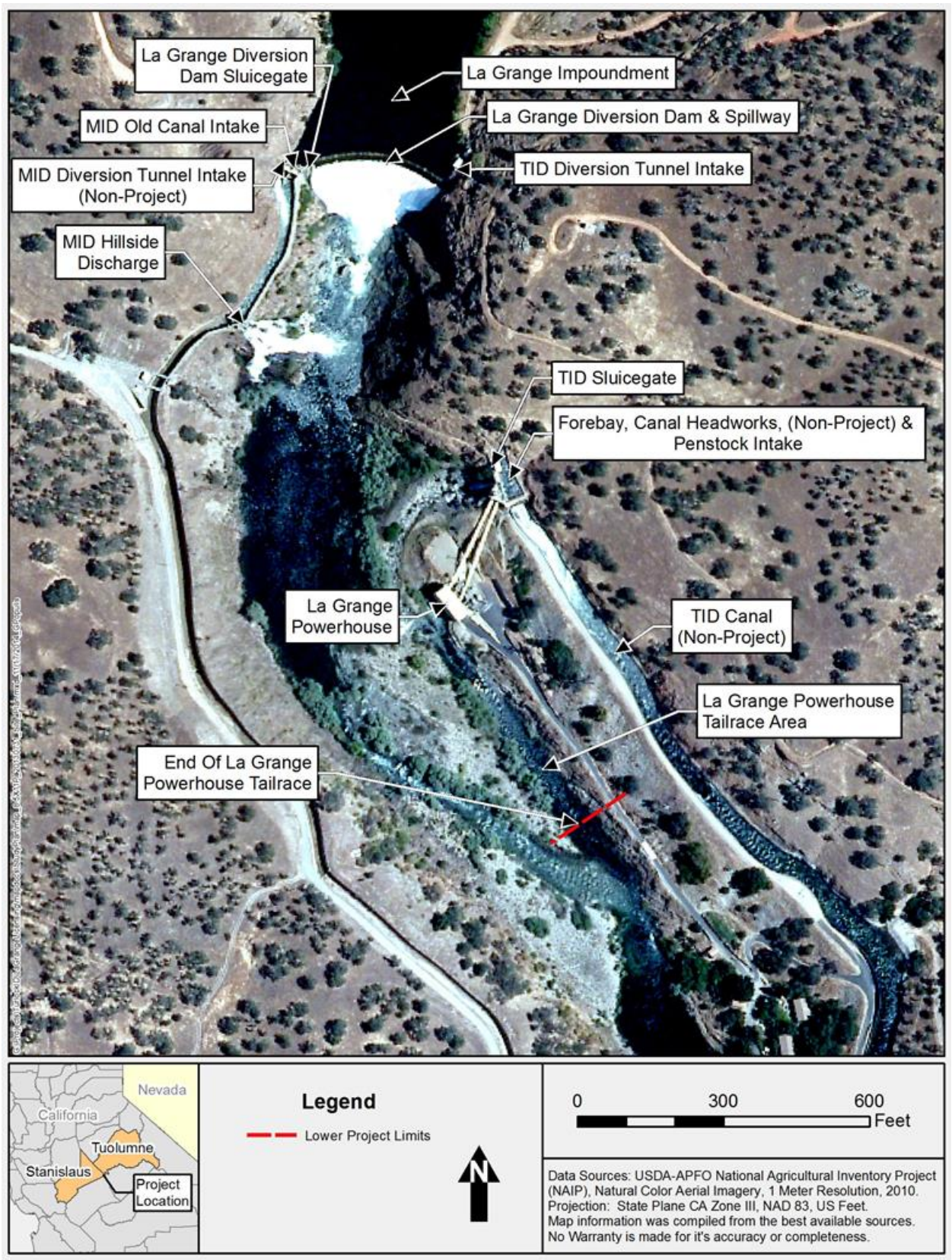

Figure 1.1-2. La Grange Hydroelectric Project site plan.

1.2 Licensing Activities to Date

The Districts have selected the ILP, as defined by 18 CFR Part 5, for the licensing of the La Grange Hydroelectric Project. On January 29, 2014, pursuant to 18 CFR Sections 5.5 and 5.6, the Districts filed the La Grange Hydroelectric Project PAD with FERC.

On May 23, 2014, FERC provided formal notice of the Districts' PAD, issued Scoping Document 1 (SD1), and solicited study requests and comments on the PAD and SD1. In the same notice, FERC set a date of June 18, 2014, for scoping meetings in Modesto and Turlock, California, and a date of June 19, 2014, for a La Grange Hydroelectric Project site visit. Appendix B of SD1 contained a *Process Plan and Schedule* which called for parties to provide comments on the SD1 and PAD by July 22, 2014, and established the same deadline for the filing of study requests.

The U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the California State Water Resources Control Board (SWRCB), the Conservation Groups[3] (CGs), and the Bay Area Water Supply and Conservation Agency (BAWSCA) each filed comment letters by the July 22, 2014 deadline. The USFWS, NMFS, SWRCB and CGs submitted a total of 16 study requests. BAWSCA submitted comments on the PAD, but did not submit any study requests. The PSP, containing three draft study plans, was issued on September 5, 2014 and provided the Districts' initial response to those study requests. On November 17, 2014, the Districts notified licensing participants that they would be issuing an Updated Study Plan to expand the Fall-Run Chinook Salmon Migration Barrier Study Plan (which is now titled the Fish Passage Assessment Study Plan). On November 21, 2014, the Districts filed the USP with FERC and distributed the USP to LPs for review and comment, and on or before December 4, 2014, Mr. Thomas Terpstra, the California Department of Fish and Wildlife (CDFW), CGs, and NMFS filed comments, on both the PSP and USP. The CGs also submitted an additional study request with their PSP comments. Subsequently, the Districts modified the Fish Passage Assessment Study Plan and the Recreation Access and Safety Assessment Study Plan based on comments received during the October 6th study plan review meeting and comments on the PSP and USP.

1.2.1 Discussion of Licensing Process with Interested Participants

On January 29, 2014, the Districts requested that FERC approve use of the Traditional Licensing Process (TLP) for the La Grange Hydroelectric Project instead of the default ILP. The due date for comments on the TLP request was February 28, 2014. On February 24, 2014, the Districts hosted a meeting with interested participants to discuss the possible use of the TLP instead of the ILP. Representatives from NMFS, USFWS, CDFW, SWRCB, California Sportfishing Protection Alliance, Tuolumne River Trust, CCSF, and Friends of the River attended the meeting.

[3] Conservation groups identified in the July 22, 2014 comment letter: American Rivers, American Whitewater, California Sportfishing Protection Alliance, California Trout, Central Sierra Environmental Resource Center, Friends of the River, Golden West Women Flyfishers, Merced Fly Fishing Club, Northern California Federation of Flyfishers, Pacific Coast Federation of Fishermen's Associations, Trout Unlimited, and the Tuolumne River Trust.

Due to the timing of the workload associated with the relicensing of the Don Pedro Hydroelectric Project (FERC Project No. 2299), attendees at the meeting requested a 21-day extension to the February 28, 2014 deadline for comments on the La Grange Hydroelectric Project TLP request. The Districts agreed to seek additional time and on February 25, 2014 filed with FERC a request for a three-week extension to the due date for comments. In letters dated February 26 and 27, 2014, CDFW and NMFS, respectively, filed letters supporting the use of the ILP. On February 28, 2014, FERC extended the deadline for comments to March 21, 2014.

On March 21, 2014, NMFS and the CGs[4] filed comment letters declining to adopt the TLP and supporting use of the ILP for the La Grange Hydroelectric Project. On March 24, 2014, the Districts stated they did not object to use of the ILP and, subject to FERC's final decision, would plan to proceed using the ILP. On April 17, 2014, FERC established March 24, 2014 as the pre-filing process start date for the ILP.

1.2.2 FERC's Issuance of Scoping Document 1

On May 23, 2014, FERC issued SD1 in accordance with 18 CFR Section 5.8. SD1 provided FERC's preliminary list of issues and alternatives to be addressed in an environmental assessment to accompany FERC's consideration of a La Grange Hydroelectric Project license. FERC requested that comments on SD1 and the PAD be provided to FERC by July 22, 2014.

1.2.3 FERC's National Environmental Policy Act Scoping Meetings and Site Visit

FERC held two public scoping meetings for the La Grange Hydroelectric Project on June 18, 2014: a daytime meeting held in Turlock, California and an evening meeting held in Modesto, California. The scoping meetings were recorded and transcripts are available through FERC. FERC conducted a Project site visit on June 19, 2014.

1.2.4 Licensing Participants Filing of Comments and Study Requests

In accordance with the ILP schedule, five parties filed letters providing study requests and/or comments on the SD1 and PAD by July 22, 2014 (Table 1.2-1). All parties except BAWSCA filed requests for studies to be undertaken by the Districts as part of La Grange Hydroelectric Project licensing.

Table 1.2-1. Entities providing study requests and/or comments on SD1 and PAD.

Licensing Participant	Date of Comment Letter
Bay Area Water Supply and Conservation Agency	July 21, 2014
Conservation Groups	July 22, 2014
NOAA - National Marine Fisheries Service	July 22, 2014
State Water Resources Control Board	July 22, 2014
U.S. Fish and Wildlife Service	July 22, 2014

[4] Conservation groups identified in the March 21, 2014 comment letter: American Rivers, American Whitewater, California Sportfishing Protection Alliance, California Trout, Central Sierra Environmental Resource Center, Friends of the River, Golden West Women Flyfishers, Northern California Federation of Flyfishers, Trout Unlimited, and the Tuolumne River Trust.

1.2.5 Districts' Filing of the Proposed Study Plan

On September 5, 2014, pursuant to 18 CFR § 5.11, the Districts filed with FERC their PSP document. The PSP consisted of five sections. Section 1.0 described the Project, licensing activities to date, and the Districts' ongoing studies and data collection activities. Section 2.0 summarized the LPs' study requests filed with FERC and the Districts' general approach to evaluating study requests. Section 3.0 summarized the three study plans proposed by the Districts in response to study requests received. Section 4.0 identified those study requests the Districts had not adopted in the PSP and provided an explanation as to why the requests were not adopted. Section 5.0 described the Districts' plan to hold a proposed study plan meeting within 30 days of filing the PSP and provided a summary of upcoming milestones in the ILP.

1.2.6 FERC's Issuance of Scoping Document 2

On September 5, 2014, FERC issued Scoping Document 2 (SD2) in accordance with 18 CFR § 5.10. SD2 stated the Commission's intent to prepare a single environmental impact statement (EIS) for licensing the La Grange Project and relicensing the Don Pedro Project and provided updates to the Process Plan and Schedule. SD2 also made several additions to both the list of resources that have the potential to be cumulatively affected by continued Project operations and the preliminary list of environmental issues to be addressed in the NEPA analysis. The Districts reserve their right to comment on SD2 in future filings.

1.2.7 Proposed Study Plan Meeting

On October 6, 2014, pursuant to 18 CFR § 5.11(e), the Districts held a PSP meeting at MID's offices in Modesto, California. The purpose of the meeting was to discuss the PSP with LPs in order to attempt to resolve any outstanding issues on studies to be included in the Districts' RSP. Notes from the meeting were filed with the Commission and issued to LPs on November 21, 2014 via email. Meeting notes were also made available on the Districts' licensing website at www.lagrange-licensing.com.

1.2.8 Study Plan Development Consultation Completed Prior to the Deadline for Filing Proposed Study Plan Comments

On November 17, 2014, the Districts issued a notice to LPs stating that the Districts anticipated making several changes to the PSP and would therefore issue an Updated Study Plan (USP) prior to the December 4, 2014 deadline for PSP comments to allow LPs the opportunity to comment on the most current version of the study plan. The Districts distributed the USP on November 21, 2014.

As a result of discussion at the October PSP meeting, the Districts contacted NMFS and USFWS, respectively, to request additional information regarding agency comments and study requests discussed at the PSP meeting. On November 12, the Districts provided NMFS with a CD containing temperature data available in the upper Tuolumne River. On December 1, 2014, NMFS provided the Districts a brief draft description of the ongoing study being conducted by NMFS of instream habitat in the upper Tuolumne River. The information provided by NMFS

included the location of seven temperature loggers recently placed in the upper Tuolumne River by NMFS. This information is referenced in the Districts' Fish Passage Assessment Study Plan. On November 25, 2014, the Districts requested feedback from USFWS on whether USFWS staff had reviewed the study plan for the ongoing W&AR-21 Lower Tuolumne River Floodplain Hydraulic Assessment being completed for the Don Pedro relicensing; the Districts also notified the USFWS of components of the USP that were responsive to USFWS' study requests. As of this filing, the USFWS have provided no additional comments. A representative of the USFWS attended the Districts' W&AR-21 Floodplain Hydraulic Assessment Workshop held on December 18, 2014 as a part of the Don Pedro relicensing process.

1.2.9 Licensing Participants' Comments on the Proposed Study Plan Document

In accordance with 18 CFR § 5.12, comments on the PSP were due to FERC by December 4, 2014. Four comment letters on the Districts' PSP and USP documents were filed with FERC by the December 4, 2014 deadline (Table 1.2-2).

Table 1.2-2. Entities providing comments on the Districts' PSP and USP documents.

Licensing Participant	Date of Comment Letter
Conservation Groups[5]	December 4, 2014
NOAA - National Marine Fisheries Service	December 4, 2014
California Department of Fish and Wildlife	December 4, 2014
Thomas Terpstra	October 8, 2014

1.3 Future Licensing Activities

As required by 18 CFR § 5.11(c) and (f), within one year of the date of FERC's Study Plan Determination the Districts will file with FERC and distribute to LPs an Initial Study Report (ISR) and within two years of the date of FERC's Study Plan Determination the Districts will file an Updated Study Report (USR). Each report will describe the Districts' overall progress in implementing the studies, any study plan variances, and any initial study conclusions. Within 15 days of filing both the ISR and the USR, the Districts will hold a meeting with the LPs and Commission staff to discuss the study results and any proposals to modify the study plan in light of the progress of the study plan and data collected. Within 15 days following each meeting, the Districts will file a meeting summary.

1.4 Districts' Ongoing Studies and Data Collection Activities

Extensive information on potential cumulative effects to environmental resources in the vicinity of the La Grange Hydroelectric Project and the lower Tuolumne River are available as part of the Don Pedro Hydroelectric Project relicensing docket (P-2299). A list of studies is provided in Tables 1.4-1 and 1.4-2. In addition to studies already completed in support of the Don Pedro Hydroelectric Project, there are several additional water and aquatic resources studies to be filed with the Commission in the Don Pedro docket in 2015 that will be available to interested parties involved in the La Grange Hydroelectric Project licensing (Table 1.4-3).

[5] Conservation groups identified in December 4, 2014 comments on the PSP: American Rivers, American Whitewater, California Sportfishing Protection Alliance, California Trout, Central Sierra Environmental Resource Center, Friends of the River, Golden West Women Flyfishers, Trout Unlimited, and the Tuolumne River Trust.

Table 1.4-1. Studies performed by the Districts during the current license term of the Don Pedro Hydroelectric Project.

Study Number	Study Name
Salmon Population Models	
1992 Appendix 1	Population Model Documentation
1992 Appendix 26	Export Mortality Fraction Submodel
1992 Appendix 2	Stock Recruitment Analysis of the Population Dynamics of San Joaquin River System Chinook salmon
Report 1996-5	Stock-Recruitment Analysis Report
Salmon Spawning Surveys	
1992 Appendix 3	Tuolumne River Salmon Spawning Surveys 1971-88
Report 1996-1	Spawning Survey Summary Report
Report 1996-1.1	1986 Spawning Survey Report
Report 1996-1.2	1987 Spawning Survey Report
Report 1996-1.3	1988 Spawning Survey Report
Report 1996-1.4	1989 Spawning Survey Report
Report 1996-1.5	1990 Spawning Survey Report
Report 1996-1.6	1991 Spawning Survey Report
Report 1996-1.7	1992 Spawning Survey Report
Report 1996-1.8	1993 Spawning Survey Report
Report 1996-1.9	1994 Spawning Survey Report
Report 1996-1.10	1995 Spawning Survey Report
Report 1996-1.11	1996 Spawning Survey Report
Report 1996-1.12	Population Estimation Methods
Report 1997-1	1997 Spawning Survey Report and Summary Update
Report 1998-1	Spawning Survey Summary Update
Report 1999-1	1998 Spawning Survey Report
Report 2000-1	1999 and 2000 Spawning Survey Reports
Report 2000-2	Spawning Survey Summary Update
Report 2001-1	2001 Spawning Survey Report
Report 2001-2	Spawning Survey Summary Update
Report 2002-1	2002 Spawning Survey Report
Report 2002-2	Spawning Survey Summary Update
Report 2003-1	Spawning Survey Summary Update
Report 2004-1	2003 and 2004 Spawning Survey Reports
Report 2004-2	Spawning Survey Summary Update
Report 2006-1	2005 and 2006 Spawning Survey Reports
Report 2006-2	Spawning Survey Summary Update
Report 2007-1	2007 Spawning Survey Report
Report 2007-2	Spawning Survey Summary Update
Report 2008-2	Spawning Survey Summary Update
Report 2009-1	2008 and 2009 Spawning Survey Reports
Report 2009-2	Spawning Survey Summary Update
Report 2009-8	2009 Counting Weir Report
Report 2010-1	2010 Spawning Survey Reports
Report 2010-2	Spawning Survey Summary Update
Report 2010-8	2010 Counting Weir Report
Report 2011-2	Spawning Survey Summary Update
Report 2011-8	2011 Tuolumne River Weir Report
Report 2012-2	Spawning Survey Summary Update
Report 2012-6	2012 Tuolumne River Weir Report

Study Number	Study Name
Seine, Snorkel, Fyke Reports and Various Juvenile Salmon Studies	
1992 Appendix 10	1987 Juvenile Chinook Salmon Mark-Recapture Study
1992 Appendix 12	Data Reports: Seining of Juvenile Chinook salmon in the Tuolumne, San Joaquin, and Stanislaus Rivers, 1986-89
1992 Appendix 13	Report on Sampling of Chinook Salmon Fry and Smolts by Fyke Net and Seine in the Lower Tuolumne River, 1973-86
1992 Appendix 20	Juvenile Salmon Pilot Temperature Observation Experiments
Report 1996-2	Juvenile Salmon Summary Report
Report 1996-2.1	1986 Snorkel Survey Report
Report 1996-2.2	1988-89 Pulse Flow Reports
Report 1996-2.3	1990 Juvenile Salmon Report
Report 1996-2.4	1991 Juvenile Salmon Report
Report 1996-2.5	1992 Juvenile Salmon Report
Report 1996-2.6	1993 Juvenile Salmon Report
Report 1996-2.7	1994 Juvenile Salmon Report
Report 1996-2.8	1995 Juvenile Salmon Report
Report 1996-2.9	1996 Juvenile Salmon Report
Report 1996-9	Aquatic Invertebrate Report
Report 1997-2	1997 Juvenile Salmon Report and Summary Update
Report 1998-2	1998 Juvenile Salmon Report and Summary Update
Report 1999-4	1999 Juvenile Salmon Report and Summary Update
Report 2000-3	2000 Seine/Snorkel Report and Summary Update
Report 2001-3	2001 Seine/Snorkel Report and Summary Update
Report 2002-3	2002 Seine/Snorkel Report and Summary Update
Report 2003-2	2003 Seine/Snorkel Report and Summary Update
Report 2004-3	2004 Seine/Snorkel Report and Summary Update
Report 2005-3	2005 Seine/Snorkel Report and Summary Update
Report 2006-3	2006 Seine/Snorkel Report and Summary Update
Report 2007-3	2007 Seine/Snorkel Report and Summary Update
Report 2008-3	2008 Seine Report and Summary Update
Report 2008-5	2008 Snorkel Report and Summary Update
Report 2009-3	2009 Seine Report and Summary Update
Report 2009-5	2009 Snorkel Report and Summary Update
Report 2010-3	2010 Seine Report and Summary Update
Report 2010-5	2010 Snorkel Report and Summary Update
Report 2011-3	2011 Seine Report and Summary Update
Report 2011-5	2011 Snorkel Report and Summary Update
Report 2012-3	2012 Seine Report and Summary Update
Report 2012-5	2012 Snorkel Report and Summary Update
Screw Trap Monitoring	
Report 1996-12	Screw Trap Monitoring Report: 1995-96
Report 1997-3	1997 Screw Trap and Smolt Monitoring Report
Report 1998-3	1998 Tuolumne River Outmigrant Trapping Report
Report 1999-5	1999 Tuolumne River Upper Rotary Screw Trap Report
Report 2000-4	2000 Tuolumne River Smolt Survival and Upper Screw Traps Report
Report 2000-5	1999-2000 Grayson Screw Trap Report
Report 2001-4	2001 Grayson Screw Trap Report
Report 2004-4	1998, 2002, and 2003 Grayson Screw Trap Reports
Report 2004-5	2004 Grayson Screw Trap Report
Report 2005-4	2005 Grayson Screw Trap Report
Report 2005-5	Rotary Screw Trap Summary Update
Report 2006-4	2006 Rotary Screw Trap Report

Study Number	Study Name
Report 2006-5	Rotary Screw Trap Summary Update
Report 2007-4	2007 Rotary Screw Trap Report
Report 2008-4	2008 Rotary Screw Trap Report
Report 2009-4	2009 Rotary Screw Trap Report
Report 2010-4	2010 Rotary Screw Trap Report
Report 2011-4	2011 Rotary Screw Trap Report
Report 2012-4	2012 Rotary Screw Trap Report
Fluctuation Assessments	
1992 Appendix 14	Fluctuation Flow Study Report
1992 Appendix 15	Fluctuation Flow Study Plan: Draft
Report 2000-6	Tuolumne River Chinook Salmon Fry and Juvenile Stranding Report
2005 Ten-Year Summary Report Appendix E	Stranding Survey Data (1996-2002)
Predation Evaluations	
1992 Appendix 22	Lower Tuolumne River Predation Study Report
1992 Appendix 23	Effects of Turbidity on Bass Predation Efficiency
Report 2006-9	Lower Tuolumne River Predation Assessment Final Report
Smolt Monitoring and Survival Evaluations	
1992 Appendix 21	Possible Effects of High Water Temperature on Migrating Salmon Smolts in the San Joaquin River
Report 1996-13	Coded-wire Tag Summary Report
Report 1998-4	1998 Smolt Survival Peer Review Report
Report 1998-5	CWT Summary Update
Report 1999-7	Coded-wire Tag Summary Update
Report 2000-4	2000 Tuolumne River Smolt Survival and Upper Screw Traps Report
Report 2000-8	Coded-wire Tag Summary Update
Report 2001-5	Large CWT Smolt Survival Analysis
Report 2001-6	Coded-wire Tag Summary Update
Report 2002-4	Large CWT Smolt Survival Analysis
Report 2002-5	Coded-wire Tag Summary Update
Report 2003-3	Coded-wire Tag Summary Update
Report 2004-7	Large CWT Smolt Survival Analysis Update
Report 2004-8	Coded-wire Tag Summary Update
Report 2005-6	Coded-wire Tag Summary Update
Report 2006-6	Coded-wire Tag Summary Update
Report 2007-5	Coded-wire Tag Summary Update
Fish Community Assessments	
1992 Appendix 24	Effects of Introduced Species of Fish in the San Joaquin River System
1992 Appendix 27	Summer Flow Study Report 1988-90
Report 1996-3	Summer Flow Fish Study Annual Reports: 1991-94
Report 1996-3.1	1991 Report
Report 1996-3.2	1992 Report
Report 1996-3.3	1993 Report
Report 1996-3.4	1994 Report
Report 2001-8	Distribution and Abundance of Fishes Publication
Report 2002-9	Publication on the Effects of Flow on Fish Communities
Report 2007-7	2007 Rainbow Trout Data Summary Report
Report 2008-6	2008 July *Oncorhynchus mykiss* Population Estimate Report
Report 2010	Tuolumne River *Oncorhynchus mykiss* Monitoring Report (submitted January 15)
Attachment 5	March and July 2009 Population Estimates of *Oncorhynchus mykiss* Report
Report 2011	Tuolumne River *Oncorhynchus mykiss* Monitoring Summary Report (submitted

Study Number	Study Name
	January 15)
Report 2010-6	2010 *Oncorhynchus mykiss* Population Estimate Report
Report 2010-7	2010 *Oncorhynchus mykiss* Acoustic Tracking Report
Report 2011-6	2011 *Oncorhynchus mykiss* Population Estimate Report
Report 2011-7	2011 *Oncorhynchus mykiss* Acoustic Tracking Report
Invertebrate Reports	
1992 Appendix 16	Aquatic Invertebrate Studies Report
1992 Appendix 28	Summer Flow Invertebrate Study
Report 1996-4	Summer Flow Aquatic Invertebrate Annual Reports: 1989-93
Report 1996-4.1	1989 Report
Report 1996-4.2	1990 Report
Report 1996-4.3	1991 Report
Report 1996-4.4	1992 Report
Report 1996-4.5	1993 Report
Report 1996-9	Aquatic Invertebrate Report
Report 2002-8	Aquatic Invertebrate Report
Report 2004-9	Aquatic Invertebrate Monitoring Report (2003-2004)
Report 2008-7	Aquatic Invertebrate Monitoring (2005, 2007, 2008) and Summary Update
Report 2009-7	2009 Aquatic Invertebrate Monitoring and Summary Update
Delta Salmon Salvage	
Report 1999-6	1993-99 Delta Salmon Salvage Report
Gravel, Incubation, and Redd Distribution Studies	
1992 Appendix 6	Spawning Gravel Availability and Superimposition Report (incl. map)
1992 Appendix 7	Salmon Redd Excavation Report
1992 Appendix 8	Spawning Gravel Studies Report
1992 Appendix 9	Spawning Gravel Cleaning Methodologies
1992 Appendix 11	An Evaluation of the Effect of Gravel Ripping on Redd Distribution
Report 1996-6	Redd Superimposition Report
Report 1996-7	Redd Excavation Report
Report 1996-8	Gravel Studies Report: 1987-89
Report 1996-10	Gravel Cleaning Report: 1991-93
Report 2000-7	Tuolumne River Substrate Permeability Assessment and Monitoring Program Report
Report 2006-7	Survival to Emergence Study Report
Report 2008-9	Monitoring of Winter 2008 Runoff Impacts from Peaslee Creek
Water Temperature and Water Quality	
1992 Appendix 17	Preliminary Tuolumne River Water Temperature Report
1992 Appendix 18	Instream Temperature Model Documentation: Description and Calibration
1992 Appendix 19	Modeled Effects of La Grange Releases on Instream Temperatures in the Lower Tuolumne River
Report 1996-11	Intragravel Temperature Report: 1991
Report 1997-5	1987-97 Water Temperature Monitoring Data Report
Report 2002-7	1998-2002 Temperature and Conductivity Data Report
Report 2004-10	2004 Water Quality Report
Report 2007-6	Flow, Delta Export, Weather, and Water Quality Data Report: 2003-2007
IFIM Assessment	
1992Appendix 4	Instream Flow Data Processing, Tuolumne River
1992 Appendix 5	Analysis of 1981 Lower Tuolumne River IFIM Data
	1995 USFWS Report on the Relationship between Instream Flow and Physical Habitat Availability (submitted by Districts to FERC in May 2004)

Study Number	Study Name
Flow and Delta Exports	
Report 1997-4	Streamflow and Delta Water Export Data Report
Report 2002-6	1998-2002 Streamflow and Delta Water Export Data Report
Report 2003-4	Review of 2003 Summer Flow Operation
Report 2007-6	Flow, Delta Export, Weather, and Water Quality Data Report: 2003-2007
Report 2008-8	Review of 2008 Summer Flow Operation
Report 2009-6	Review of 2009 Summer Flow Operation
Restoration, Project Monitoring, and Mapping	
Report 1996-14	Tuolumne River GIS Database Report and Map
Report 1999-8	A Summary of the Habitat Restoration Plan for the Lower Tuolumne River Corridor
Report 1999-9	Habitat Restoration Plan for the Lower Tuolumne River Corridor
Report 1999-10	1998 Restoration Project Monitoring Report
Report 1999-11	1999 Restoration Project Monitoring Report
Report 2001-7	Adaptive Management Forum Report
Report 2004-12	Coarse Sediment Management Plan
Report 2004-13	Tuolumne River Floodway Restoration (Design Manual)
2005 Ten-Year Summary Report Appendix D	Salmonid Habitat Maps
2005 Ten-Year Summary Report Appendix F	GIS Mapping Products
Report 2005-7	Bobcat Flat/River Mile 43: Phase 1 Project Completion Report
Report 2006-8	Special Run Pool 9 and 7/11 Reach: Post-Project Monitoring Synthesis Report
Report 2006-10	Tuolumne River La Grange Gravel Addition, Phase II Annual Report
Report 2006-11	Tuolumne River La Grange Gravel Addition, Phase II Geomorphic Monitoring Report
General Monitoring Information	
Report	1992 Fisheries Studies Report
Report 2002-10	2001-2002 Annual CDFW Sportfish Restoration Report
Report	2005 Ten-Year Summary Report

Table 1.4-2. Studies completed by the Districts as part of the Don Pedro Hydroelectric Project relicensing process.

Study Number	Study Title
Cultural Resources (CR)	
CR-01	Historic Properties Study
CR-02	Native American Traditional Cultural Properties Study
Recreation Resources (RR)	
RR-01	Recreation Facility Condition and Public Accessibility Assessment, and Recreation use Assessment
RR-02	Whitewater Boating Take Out Improvement Feasibility Study
RR-03	Lower Tuolumne River Lowest Boatable Flow Study
RR-04	Visual Quality Study
Terrestrial Resources (TR)	
TR-01	Special-Status Plants Study
TR-02	ESA- and CESA-Listed Plants Study
TR-03	Wetland Habitats Associated with Don Pedro Reservoir Study
TR-04	Noxious Weed Survey
TR-05	ESA-Listed Wildlife - Valley Elderberry Longhorn Beetle Study
TR-06	Special-Status Amphibians and Aquatic Reptiles Study
TR-07	ESA-Listed Amphibians - California Red-Legged Frog Study

Study Number	Study Title
TR-08	ESA-Listed Amphibians - California Tiger Salamander Study
TR-09	Special-Status Wildlife - Bats Study
TR-10	Bald Eagle Study
Water and Aquatic Resources (W&AR)	
W&AR-01	Water Quality Assessment
W&AR-02	Project Operations/Water Balance Model
W&AR-03	Don Pedro Reservoir Temperature Model
W&AR-04	Spawning Gravel in the Lower Tuolumne River Study
W&AR-05	Salmonid Population Information Integration and Synthesis Study
W&AR-06	Tuolumne River Chinook Salmon Population Model
W&AR-07	2012 Predation Study
W&AR-08	Salmonid Redd Mapping Study
W&AR-10	*Oncorhynchus mykiss* Population Model
W&AR-13	Fish Assemblage and Population Between Don Pedro Dam and La Grange Dam Study
W&AR-15	Socioeconomics Study
W&AR-16	Lower Tuolumne River Temperature Model
W&AR-17	Don Pedro Fish Population Survey
W&AR-18	Sturgeon Study
W&AR-19	Lower Tuolumne River Riparian Information and Synthesis Study
W&AR-20	*Oncorhynchus mykiss* Scale Collection and Age Determination Study
NMFS Information Request	Description of La Grange Facilities and Potentially Affected Environment of Anadromous Fish in the Vicinity of the La Grange Facilities
Lower Tuolumne River Instream Flow Study	Lower Tuolumne River Instream Flow Study, including Habitat Suitability Curves for Splittail and Lamprey
Additional Information Developed in Support of the Final License Application (FLA)	
FLA Attachment A	Assessment of Don Pedro Project Operations to Meet EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards
	Jayasundara, N. C., M. L. Deas, E. Sogutlugil, E. Miao, E. Limanto, A. Bale, Nd S. K. Tanaka. 2014. Tuolumne River flow and temperature model: without project assessment. Prepared by Watercourse Engineering, Inc., Davis, CA.

Table 1.4-3 Studies in the Don Pedro Hydroelectric Project yet to be completed.

Study Number	Study Title
W&AR-11	Chinook Salmon Otolith Study
W&AR-12	*Oncorhynchus mykiss* Habitat Survey
W&AR-14	Temperature Criteria Assessment (Chinook Salmon and *O. mykiss*)
W&AR-21	Lower Tuolumne River Floodplain Hydraulic Analysis
Lower Tuolumne River Instream Flow Study	Effective Weighted Usable Area Estimate for *O. mykiss*
	Evaluation of Non-Native Predatory Fish

2.0 LICENSING PARTICIPANTS' STUDY REQUESTS AND COMMENTS

Comments on the Districts' PAD, SD1, PSP and/or USP were received from seven entities, as summarized in Section 1.0. Five LPs submitted study requests and/or suggested modifications to the Districts' PSP and/or Updated Study Plan (Table 2.0-1).

Table 2.0-1. Study plan modifications and study requests filed with FERC by LPs.

Licensing Participant	Date of Comment Letter	Requested New Study or Modification
California Department of Fish and Wildlife	December 4, 2014	• Comments on the Districts' Fish Passage Assessment USP
Conservation Groups	July 22, 2014	• Fish Passage • Upper Tuolumne Habitat Suitability • Recreational Access and Facilities Feasibility
	December 4, 2014	• Comments on the Districts' Fish Passage Assessment • Comments on the Districts' Recreation Access and Safety Assessment • Water Hyacinth Study
National Marine Fisheries Service	July 22, 2014 and December 4, 2014	• Effects of the La Grange Project and Related Activities on Fish Passage for Anadromous Fishes • Effects of the Project and Related Activities on Fish Stranding and Salmonid Habitat in the Vicinity of the La Grange Project • Quantifying Existing Upper Tuolumne River Habitats for Anadromous Fish as They Pertain to Fish Passage Blockage at La Grange Dam • Effects of Project and Related Activities on the Genetic Makeup of Steelhead/Rainbow Trout *Oncorhynchus mykiss* in the Tuolumne River • Effects of the Project and Related Activities on the Losses of Marine-Derived Nutrients in the Tuolumne River
State Water Resources Control Board	July 22, 2014	• Fish Passage Feasibility Study • Upper Tuolumne River Habitat Assessment • Tailrace Habitat Assessment
U.S. Fish and Wildlife Service	July 22, 2014	• Draft Juvenile Salmonid Floodplain Rearing Study • Draft Chinook Salmon Egg Viability Study • Draft Juvenile Chinook Salmon Survival Study • Draft Genetics of Chinook Salmon in the Upper Tuolumne River • Draft Redd Dewatering Study

In accordance with 18 CFR Section 5.9(b)(1)-(7), all study requests must be accompanied by a showing that all of the ILP study plan criteria (Table 2.0-2) are met. A study request must meet all seven criteria. The Districts evaluated whether each study request met all study plan criteria.

Table 2.0-2. ILP study plan criteria

No.	Criteria (18 CFR Section 5.9(b)(1) – (7))
1	Describe the goals and objectives of each study proposal and the information to be obtained
2	If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied
3	If the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study
4	Describe existing information concerning the subject of the study proposal, and the need for additional information
5	Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements
6	Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge
7	Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs

This RSP document contains the studies proposed to be conducted by the Districts during the study phase of the licensing process. Section 3.0 provides a summary of each of the Districts' proposed studies, including responses to related LPs' study requests that were partially or wholly adopted. Section 4.0 provides the Districts' explanation why certain study requests received from LPs have not been adopted by the Districts.

Following submittal of the PSP and the PSP meeting, four LPs submitted comments on the PSP and USP. The Districts' responses to these comments are provided in Appendix A, along with descriptions of how the study plans were modified since the PSP/USP to reflect these comments.

3.0 SUMMARY OF THE DISTRICTS' STUDY PLANS

The study plans contained within this RSP (Table 3.0-1) reflect and respond to the discussions held during the October 6, 2014 PSP meeting and additional comment letters received by the Districts. These studies, when combined with existing information as summarized in the Districts' PAD and other ongoing data gathering activities (see Section 1.4), will be used to evaluate the effects of La Grange Hydroelectric Project on environmental resources and inform the development of license requirements. Further, the Fish Passage Assessment Study Plan outlines study elements the Districts are voluntarily implementing in response to LP study requests, even though the Districts contend that many of these studies or study elements do not meet all the ILP Study Plan Criteria, especially Criteria 5 (Project Nexus).

Table 3.0-1. Districts' study plans.

Study Title	Licensing Participants' Study Requests Adopted or Adopted in Part in the Revised Study Plan
Cultural Resources Study	The Districts proposed this study in the PAD.
Recreation Access and Safety Assessment	Recreational Access and Facilities Feasibility Study Request (CGs)
Fish Passage Assessment	• Fish Passage (CGs) • Upper Tuolumne Habitat Suitability (CGs) • Effects of the La Grange Project and Related Activities on Fish Passage for Anadromous Fishes (NMFS) • Effects of the Project and Related Activities on Fish Stranding and Salmonid Habitat in the Vicinity of the La Grange Project (NMFS) • Quantifying Existing Upper Tuolumne River Habitats for Anadromous Fish as They Pertain to Fish Passage Blockage at La Grange Dam (NMFS) • Fish Passage Feasibility Study (SWRCB) • Upper Tuolumne River Habitat Assessment (SWRCB) • Tailrace Habitat Assessment (SWRCB) • Draft Redd Dewatering Study (USFWS)

3.1 Cultural Resources Study

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires federal agencies to consider the effects of their undertakings on historic properties listed in or eligible for inclusion in the National Register of Historic Places (NRHP). FERC's issuance of a license for the La Grange Hydroelectric Project is considered a federal undertaking, and is therefore subject to the provisions and regulations of Section 106.

The primary study goal is to assist FERC in meeting its compliance requirements under Section 106 of the NHPA by determining if licensing of the La Grange Hydroelectric Project will have an adverse effect on historic properties or a Traditional Cultural Property. The objective of this study is to identify cultural resources within the La Grange Hydroelectric Project's Area of Potential Effects (APE); evaluate their eligibility to the NRHP, if needed; and identify any La Grange Hydroelectric Project-related effects on those resources. The results of the study will then be used to develop a Historic Properties Management Plan, if necessary, which will ensure that all cultural resources identified within the APE will be appropriately considered and managed during the term of a FERC license. The Districts will develop a technical report

prepared to current professional standards consistent with the Archaeological Resource Management Report Guidelines (OHP 1995).

The Districts' Cultural Resources Study Plan is provided in Appendix B of this RSP.

3.2 Recreation Access and Safety Assessment

FERC regulations require that the license application include a description of existing recreation facilities to be continued and maintained during the term of the license, new measures or facilities proposed by the applicant for the purpose of enhancing recreational opportunities at the Project, and measures to ensure the safety of the public in its use of Project lands and waters. Recreation is a recognized project purpose at FERC-licensed projects under Section 10(a) of the Federal Power Act.

There are no recreation facilities associated with the Project or located along the reach of the Tuolumne River between Don Pedro Dam and La Grange Diversion Dam. Public access to this reach of the Tuolumne River has been historically limited to occasional use by the adjacent private property owners. All existing information on recreational use along the La Grange pool and in the immediate area below La Grange Diversion Dam, and the safety risks potentially associated with recreational use, is anecdotal. The proposed study will identify potential recreational uses at the Project. The Districts will first evaluate whether it is safe for the public to utilize any potential recreational resources identified at the Project; where the potential for safe recreation activities are identified, additional investigations of potential recreation enhancements will be developed in collaboration with licensing participants. The goals of this study are: (1) to identify and characterize public use and potential recreation opportunities in the study area, and (2) to assess the public safety risk of identified recreation opportunities in the study area. The results of the study in Year 1 may be used to develop a Year 2 recreation facilities siting assessment for those recreational activities identified during the Year 1 study as being able to safely occur at the Project.

The Districts' Recreation Access and Safety Assessment Study Plan is provided in Appendix C of this RSP.

3.3 Fish Passage Assessment Study Plan

In response to comments received at the PSP meeting and subsequent written comments, the Districts have significantly modified the Fall-Run Chinook Salmon Migration Barrier Study Plan (which is now entitled the Fish Passage Assessment). The Fish Passage Assessment Study Plan contains three related elements that together comprise the entire study plan: (1) Fish Passage Facilities Assessment; (2) Upstream Habitat Assessment; (3) Habitat Assessment and Fish Stranding Observations below La Grange Diversion Dam and Powerhouse. The components of the Districts' Fish Passage Assessment Study Plan are summarized below, and the plan is provided in Appendix D of this RSP.

3.3.1 Fish Passage Facilities Assessment

Resource agencies and CGs requested that the Districts undertake extensive studies of anadromous fish passage facilities at the LGDD as part of the licensing process for the La Grange Project. Specifically, these entities requested that the Districts undertake investigations of upstream and downstream fish passage facilities at both LGDD and the Districts' Don Pedro Dam located upstream of LGDD. While the Districts do not believe that studies of fish passage facilities meet FERC's study criteria specified in the regulations governing the Integrated Licensing Process (ILP) (see 18 C.F.R. Part 5, Section § 5.9), the Districts are willing to collaborate with licensing participants and FERC staff to perform certain investigations of upstream and downstream anadromous fish passage facilities at the Districts' La Grange and Don Pedro developments as described herein. The fish passage facilities assessment includes two components, the initially proposed fish barrier assessment below LGDD and La Grange powerhouse, and an additional concept-level fish passage alternatives analysis, in response to LPs' comments. The fish barrier assessment is designed to evaluate the potential impact of the LGDD and the La Grange powerhouse as barriers to potential upstream migration. For the concept-level fish passage alternatives component, the Districts are willing to conduct an initial two-year, phased evaluation to (1) develop in cooperation with LPs initial biological design criteria for fish passage facilities, (2) gather hydrologic and engineering data and information in cooperation with LPs to inform conceptual upstream and downstream passage facility layouts, (3) identify and discuss the pros and cons of potential fish passage alternatives, and (4) for select passage alternatives, develop preliminary functional design information, facility sizing, site layouts, and initial cost estimates. In addition, any significant remaining data gaps or additional information needed to develop realistic and reliable facility functional designs and costs will be identified and defined.

3.3.2 Upper Tuolumne River Basin Habitat Assessment

NMFS's Recovery Plan identifies the upper Tuolumne River above Don Pedro Reservoir as a candidate area for reintroduction of Central Valley steelhead and spring-run Chinook salmon (NMFS 2014). However, little information exists to reliably assess the current quantity and quality of suitable habitat for the adult, egg viability, fry, and juvenile life stages of these salmonid species in the upper Tuolumne River watershed. NMFS has requested information on upstream fish migration barriers and water temperatures in the upper basin to inform its decision making in the context of potential Federal Power Act (FPA) 10(j) recommendations, section 18 fishway prescriptions, and Endangered Species Act (ESA) consultation. The SWRCB and CGs also requested assessments of potential habitat upstream of the Don Pedro Reservoir. The Districts do not believe these study requests meet FERC's study criteria; nonetheless, the Districts are willing to voluntarily conduct a two-year, phased assessment of certain habitat characteristics in the upper Tuolumne River, including: (1) physical barriers to upstream anadromous salmonid migration; (2) water temperature monitoring and modeling; and (3) upstream habitat characterization using other available information on habitat conditions in the upper Tuolumne River basin, in cooperation with LPs.

3.3.3 Habitat Assessment and Fish Stranding Observations below La Grange Diversion Dam and Powerhouse

NMFS requested information related to the operation of the La Grange Project and associated "five flow conduits". NMFS indicates these "flow conduits" may have the potential to influence fish behavior and movement in the immediate vicinity of the La Grange Project, as upstream migrating fish may be attracted to different sources of flow. LPs believe that the discharge patterns resulting from flows passed at the LGDD have the potential to attract, then possibly strand, fish in multiple locations. The Districts have been asked to document flow, characterize physical habitat, and observe fish behavior in the immediate vicinity of the La Grange Project. The SWRCB and USFWS also submitted requests for evaluation of potential standing and/or redd dewatering which have now been incorporated into the Fish Passage Assessment Study Plan.

The Districts agree that La Grange facility operations have the potential to affect anadromous fish behavior, to the extent that anadromous fish may be present in the immediate area of Project facilities, thereby establishing a reasonable project nexus. Although the Districts have previously presented information on flow variability downstream of the La Grange Project (see Don Pedro Project Updated Study Report, January 2014), the NMFS study request identifies the need for information on discharges associated with individual conduits, including the MID hillside discharge and the sluicegate located in the diversion dam, that were not individually evaluated as part of the previous study under the Don Pedro relicensing proceeding. As such, the Districts have agreed to conduct a two-year evaluation of flows, associated habitat attributes, and observations of salmonids in the immediate area of the La Grange Project under certain flow conditions, all as described in the study plan.

4.0 DISTRICTS' RESPONSE TO STUDY REQUESTS

Four LPs submitted a total of 17 study requests (Table 2.0-1). Under the regulations governing the ILP, a study request must meet each of seven criteria provided in § 5.9(b) of FERC's regulations. The Districts reviewed each study request in light of the ILP criteria and determined that many study requests, such as the requests to study fish passage for anadromous fish and the requests to study habitat upstream of the Districts' Don Pedro Reservoir, do not meet the ILP criteria. However, to more fully support licensing participants in the development of information and to foster collaboration among all parties, the Districts have adopted elements from 10 of the 17 study requests.

4.1 Study Requests Adopted or Adopted in Part

4.1.1 Study Requests Related to Passage of Anadromous Fish

In their initial study request letters, NMFS (Study Request #1), SWRCB, and CGs each requested that the Districts undertake investigations of upstream and downstream fish passage facilities at both LGDD and the Districts' Don Pedro Dam located upstream of LGDD. The USFWS also indicated in its comment letter that it supports the fish passage planning studies requested by NMFS. While the Districts outline in the study plan contained in this RSP why the Districts do not believe that studies of fish passage facilities meet FERC's criteria specified in its regulations, the Districts are willing to collaborate with LPs and FERC staff to perform certain investigations of upstream and downstream anadromous fish passage facilities at the Districts' La Grange and Don Pedro projects. In their comments on the USP, CGs indicated that the Districts' Fish Passage Assessment Study Plan incorporates the majority of the study elements requested by the CGs, and that the CGs will address any outstanding areas of disagreement, interpretation, or omission during the defined opportunities for consultation with LPs provided by the collaborative process outlined in the Fish Passage Assessment Study Plan. In its comments on the PSP, NMFS specifically noted that it was not submitting comments on the USP, and would submit any remaining comments on the RSP, however, where NMFS' comments on the fish barrier assessment study were still relevant to the revised plan, the Districts have responded to NMFS comments. The Districts incorporated elements from each fish passage study request into the Fish Passage Assessment Study Plan as summarized in Table 4.1-1.

Table 4.1-1. Districts' response to fish passage study requests.

Licensing Participant(s)	Study Request	Districts' Response
NMFS	NMFS Study #1 (Element #1) Biological and Physical Requirements of Target Species	In collaboration with LPs, the Districts will develop biological and physical design requirements to inform the conceptual fish passage alternatives for upstream and downstream passage.
SWRCB, NMFS, CGs	The SWRCB, NMFS (Element #2), and the CGs requested study of conceptual level alternatives for providing fish passage up to the upper Tuolumne River watershed. Study requests suggested consideration of adult capture locations, release locations, and acclimation facilities, cost, construction impacts, and overall benefit to the fishery.	The Districts have proposed studying conceptual alternatives to upstream fish passage in the Section 6.2.1 of the Fish Passage Assessment.

Licensing Participant(s)	Study Request	Districts' Response
NMFS, CGs	NMFS (Element #3) requested conceptual level downstream passage alternatives, and the CGs requested the Districts evaluate potential locations, facilities and costs for downstream juvenile capture, acclimation and transport facilities	The Districts propose methods for studying conceptual alternatives of downstream fish passage in Section 6.2.1 of the Fish Passage Assessment.
CGs	The CGs recommend establishing a Tuolumne River Fish Passage Technical Working Group	The Districts have adopted a collaborative process, including three workshops during 2015, to implement the Fish Passage Assessment.

4.1.2 Study Requests Related to Habitat Upstream of Don Pedro Dam

Little information exists to reliably assess the current quantity and quality of suitable habitat for the adult, egg viability, fry, and juvenile life stages of anadromous salmonid species in the upper Tuolumne River watershed. NMFS, SWRCB, and CGs each requested that the Districts undertake investigations of potential anadromous salmonid habitat upstream of Don Pedro Project. The Districts do not believe that these requests satisfied the study criteria requirements mandated by FERC's ILP process (e.g., Criteria 5 Project Nexus). Nevertheless, the Districts are willing to voluntarily conduct a two-year, phased assessment of certain habitat characteristics in the upper Tuolumne River, including: (1) physical barriers to upstream anadromous salmonid migration; (2) water temperature monitoring and modeling; and (3) upstream habitat characterization using other available information on habitat conditions in the upper Tuolumne River basin, in cooperation with LPs. The Districts incorporated the majority of information requests from the LPs' Tuolumne River upstream habitat study requests into the Fish Passage Assessment Study Plan, Upper Tuolumne River Basin Habitat Assessment component (Table 4.1-2).

Table 4.1-2 Districts' response to upstream habitat study requests.

Licensing Participant(s)	Study Request Elements	Districts' Response
NMFS	Request Element #1: Migration Barriers	The Districts have addressed this request in the Fish Passage Assessment, Section 6.2.2
CGs	Conduct a Fish Barrier Assessment	The Districts have included a review of existing studies and a field assessment under existing flow conditions in the Fish Passage Assessment. However, the Districts will not evaluate changes of CCSF's operation of the Hetch Hetchy project on barriers (or other habitat characteristics), as CCSF's operations are not under the Districts' control.
NMFS, CGs	NMFS (Request Element #2) and the CGs request Water Temperature Monitoring and Modeling.	The Districts have included temperature data review, collection, and development of a model in the Fish Passage Assessment.
CGs	The CGs requested that the Districts perform a Habitat Suitability Evaluation, including gravel suitability assessments.	Upstream habitat data to be collected includes a barrier assessment and water temperature information and is described in the Fish Passage Assessment. To the extent that data already exist on other parameters, or data are being collected by other entities (e.g., the on-going NMFS upper Tuolumne River habitat study), the Districts will review these data collaboratively with LPs.
CGs	The CGs suggested utilizing LiDAR and conducting Hyperspectral Remote Sensing to characterize habitat	The Districts have proposed a two-phase habitat assessment. In the first year, the focus of the

Licensing Participant(s)	Study Request Elements	Districts' Response
	characteristics on the upper watershed.	study is identifying barriers and temperatures. NMFS is conducting an upper watershed habitat study in 2015 and will be defining habitat units based on data collected via LiDAR and field information on substrates, potentially providing information requested by the CGs. In Year 2 of the study, following review of these data, the Districts will work with LPs to determine if additional information, such as suggested by the CGs, is still needed to complete a habitat assessment.
SWRCB	SWRCB requested a habitat assessment to assess amount and types of salmonid habitat upstream Don Pedro Project, and characterize the capacity of the Upper Tuolumne River to support the reintroduction of salmonids and SWRCB and the CGs requests that criteria for evaluation be developed in consultation with LPs.	The Districts contend there are no habitat impacts upstream of the Don Pedro Project Boundary due to the La Grange Hydroelectric Project. Nonetheless, the Districts voluntarily include a habitat assessment to collaborate with LPs to characterize habitat in the Upper Tuolumne River and have proposed workshops with LPs to review information needs and habitat evaluation criteria.
NMFS	NMFS has requests that the Districts determine what additional monitoring actions are funded or need to be implemented as recommended by McBain and Trush (2007) in its request Element #3: Implement Monitoring Actions.	The Districts will review existing information, including McBain and Trush (2007) and have included workshops with LPs to review information gathered in Year 1 in order to inform Year 2 study efforts, as necessary.
CGs	Modification and Additions to Districts' Operations Model	CCSF operations are independent and unrelated to the Districts. The CGs suggested modifications and additions to the Districts' Don Pedro operations model are not relevant to analysis of the potential impacts of the La Grange Hydroelectric Project. Further, existing gage information upstream of the Don Pedro Reservoir will be summarized in the Upstream Habitat Assessment for use in the habitat assessment in the Fish Passage Assessment.
NMFS	Request Element #4: Salmonid Life-Cycle Model. The Applicants should use available information and newly developed information from the tasks outlined above, for use in salmonid life-cycle models for Chinook salmon and steelhead above New Don Pedro reservoir. The models should determine carrying capacities for each lifestage of steelhead and Chinook salmon in the suitable habitat identified in the previous elements of this study. These models should then use literature and field derived values for life-stage survival, potentially utilizing values and relationships already established for the life-cycle models developed for the lower Tuolumne River. In this way, the population-level benefits of restoring access of anadromous fishes to the Upper Tuolumne can be evaluated in the context of downstream influences.	There is no project nexus (ILP Criteria 5) to justify a Salmonid Life-Cycle model. Such a model, if even possible to develop, would be the responsibility of the agency proposing to re-introduce salmonid species. The existing population model developed for the Don Pedro relicensing addresses available habitat downstream of La Grange and Don Pedro in the Tuolumne River and is based on available empirical data.

4.1.3 Study Requests Related to Stranding and Potential Redd Dewatering

NMFS and SWRCB requested the Districts study the potential for Project operations to affect anadromous fish behavior in the immediate vicinity of the La Grange facilities, to the extent that anadromous fish may be present in the immediate area of Project facilities. The USFWS also

requested a Redd Dewatering Study. The Districts have agreed to conduct a two-year evaluation of flow rates and frequencies, associated habitat attributes, and observations of salmonids and redds in the immediate area of the Project, as described further below. The Districts incorporated methods to address NMFS', SWRCB's, and USFWS' study requests into the revised Fish Passage Assessment Study Plan (Table 4.1-3).

Table 4.1-3 Districts' response to stranding and redd dewatering study requests.

Licensing Participant(s)	Study Request Elements	Districts' Response
NMFS	Request Element #1: Develop hydrological data sets specific to flow conduits at the La Grange Project	The Habitat Assessment and Fish Stranding Observations below LGDD and powerhouse component (Section 6.2.3) of the Fish Passage Assessment incorporate this study request going forward. To the extent past data are available, they will be summarized.
NMFS	Request Element #2: Collect topographic, bathymetric, and habitat data in the vicinity of the La Grange Project	The Habitat Assessment and Fish Stranding Observations below LGDD and powerhouse component (Section 6.2.3) of the Fish Passage Assessment incorporate this study request.
NMFS	Request Element #3: Direct observation of fish presence and potential stranding in the TID canal spillway and tailrace channel	The Habitat Assessment and Fish Stranding Observations below LGDD and powerhouse component (Section 6.2.3) of the Fish Passage Assessment incorporate this study request.
NMFS	Request Element #4: Tailrace Barrier Protection Requirements	The Fish Barrier Assessment incorporates twice daily observations of fish (Section 6.2.1), and the Habitat Assessment and Fish Stranding Observations below LGDD and powerhouse component (Section 6.2.3) of the Fish Passage Assessment incorporates requested hydraulic data gathering.
NMFS	Request Element #5: Implement formal documentation of incidental fish observations at the La Grange Project	The Fish Barrier Assessment (Section 6.2.1.2 of the Fish Passage Assessment) incorporates this study request.
SWRCB	The primary goal of this study is to characterize the salmonid habitat in the Tuolumne River, below the Project powerhouse tailrace in relation to stream flow. Due to Project operations, this stretch of river is subject to rapid flow fluctuations and potential dewatering.	As described in the analysis of stage change provided in the PAD, La Grange operations do not result in "rapid flow fluctuations". Nonetheless, the Districts have included study elements per resource agencies' requests in Section 6.2.3 of the Fish Passage Assessment.
USFWS	The USFWS Redd Dewatering Study Downstream of La Grange Dam requested the Districts determine the amount, extent, and level of redd dewatering that would result from Project operations and to estimate the effect of the dewatering on anadromous and resident salmonids. USFWS requested redd surveys 1-mile below the Project from end-September to February at varying intervals. USFWS also requested documentation whenever there is a reduction in flow following an operational action and that an additional redd survey be conducted within 48 hours of flow reduction, but will only occur in river areas that are 1 foot (25 cm) in depth or less to the high-water mark of the prior 30 days. Reporting for any dewatered redds detected, including redds that are found within 1 foot (25 cm) of the water surface, NMFS, USFWS, and CDFW contacts from the licensing meetings will be contacted via email within 1 day.	As a component of the Fish Barrier Assessment (Section 6.2.1.2 of the Fish Passage Assessment), the Districts will conduct weekly redd surveys from September through April for the 2015/2016 and 2016/2017 migration seasons. Notation of any redds that become dewatered will be made on daily logs described in the study plan. Further, Section 6.2.3 includes a procedure for notification and conduct of additional surveys due to a change in powerhouse operations.

4.1.4 CGs: Recreation Access and Facilities Feasibility

The Districts have incorporated several elements of this study request (i.e., assess the feasibility of access, determine whether boating and shore-based fishing and hiking at La Grange pool could occur safely, and identify and describe Project features that pose a risk to public safety) into the Recreation Access and Safety Assessment Study Plan (Appendix C) (Table 4.1-4). Other study request elements were not adopted. Several elements, such as requests to evaluate the feasibility of physical and flow improvements at the La Grange Hydroelectric Project, provide a description of agency recommendations for enhancing recreation, and develop and evaluate alternatives for fishing and hiking were requests for PM&E measures and were considered premature at this stage of the licensing process. Other elements, such as the request to identify manmade hazards in the lower Tuolumne River, were not adopted because they have no nexus to the Project (ILP Criteria 5). The Districts did not adopt the CG's proposed study area, which encompasses the Tuolumne River from the La Grange pool downstream to the confluence with the San Joaquin River, because these areas are not under the Districts' control. However, in response to comments on the PSP, the Districts' modified the study area to incorporate the La Grange pool and potential access routes.

The CGs' requests to estimate existing recreation at the Project were not adopted. The Districts note that there is no authorized recreation at the La Grange Hydroelectric Project. The Districts are concerned that the presence and operation of industrial machinery at the Project, as well as unpredictable changes in flows due to operational activities, forced outages, and seasonal variations in upstream flow, may create hazardous conditions that could endanger the safety of individuals recreating onsite. The Districts contend it is inappropriate to attempt to quantify existing recreation for purposes of proposing recreation enhancements, without first evaluating what recreation activities could be safely conducted at the Project. Regarding the CGs' requests to estimate regional recreation needs and recreation potential, the Districts note that this information request does not meet ILP Criteria 4, as adequate information is already available in such sources as the 2008 California Outdoor Recreation Plan (California State Parks 2009) and the Don Pedro Project Recreation Facility Condition and Public Accessibility Assessment, and Recreation Use Assessment Study Report (TID/MID 2013g).

Table 4.1-4 Districts' response to CGs recreation access and feasibility study request.

Elements from the Study Request	Districts' Response
The CGs requested that the Districts determine the potential for recreation activities such as the boating, shore-based fishing, and hiking to occur safely at the La Grange Reservoir, and to identify operational constraints to such activities.	Methods to address this request are described in the Recreation Access and Safety Assessment Study Plan, Section 7.0.
The CGs requested that site characteristics to be assessed at the reservoir including proximity to improved roads, site topography and bank slope, and presence of sensitive resources. The CGs requested that site conditions be detailed quantitatively, described narratively, and photographed.	Methods to address this request are described in the Recreation Access and Safety Assessment Study Plan, Section 7.0.
The CGS requested that the study report include an engineering feasibility assessment of alternatives and conceptual drawings, investigate flow alternatives to enhance downstream recreation opportunities, develop safe boating access alternatives, and identify manmade hazards and other downstream mitigation opportunities.	The Districts propose a two-year study. In Year 1 safety assessments will be conducted and the potential for recreation activities assessed. In Year 2, feasibility assessments related to potential safe recreational activities identified during the Year 1 study will be conducted.
The report must specifically contain a description of any existing recreational facilities at the project, indicating whether the facilities	There are no existing recreation facilities at the Project. Potential recreation opportunities will be

Elements from the Study Request	Districts' Response
are available for public use.	evaluated in this study.
The CGs requested estimates of existing and future use of potential improvements and operational changes, as well as an estimate of existing and potential recreational use of the project area, in daytime and overnight visits.	The study plan will first identify potential safe recreation activities. Ample existing information on regional and local (Don Pedro) recreation uses exists to estimate potential use of enhancements that may be considered as a result of the proposed study.
The report must specifically contain a description of any measures or facilities recommended by the agencies consulted for the purpose of creating, preserving, or enhancing recreational opportunities at the project and in its vicinity.	The Districts address this component in the Revised Study Plan document, Section 4.1.4.
The CGs suggest that the study report specifically contain a statement of the existing measures or facilities to be continued or maintained and the new measures or facilities proposed by the applicant for the purpose of creating, preserving, or enhancing recreational opportunities at the project and in its vicinity.	Specific measures will be considered in the license application. Specific recreation proposals, if any, will be evaluated, in conjunction with all resource measures in the license application, based on the results of the Year 1 and Year 2 studies.
Focus groups with boaters, anglers, hikers, and other outdoor enthusiasts will be used to elicit potential improvements and alternative sites. Information will be gathered via interviews or questionnaires. Volunteers for the study team will be identified through information provided by relicensing participants knowledgeable about boating, fishing, and hiking in the region, agencies responsible for managing the Tuolumne River, and professional fishing guides.	The La Grange Hydroelectric Project covers a relatively compact area. The Districts have included a site visit and consultation meeting with interested LPs following the site visit. Results of the meeting will be recorded and shared for additional comment by LPs.

4.2 Study Requests Not Adopted by the Districts

4.2.1 USFWS: Juvenile Salmonid Floodplain Rearing Study

This study request by the USFWS is intended to obtain the information needed to evaluate Project effects on the total amount of available habitat for various life stages of fall-run Chinook salmon and *O. mykiss* in the lower river, so that resource agencies can design an instream flow regime to protect and enhance stream connectivity, water quality, and aquatic habitat from the Project-affected stream reaches downstream to the San Joaquin River, Sacramento-San Joaquin River Delta, and San Francisco Bay to the Pacific Ocean.

Notwithstanding the fact that the La Grange Hydroelectric Project has no effect on flows in the lower Tuolumne River, the information requested in this USFWS proposal has been developed previously or will be provided by an existing study and the USFWS does not demonstrate a need for additional information (ILP Criteria 4). Specifically, it appears that the USFWS did not consider significant additional information available from the on-going 2D modeling study (2013h, W&AR-21 Lower Tuolumne River Floodplain Hydraulic Assessment, being conducted as required by FERC's May 21, 2013 Determination on Requests for Study Modifications and New Studies for the Don Pedro Hydroelectric Project). Further, the study plan in the Don Pedro relicensing process was developed in consultation with the USFWS and other relicensing participants. This existing study either specifically addresses, or meets the intent of the USFWS current study request, as the resulting model will be able to address the following components of the USFWS study request:

- Quantify the amount, inundation frequency, and inundation period of overbank habitat for fry and juvenile life stages.

- Applies existing depth and velocity habitat suitability criteria (HSC) developed in the Don Pedro IFIM study for juvenile Chinook and *O.mykiss* life stages. The USFWS did not demonstrate why these existing criteria and supporting information is not adequate for describing floodplain habitat suitability. The USFWS proposed data collection to develop floodplain specific HSC would take considerable additional time and expense for limited utility.
- Study area encompasses the entire lower Tuolumne River between La Grange Diversion Dam and the confluence of the San Joaquin River.
- Flows examined exceed those requested by the USFWS. The W&AR-21 TUFLOW model address flows from 1,000 cfs to 9,000 cfs.
- The USFWS suggests use of River 2D model. The Districts' study uses the TUFLOW model, which is also capable of providing overbank inundation and habitat suitability information. The benefits of using TUFLOW are described further in the W&AR-21 Study Plan (TID/MID 2014h).
- The USFWS suggests extensive hydraulic data collection in order to develop the 2D model. For the conduct of W&AR-21, the Districts have compiled the best available information, including existing LiDAR flown in 2012, DWR and FEMA models and newly collected survey information in support of the TUFLOW model and have successfully calibrated the model. These data sources will be fully documented in the W&AR-21 study report, and were summarized at the W&AR-21 Workshop held on December 18, 2014, the PowerPoint presentation for which is available at www.donpedro-relicensing.com.

Information requests regarding development of a river-wide 2D model of *in-channel habitat* were previously addressed in FERC's May 12, 2010 Order Modifying and Approving Instream Flow and Water Temperature Model Study Plans. The existing 1D instream flow report (Stillwater Sciences 2013) provides sufficient information to characterize in-channel spawning and rearing habitat. Lastly, requests for use of Yuba River HSC were previously addressed in HSC workshops and by the consensus development of the final HSC site-specific and composite curves for the Tuolumne River, as documented in the 2013 instream flow study report appendices (Stillwater Sciences 2013).

Beyond this, it is important to note, despite the extensive information to be provided by W&AR-21, the results may not be useful for determining the needs of juvenile Chinook salmon. Information reviews conducted as part of the Salmonid Population Information Integration and Synthesis Study (TID/MID 2013b) as well as simulations conducted as part of the Chinook Salmon Population Model (TID/MID 2013c) indicate that rearing habitat availability is not limiting smolt productivity in the lower Tuolumne River under current conditions, so gaining additional habitat from the inundation of floodplain areas would not necessarily have a positive effect on Chinook productivity.

4.2.2 NMFS: Effects of the Project and Related Activities on the Genetic Makeup of Steelhead/Rainbow Trout *Oncorhynchus mykiss* in the Tuolumne River

The Districts have not adopted this study because it constitutes a research effort aimed at determining the genetics of *O. mykiss*, with no clear link to how the information developed would be used to develop license requirements or how the genetics of *O. mykiss* are connected to the La Grange project operations. Moreover, the genetics of Central Valley *O. mykiss* has already been studied by Nielsen et al. (2005) and Garza and Pearse (2008).

The genomes of *O. mykiss* upstream of the Don Pedro Hydroelectric Project reflect introgression resulting from fish stocking conducted by state and federal agencies, CDFW in particular. Lindley et al. (2007) suggest that hatchery introductions have altered the genetic structure of salmonid populations in the Central Valley, and Garza and Pearse (2008) indicate that because of historical planting operations most *O. mykiss* in the Central Valley are of common hatchery origin. Nielsen et al. (2005) did find genetic differences between *O. mykiss* collected upstream and downstream of Don Pedro Dam, but could not determine if these differences reflected the existence of a pre-dam population upstream of Don Pedro Dam or evidence that historical stocking and genetic drift have resulted in genetic separation of the two populations.

Adverse consequences of hatchery supplementation cannot be considered an effect of the La Grange facilities. In addition, it is unclear how additional genetics information, especially in light of the effects of hatchery stocks on native fish, would be used to make decisions about possible PM&Es associated with the Project's licensing. The Districts disagree that it is their responsibility to develop information to enable agencies' "management decisions."

Genetics studies were also proposed during the relicensing of the Don Pedro Hydroelectric Project. In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC concluded the request for the Districts to study the genetic makeup of fish inhabiting the river upstream of Don Pedro Reservoir constituted a research effort and such an effort, although necessary to make fisheries management decisions, would not inform licensing requirements.

4.2.3 NMFS: Effects of the Project and Related Activities on the Losses of Marine-Derived Nutrients in the Tuolumne River

The Districts have not adopted this study for several reasons. First, the study request, at least in part, intends to establish pre-Project conditions related to the delivery of marine-derived nutrients to the upper Tuolumne River. The stated objective of Request Element #1 of this proposed study is to "Estimate a range of the historic mass of marine-derived N transported annually by Chinook salmon (all runs) to the Tuolumne River." Request Element #4 states, "Estimate the annual losses, from historic to current levels, of marine-derived N transported by fall-run Chinook salmon to the Tuolumne River." This, like Request Element #1, is inconsistent with FERC's definition of baseline in the context of licensing hydropower projects, and would be purely speculative and, therefore, would not inform the development of license conditions.

Request Element #2 is not only aimed at estimating historical conditions, it focuses on spring-run Chinook salmon, a species for which there is no evidence of a run in the lower Tuolumne River. Information derived from such a request could not be used to inform decision-making in the context of the Project's licensing process.

The Districts have also not adopted this study request because it constitutes an analysis of fish passage at the Don Pedro Project, which is an independent project and not germane to the licensing of the La Grange Hydroelectric Project.

In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC noted that NMFS' proposed marine-derived nutrients study did not have the ability to discern the attribution of, or even magnitude of, potential Project-related effects and the effects of the many non-Project related independent variables that influence present-day salmon returns to the Tuolumne River, including, but not limited to, naturally occurring oscillations in ocean productivity or climatological effects. Simply subtracting a gross estimate of the current mass of marine-derived nitrogen from an even more uncertain estimate of the historical mass of marine-derived nitrogen would not produce a reliable estimate of losses, and even less so an estimate of potential Project effects.

4.2.4 USFWS: Chinook Salmon Egg Viability

The Districts have not adopted this study request as adequate information already exists. Egg survival to emergence has been extensively studied in the Tuolumne River (e.g., TID/MID 1992; Stillwater Sciences 2007) and incubation temperature criteria are well established in the literature. The USFWS provides no explanation why existing information is not adequate to address this request. Further, the data request appears to be substantially identical to the study plan request submitted for the Don Pedro Hydroelectric Project, which was denied by FERC. Additional information is available in the P-2299 relicensing project record and is summarized below.

In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC denied the USFWS's request for further evaluation of egg viability in the Tuolumne River. FERC noted that it is unnecessary to identify measures or conditions that might improve egg viability in the lower Tuolumne River, because existing studies indicate that poor spawning gravel quality due to infiltration of fine sediment, not water temperature, is the primary cause for low survival-to-emergence rates. These conclusions remain valid and information in support of this premise was expanded upon in the existing studies summarized below. The USFWS does not provide justification why the existing information does not meet the suggested information need.

As noted above, further evaluation of egg viability is not necessary. The Salmonid Population Information Integration and Synthesis Study Report (TID/MID 2013b), Section 5.2.3.2, addresses factors contributing to direct and indirect Chinook salmon mortality. Intra-gravel dissolved oxygen measurements (TID/MID 2007; TID/MID 2005) suggest that hyporheic water quality conditions are suitable for incubating Chinook salmon eggs in the lower Tuolumne River. The report also states that based on assessments of seasonal water temperatures and typical spawning periods, fall-run Chinook salmon in the San Joaquin River basin are unlikely to encounter unsuitable water temperatures leading to reduced egg viability. The Chinook Salmon Population Model (TID/MID 2013c), Section 6.3.4 states that, "smolt productivity is unaffected by normal seasonal variations in air and water temperatures. More specifically, since the

majority of spawning takes place under suitable temperature conditions, modeled egg mortality effects due to potentially unsuitable water temperatures for early arriving spawners during late summer or early fall do not appear to affect subsequent smolt productivity." The USFWS and other agencies did not provide comments on the final Chinook population model, and as such, the Districts consider conclusions based on the model to be the best available science.

The USFWS also errantly characterizes Project nexus, stating that "The Project directly impacts the availability, distribution, and quantity of spawning gravel for anadromous salmonids in the lower Tuolumne River by blocking an estimated 30,000 tons of coarse gravel per year which is accumulating behind the non-Project Don Pedro Dam." This misattributes the effects of the Don Pedro Dam to the La Grange Hydroelectric Project.

The USFWS also notes that the Central Valley Regional Water Quality Control Board adopted a resolution to approve the 2008 update to the 303(d) list of impaired water bodies, which includes the proposed listing of the Tuolumne River downstream of the Don Pedro Hydroelectric Project as impaired due to temperature based on data submitted by CDFW. La Grange pool is shallow and short and does not thermally stratify. Water temperatures in the lower Tuolumne River are affected by the water supply diversions, which result in a cooling effect below La Grange Diversion Dam from June to early October, no significant effect during the early April to mid-May and mid-October to mid-November timeframes, and tends to provide a slight initial warming during the November to early April period (TID/MID 2014, i.e., the Don Pedro Hydroelectric Project FLA).

A without-dams simulation (Jayasundara et al. 2014) reveals that average water temperatures in the Tuolumne River mainstem, in the absence of impoundments, would approach thermal equilibrium well upstream of the current location of the La Grange Hydroelectric Project, and the highest without-dams 7DADM temperatures at RMs 88 and 98 (≈ 24°C) are similar to the highest without-dams temperatures in the lower river (≈ 25°C). These analyses indicate that the La Grange Hydroelectric Project's primary purpose of water supply contributes only slightly to the cumulative effects on temperatures in the lower Tuolumne River. As a result, even if there were observed temperature effects on Chinook salmon egg viability, which as noted above does not appear to be the case, the effects would be the result of a range of factors including, but not necessarily limited to, water storage and diversions beginning at the Hetch Hetchy Project; substantial in-channel and floodplain habitat modifications, including removal of riparian vegetation; return flow from irrigation operations and alteration of groundwater accretion; riparian diversions; Dry Creek inflows; and wastewater discharges.

4.2.5 USFWS: Juvenile Chinook Salmon Survival

The Districts have not adopted this study request because existing information is adequate to address the USFWS' objective, i.e., "characterize the limiting factors for juvenile Chinook salmon survival through the lower Tuolumne River". The USFWS does not justify the need for additional information (ILP Criteria 4), as The Chinook Salmon Population Model (TID/MID 2013c) developed as part of the Don Pedro Hydroelectric Project relicensing incorporates existing information on relative smolt survival in the lower Tuolumne River and provides an

information base for evaluation of river-wide and reach-specific mortality of juvenile Chinook salmon.

The population model shows that for fry, juvenile, and smolt life stages, changes in relative passage between the two rotary screw trap locations at Waterford (RM 29.5) and Grayson (RM 5.2) can be attributed to predation-related mortality. The Districts' FERC-approved mark-recapture study (TID/MID 2013d), a continuation of the 2012 Predation Study, developed as part of the Don Pedro Hydroelectric Project relicensing but still to be conducted, will provide additional information to complete the assessment of juvenile Chinook survival in the lower Tuolumne River.

In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC concluded that existing indices adequately characterized river-wide and reach-specific smolt survival. FERC noted that, in general, river-wide survival was correlated with flow. Moreover, FERC noted that reach-specific survival was near 100 percent in the upstream spawning reach but varied, at times being quite low, in the aggregate mining and sand-bedded reaches. FERC points out that existing information suggests that water temperature and predation are most likely responsible for the relatively high levels of juvenile mortality in parts of the lower Tuolumne River and that the Districts' completed Predation Study (W&AR-07) should lead to a better understanding of how juvenile mortality relates to habitat, flow, and predation in the mining reach. FERC also noted that water temperature would be addressed by the Districts' water temperature modeling in combination with the Tuolumne River Chinook Salmon Population Model (TID/MID 2013c) and the *O. mykiss* Population Study (TID/MID 2014). The USFWS did not substantially modify its previous (2011) study request, nor did it acknowledge the substantial new information available in the Don Pedro record and referenced above, or make any argument why the models developed in the Don Pedro relicensing process do not address this study request (ILP Criteria 7).

4.2.6 USFWS: Genetics of Chinook Salmon in the Upper Tuolumne River

The Districts have not adopted this study request because the genetic composition of Chinook salmon in the upper Tuolumne River basin is a function of CDFW's hatchery program, which is unrelated to La Grange Hydroelectric Project effects and therefore does not meet ILP Criteria 5 – Project Nexus. The USFWS offers only anecdotal support, based on personal communication, for a major assertion in the proposed study, i.e., that there is a self-sustaining adfluvial run of Chinook salmon in the Tuolumne River upstream of the Don Pedro Hydroelectric Project. Further, the Districts disagree that it is their responsibility to develop information for the agencies to use in making "management decisions that will enhance the survival and recovery of the anadromous populations..." This study would not inform the development of potential license conditions because FERC has no authority to control the activities of CDFW's genetic management of its hatchery program or its decisions regarding where to stock hatchery fish.

The USFWS also proposed a Chinook salmon genetics study as part of the Don Pedro Hydroelectric Project relicensing and the study request submitted in this proceeding is not substantially different. In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC noted that the USFWS' request for the Districts to study the genetic

makeup of landlocked Chinook salmon was a research effort for determining the genetic makeup of Chinook salmon stocked in Don Pedro Reservoir. FERC concluded that although such a research effort may be needed to make fisheries management decisions, it would not inform the development of license requirements. This conclusion also applies to the genetics study in the context of the La Grange Hydroelectric Project licensing process.

In addition, during the Don Pedro Hydroelectric Project relicensing, the USFWS agreed that the Districts' approach of taking fin clips of Chinook salmon in Don Pedro Reservoir (as part of the fish resources surveys in (TID/MID 2013e and TID/MID 2013f) was adequate for addressing the USFWS' above-dam Chinook genetics study objectives and the USFWS does not provide justification why the existing information provided to the USFWS during the Don Pedro relicensing studies does not meet the suggested information need (ILP Criteria 7).

4.2.7 CGs: Hyacinth Study

In their December 4, 2014 comments on the PSP, the CGs requested a study "to determine the most effective means of controlling the spread of water hyacinth which has proliferated within the Project area." The Districts note that this is a new study request, and was not included in the CGs' comments and study requests filed on July 22, 2014. The CGs also acknowledge that this is a new study request, claiming at the time of their original filing, the extent of the water hyacinth problem was not clear. However, the occurrence of water hyacinth in the lower Tuolumne River (well below the La Grange Hydroelectric Project tailrace and potential impact area), and its proliferation in Central Valley rivers is a known river management issue.

Section 5.9(a) of FERC's regulations states that study requests must be filed with the Commission within 60 days following the Commission filing its notice of consultation procedures. The Commission filed its notice of consultation procedures for the La Grange Project on May 23, 2014; therefore, all study requests were due to be filed by July 22, 2014. The CGs filed their water hyacinth study request on December 4, 2014, over four months past the deadline for study requests. Because this study request is not in time and does not meet the ILP schedule for study requests, it must be denied.

Additionally, the Districts note that the CGs' study request does not meet ILP Criteria 5 (Project Nexus). The study request includes documentation of impacts of hyacinth on native species, impacts on recreational opportunities, investigation of nutrient loads from agricultural runoff, instream flow assessments, and exploration of control methods and funding for control. None of these study request elements are related to the operation of the La Grange Hydroelectric Project.

The CG states that "The Project has contributed to…creating more lentic conditions favorable to the proliferation of water hyacinth…" The San Joaquin River and its tributaries below an elevation of about 80 ft are typically characterized by warm sluggish channels, swamps, and sloughs (Moyle 2002). Therefore, even under historical conditions, the lowest reaches of the Tuolumne River had a lentic character under baseflow conditions, which was dictated by geomorphological conditions, chiefly low gradient. The CG provides no evidence that the Project contributes to the proliferation of water hyacinth.

The proliferation of water hyacinth in the lower Tuolumne and in the San Joaquin rivers likely has a number of potential causes, but again, there is no evidence offered by the CGs that its existence and abundance are related to the existence or operation of the La Grange Hydroelectric Project. The CGs acknowledge this in their study request, stating that they are "unaware of any existing information regarding the proliferation of water hyacinth in the Tuolumne River and the Project's contribution to conditions preferred by water hyacinth." Further, management and treatment of water hyacinth is the responsibility of California Department of Boating and Waterways, and study and control of this species is not under the Districts' authority or responsibility.

4.2.8 Study Requests Not Adopted by the Districts Because Study Criteria Were Not Addressed

In addition to the 17 study requests attempting to address the ILP criteria, commenters submitted a number of requests that are properly interpreted as requests for new studies or requests for gathering additional information, even if such requests were not explicitly identified as such in the comments. None of these requests for new studies or additional information gathering attempted to address the requirements identified in FERC's regulations governing the ILP; therefore, by this measure alone, all additional information requests that did not attempt to address the ILP study criteria were not adopted by the Districts. Further, many of these information requests were for information regarding potential protection, mitigation, and enhancement measures, and as such, the information requests are premature. Each of the requests for additional information gathering or new studies is identified below.

- CGs, July 22, 2014 comment letter, page 4: "The Districts should provide additional information regarding Dennett Dam so that OEP Staff and stakeholders can evaluate whether its removal might help mitigate the project's cumulative effects on recreation and fish passage."
- CGs, July 22, 2014 comment letter, pages 4-5: "The former haul road bridge remnant a mile downstream from new La Grange Bridge, J-59...the Districts should provide additional information regarding this structure so that OEP Staff and stakeholders can evaluate removal to protect and develop recreational opportunities in the project area."
- CGs, July 22, 2014 comment letter, page 5: "...the Districts should provide additional information regarding Hickman Spill so that stakeholders can evaluate whether there are actions the Districts can take that would help mitigate the project's cumulative effects on recreation.

5.0 REFERENCES

California State Parks. 2009. 2008 California Outdoor Recreation Plan. Available online: http://www.parks.ca.gov/pages/795/files/2009-2014%20corp.pdf. (Accessed August 14, 2014).

Garza, J.C., and D.E. Pearse. 2008. Population genetic structure of *Oncorhynchus mykiss* in the California Central Valley. Report to California Department of Fish and Game. Contract No. PO485303. University of California, Santa Cruz, and NOAA Southwest Fisheries Science Center, Santa Cruz, California.

Jayasundara, N. C., M. L. Deas, E. Sogutlugil, E. Miao, E. Limanto, A. Bale, Nd S. K. Tanaka. 2014. Tuolumne River flow and temperature model: without project assessment. Prepared by Watercourse Engineering, Inc., Davis, CA.

Lindley, S.T., R.S. Schick, E. Mora, P.B. Adams, J.J. Anderson, S. Greene, C. Hanson, B.P. May, D.R. McEwan, R.B. MacFarlane, C. Swanson, and J.G. Williams. 2007. Framework for assessing viability of threatened and endangered salmon and steelhead in the Sacramento- San Joaquin Basin. San Francisco Estuary and Watershed Science Volume 5, Issue 1 [February 2007], article 4.

Moyle, P. B. 2002. Inland fishes of California, revised and expanded. University of California Press, Berkeley, California.

National Marine Fisheries Service (NMFS). 1998. Factors Contributing to the Decline of Chinook Salmon: An Addendum to the 1996 West Coast Steelhead Factors for Decline Report. Portland, Oregon: Protected Resources Division, National Marine Fisheries Service.

_____. 2009. Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead. Sacramento Protected Resources Division. October 2009. 273.

_____. 2014. Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead. NMFS, West Coast Region, Sacramento, CA. July 2014.

Nielsen, J.L., S.A. Pavey, T. Wiacek, and I. Williams. 2005. Genetics of Central Valley *O. mykiss* populations: drainage and watershed scale analyses. San Francisco Estuary and Watershed Science, 3:31.

Office of Historic Preservation (OHP). 1995. Instructions for Recording Historical Resources. Sacramento, California. On file, Office of Historic Preservation, Sacramento, California.

Stillwater Sciences. 2007. Tuolumne River Fine Sediment Management Project: Chinook Salmon Survival to Emergence Study. Prepared for California Bay Delta Authority (Agreement 2001-C208) by Stillwater Sciences, Berkeley, CA. March.

_____. 2013. Lower Tuolumne River Instream Flow Study. Final Report. Prepared by Stillwater Sciences, Davis, California for Turlock and Irrigation District and Modesto Irrigation District, California. April 2013.

Turlock Irrigation District and Modesto Irrigation District (TID/MID). 1992. Report of Turlock Irrigation District and Modesto Irrigation District pursuant to Article 39 of the license for the Don Pedro Project. Turlock, California. 8 Volumes. April.

_____. 2005. 2004 Report of Turlock Irrigation District and Modesto Irrigation District Pursuant to Article 58 of the License for the Don Pedro Project, No. 2299. March.

_____. 2007. 2006 Report of Turlock Irrigation District and Modesto Irrigation District Pursuant to Article 58 of the License for the Don Pedro Project, No. 2299. March.

_____. 2013a. *Oncorhynchus mykiss* Habitat Survey Study Report (W&AR-12). Attachment to Don Pedro Hydroelectric Project Updated Study Report. December 2013.

_____. 2013b. Salmonid Population Information Integration and Synthesis Study Report (W&AR-05). Attachment to Don Pedro Hydroelectric Project Draft License Application. December 2013.

_____. 2013c. Tuolumne River Chinook Salmon Population Model Study Report (W&AR-06). Attachment to Don Pedro Hydroelectric Project Updated Study Report. December 2013.

_____. 2013d 2014 Mark-Recapture Predation Study Plan. September 2013.

_____. 2013e. Fish Assemblage and Population Between Don Pedro Dam and La Grange Dam Study Report (W&AR-13). Attachment to Don Pedro Hydroelectric Project Draft License Application. December 2013.

_____. 2013f. Don Pedro Fish Population Survey Study Report (W&AR-17). Attachment to Don Pedro Hydroelectric Project Draft License Application. December 2013.

_____. 2013g. Recreation Facility and Public Accessibility Assessment, and Recreation use Assessment Study Report (RR-01), Attachment to Don Pedro Hydroelectric Project Updated Study Report. December 2013.

_____. 2013h. Lower Tuolumne River Floodplain Hydraulic Assessment (W&AR-21) Study Plan. September 2013.

_____. 2014. *Oncorhynchus mykiss* Population Study Report (W&AR-10). April 2014.

Zimmerman, C.E., G.W. Edwards, and K. Perry. 2009. Maternal origin and migratory history of steelhead and rainbow trout captured in rivers of the Central Valley, California. Transactions of the American Fisheries Society 138(2):280–291.

REVISED STUDY PLAN DOCUMENT

APPENDIX A

DISTRICTS' RESPONSE TO LP COMMENTS ON PSP AND USP

This Page is Intentionally Left Blank

APPENDIX A
La Grange Hydroelectric Project, Districts' Response to LP Comments on PSP and USP

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
Fish and Aquatic	CDFW	Page 2	"While the USP states on page 18, 'To the Districts' knowledge, salmon egg retention (i.e., pre-spawn mortality) has never been documented on the Tuolumne River,' the Department does have data of some occurrences of pre-spawn or partial spawn-mortality as shown in Table 1…"	The USP was revised to include the following statement: "CDFW has documented low levels of pre-spawn or partial-spawn mortality of fall-run Chinook during surveys conducted in 1993, 1999, 2008, 2013, and 2014 (CDFW 2014)." The Districts will request these data from CDFW and incorporate them into the record.
Fish and Aquatic	CDFW	Page 2	"The USP notes that the Department will be notified if any fish carcasses are observed above the counting weirs. The Department requests that the Districts and/or their consultants consult with and then collect and deliver any carcasses to Department staff so that efficient use can be made of any biological materials that can be extracted from the fish (e.g., otoliths, etc.)."	The USP was revised to include the following statement: "The location, date, and time of discovery; sex; and presence of fin clips will be recorded for each carcass." The Districts will collect each anadromous salmonid carcass found upstream of the weir, freeze it, and then deliver it to the CDFW office in La Grange.
Fish and Aquatic	CDFW	Page 2	"The Districts propose as part of the data collected from observations of fish above the counting weir the 'identification of species, if possible' (USP page 18). The Department requests that individual fish identifications are made as specific as practical and that at a minimum each fish is put into a category of salmonid or non-salmonid."	The USP was revised to include the following bulleted statement: • Identification of species, if possible; at a minimum each fish will be identified as a salmonid or non-salmonid.
Fish and Aquatic	CDFW	Pages 2-3	"Finally, the Department does not agree with the Districts' assumptions regarding evidence to indicate whether or not LGDD is a barrier for fish…To infer that the La Grange Dam is not blocking upstream migration of anadromous fish species in the Tuolumne River is not scientifically supportable. It is the nature of anadromous salmonids to migrate as far as they can upstream and if this dam were not present anadromous salmonids would migrate upstream past this location. The scientific literature documents historical occurrence of anadromous salmonids in the Tuolumne River upstream of La Grange Dam."	Historical conditions are not relevant in the context of decision-making related to implementation of fish passage. The relevant question, as dictated by FERC's definition of baseline conditions[1], is whether or not existing spawning habitat in the lower Tuolumne River is sufficient to support the fall-run Chinook population that currently inhabits the river. The study design as proposed in the USP will indicate whether fall-run Chinook appear to be motivated to migrate upstream of LGDD, and whether existing conditions in the lower Tuolumne River appear to provide sufficient spawning habitat for the existing fall-run Chinook population. The Districts note that there is no evidence of a Central Valley steelhead run in the lower Tuolumne River under current conditions (TID/MID 2013, W&AR-05; Zimmerman et al. 2008) and that native spring-run Chinook salmon have been extirpated from all tributaries in the San Joaquin River Basin (NMFS 2009).

[1] The Commission's choice of current environmental conditions as the baseline for environmental analysis in relicense cases was affirmed in *American Rivers v. FERC*, 187 F.3d 1007, amended and rehearing denied, 201 F.3d 1186 (9th Cir., 1999); *Conservation Law Foundation v. FERC*, 216 F.3d 41 (D. C. Cir. 2000).

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
Fish and Aquatic	CDFW	Page 3	"It is further noted that both Chinook salmon and steelhead have complex migration behaviors. Females of these species have been shown to search for optimal spawning sites, but confronted with less than optimal conditions they will spawn in those sub-optimal sites. If LGDD prevents access to optimal upstream spawning sites, female steelhead and/or Chinook salmon that encounter LGDD could be impacted by being forced to use less optimal sites than they would have otherwise selected."	First, there is no empirical evidence of a self-sustaining "run" or population of steelhead currently in the Tuolumne River (TID/MID 2013, W&AR-05; Zimmerman et al. 2008). Second, because there are no data indicating that historical fall-run Chinook spawning habitat upstream of LGDD was more or less "optimal" than what is currently available in the lower Tuolumne River, any statements about such habitat constitute conjecture. The fact that NMFS and the USFWS requested an assessment of the habitat upstream of the dam demonstrates that there is uncertainty regarding the suitability of this habitat relative to what exists in the lower river. Also, current, not historical, conditions are at issue in the context of FERC licensing.
Fish and Aquatic	CDFW	Page 3	"Further, finding that any one year's spawning class is not prevented from moving upstream by LGDD does not demonstrate that during future years, when conditions are different, there would be no effect."	The study design in the USP calls for the evaluation of fish behavior in the 2015/2016 and 2016/2017 migration seasons, i.e., more than "one year's spawning class." The duration of the fieldwork is dictated by FERC's ILP schedule.
Fish and Aquatic	NMFS	Page 1	"NMFS finds that the PSP does not adequately incorporate the vast majority of elements in NMFS' information or study requests filed, in this Integrated Licensing Process (ILP), on July 22, 2014."	This comment is no longer relevant, given that the "vast majority" of study elements requested by NMFS have been incorporated into the Districts' proposed USP. NMFS acknowledged having received the USP but declined to comment on it as indicated in the following statement excerpted from the December 4, 2014 NMFS comment letter: "…the recent date of the Districts' filing (November 21, 2014) did not provide sufficient time for NMFS to review and prepare comments on a document revising the PSP by the PSP comment deadline (December 4, 2014)…NMFS plans to review and comment on any RSP filed in this ILP, by the deadline for submitting RSP comments established under the ILP schedule and regulations."
Fish and Aquatic	NMFS	Enclosure A, page 2	"(NMFS' Request #1) Effects of the Project and Related Activities on Fish Passage for Anadromous Fishes…The Districts' rejected NMFS' Request #1 based primarily on their view that the study request is a fish passage evaluation of the Don Pedro Project (P-2299) and a study of a potential PM&E measure."	The Districts' USP includes a "Fish Passage Facilities Assessment," which is designed to address objectives contained in NMFS' Study Request #1.
Fish and Aquatic	NMFS	Enclosure A, page 5	"(NMFS' Request #2) Effects of the Project and Related Activities on Fish Stranding and Salmonid Habitat in the Vicinity of the La Grange Project…The Districts' rejected NMFS' Request #2 based primarily on their view that information collected as part of the Don Pedro Project (P-	The Districts' USP includes a component titled, "Habitat Assessment and Fish Stranding below La Grange Dam and Powerhouse," which is designed to supplement existing information and further address objectives contained in NMFS' Study Request #2.

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
			2299) represents sufficient, existing information."	
Fish and Aquatic	NMFS	Enclosure A, page 6	"(NMFS' Request #3) Quantifying Existing Upper Tuolumne River Habitats for Anadromous Fish as they Pertain to Fish Passage Blockage at La Grange diversion dam…NMFS Request #3 was not adopted by the Districts."	The Districts' USP includes a component titled, "Upstream Reach Assessment," which is designed to address objectives contained in NMFS Study Request #3. Further, the Districts have requested that NMFS collaborate with the Districts and share information that NMFS is gathering independently to meet its own request. Information provided by NMFS regarding its study scope has been incorporated into the RSP.
Fish and Aquatic	NMFS	Enclosure A, page 8	"(NMFS' Request #4) Quantifying Effects of the Project and Related Activities on the Genetic Makeup of Steelhead⁄ Rainbow Trout Oncorhynchus mykiss in the Tuolumne River NMFS Request #4 was not adopted by the Districts."	NMFS contends that "The Project has prevented gene flow of *O. mykiss* between above and below barrier populations since 1894, and continues to in current conditions – this is an ongoing Project effect (Enclosure A, page 9)." Shortly after this, NMFS cites Garza and Pearse (2008), providing a direct quote that states, "In fact, the salient characteristic of population structure for Central Valley *O. mykiss* inferred from this study is that the populations of naturally-spawning fish sampled here are all closely related, regardless of whether they are currently above or below barriers to anadromy (Enclosure A, page 10).'" If populations above and below dams are "closely related regardless of whether they are currently above or below barriers," of what significance is the presumed effect on gene flow caused by these barriers? The Districts continue to assert that the request for the Districts to study the genetic makeup of fish inhabiting the river upstream of Don Pedro Reservoir constitutes a research effort aimed at making fisheries management decisions rather than informing licensing requirements (as concluded by FERC in its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project), and as a result there is no Project nexus.
Fish and Aquatic	NMFS	Enclosure A, page 11	"(NMFS' Request #5) Effects of the Project and Related Activities on the Losses of Marine-Derived Nutrients in the Tuolumne River…NMFS' Request #5 was not adopted in any part by the Districts."	The Districts reiterate their rationale for not adopting this study, i.e., "The stated objective of the proposed study is to 'Estimate a range of the historic mass of marine-derived N transported annually by Chinook salmon (all runs) to the Tuolumne River.'" This constitutes an evaluation of historical conditions and as a result is inconsistent with FERC's definition of baseline in the context of licensing hydropower projects.
Fish and Aquatic	NMFS	Enclosure A, page 15 -16	"The Fall-Run Chinook Salmon Migration Barrier Study [now called La Grange Hydroelectric Project Fish Passage Assessment in the Districts' USP]…Installation of a weir	The Districts propose to conduct passive sampling at the weir installed near the LGDD, i.e., using a video system to enumerate fish. The weir will be designed to allow unimpeded upstream and

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
			across a river is a barrier to fish migration in and of itself, that can affect fish behavior, requires additional energy expenditure, as well as results in the fish being handled by humans. In the proposed study, these impacts to the fish could potentially occur twice: once at RM 24.5 and again at the weir near the Project."	downstream fish passage. No fish will be handled at the weir.
Fish and Aquatic	NMFS	Enclosure A, page 16	"The Fall-Run Chinook Salmon Migration Barrier Study [now called La Grange Hydroelectric Project Fish Passage Assessment in the Districts' USP]…Furthermore, weir operation for 16 months (over a two-year period) is an expensive operation that will potentially limit funding available for other more essential data needs related to the La Grange Hydroelectric ILP. Thus, due to the potentially deleterious effects to fish having to pass over multiple weirs, the ancillary nature of the data collected at a second weir beyond what will already be recorded at the weir at RM 24.5, NMFS does not believe the cost to benefit of the proposed multiple weirs merits carrying out this portion of the PSP."	The Districts disagree that the weir will have deleterious effects on fish for the reasons identified above (see previous response). NMFS also appears to misunderstand the intent of the proposed study, which is to establish whether salmonids appear to be motivated to migrate past LGDD when there is sufficient habitat in the lower Tuolumne River. NMFS mischaracterizes the results of the proposed study, stating that the upstream weir would yield data equivalent to those collected at the downstream weir located at RM 24.5. The Districts' proposed study is a rational first step, i.e., evaluating whether there is a justification for fish passage at the La Grange Project.
Fish and Aquatic	NMFS	Enclosure A, page 16	"The Fall-Run Chinook Salmon Migration Barrier Study [now called La Grange Hydroelectric Project Fish Passage Assessment in the Districts' USP]…However, NMFS does recommend less invasive monitoring techniques of fish in the vicinity of the Project through use of DIDSON cameras and direct observation from the banks…"	Again, sampling at the upstream weir will be conducted using a video system. The weir will be designed to allow unimpeded upstream and downstream fish passage. No fish will be handled at the weir. Moreover, the Districts' USP includes two study components that involve conducting direct observations of fish: (1) As part of the La Grange Project Fish Barrier Assessment, observations of fish above the counting weir and in the TID sluicegate channel would be conducted twice daily (times would vary as a function of existing workload) by project operators in the immediate vicinities of the LGDD, La Grange powerhouse, and within the TID sluicegate channel. Observations would be recorded on standardized datasheets, which would include the following information requested by NFMS: • Date and time of observation; • Approximate discharge and conduit status at time of observation; • Powerhouse output at time of observation; • Number of fish observed and their approximate size; • Identification of species, if possible; • Locations of fish (to be indicated on a previously-generated base map);

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
				• Description of general fish behaviors, such as moving upstream or downstream, spawning, holding in one specific location, or leaping/jumping; • Notation of any observations of fish swimming into the La Grange powerhouse tailrace; • Notation of any observations of fish swimming into the TID sluicegate channel; • Notation of whether or not any redds become dewatered, and the duration of any dewatering, if it occurs, due to a change in powerhouse operations; and (2) Fish Presence and Potential Stranding in the TID Sluicegate Channel and La Grange Tailrace, which would involve direct visual observation of fish presence from August 2015 through April 2016 and August 2016 through April 2017 any time that a flow change occurs in the TID sluicegate channel, and direct observations of fish in the sluiceway and tailrace channels if the La Grange powerhouse trips offline.
Fish and Aquatic	NMFS	Enclosure A, page 17	"The Fall-Run Chinook Salmon Migration Barrier Study (now called La Grange Project Fish Barrier Assessment in the Districts' USP)…It also appears that the Fall-Run Chinook Salmon Migration Barrier Study assumes that if a female reaches the La Grange Project, is blocked and delayed, and then later recovered as a carcass without any eggs that this salmon was a successful spawner, and not impacted by the Project. This logic is flawed in several aspects. The analysis has no way of knowing if the female and her gametes were deleteriously affected due to excessive delay, stress, or energy expenditure at the Project; these are potential effects that could significantly impact if not eliminate, the reproductive success of that fish at the time of egg release."	The Districts agree that the study design and methods proposed in the USP would not reveal the extent to which spawning is "successful." The documentation of egg retention would only indicate whether or not spawning took place. As a result, the word "successful" was removed as appropriate from the study plan.
Recreation	NMFS	Enclosure A, page 14	"…truncating the study area at an arbitrary elevation of 300 feet appears to unnecessarily limit the study area and prevents the study area from extending to Don Pedro Dam as stated in the Study Plan. NMFS requests that the study area elevation threshold either be removed or increased to an elevation suitable to evaluate all potential recreation uses identified in the Study Plan."	The Districts have removed the study area elevation threshold.
Recreation	CG	Page 5	"The Districts propose to extend the study area upstream of La Grange Dam to an elevation of 300 feet…to adequately	The Districts have removed the study area elevation threshold. The Districts note that a study area bounded by the 950-foot elevation

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
			describe potential public access routes it will be necessary to examine the area surrounding La Grange Reservoir up to approximately 950 feet."	contour would encompass many thousands of acres as this elevation contour is not found in the immediate vicinity of the La Grange Pool.
Recreation	CG	Page 5	"The proposed study appears to be limited to identifying existing public access routes. We believe that the study plan should examine potential public access routes as well. If the study strictly looks at existing public access routes it is unlikely to identify very many, if any, other than routes that can be hiked on foot, which we consider to be insufficient."	The Districts maintain that it would be inappropriate to evaluate recreational enhancements, including public access enhancements, without first determining that the potential for safe use by the public for recreation exists.
Recreation	CG	Page 5	"Under Step 1, the Districts state that 'site characteristics in the study area will be assessed for recreation potential.' The Districts should clarify that they intend to assess the characteristics of potential recreational sites. Additionally, potential recreational uses should include hiking, shore-based fishing, and bird watching. Potential recreational facilities should include launches for non-motorized and motorized watercraft, parking, and restrooms."	The Districts propose to use existing aerial photography, topography data, and property ownership data; as well observations made and documented during a site visit, to identify locations with the potential to support public recreation. The Districts have added bird watching to the Canadian Dam Association (CDA) Worksheet. The Districts note that hiking and shore-based fishing are already included on the CDA Worksheet. Depending on the results of the Recreation Access and Safety Assessment, the Districts may propose a Year 2 study to assess the feasibility of potential recreation enhancements.
Recreation	CG	Page 5	"Also, Step 2, Number 2 of the proposed study has an internal inconsistency. The header of Number 2 states 'Identify **Potential** Recreation Activities within Each Component' (emphasis added) whereas the description that follows states 'Information will be obtained regarding the types and level of public activities **currently associated** with each component, where applicable' (emphasis added). We request that the Districts make the description consistent with the header and by modifying the description to read 'Information will be obtained regarding the types and level of **existing and potential** public activities associated with each component, where applicable.'"	The Districts have made this change to the study plan.
Recreation	CG	Page 6	"…we reviewed the Canadian Dam Association Public Safety around Dams Risk Assessment Tool that is to be used in the Recreation Access and Safety Study. We recommend the addition of bird watching to the list of activities identified in the chart that comprises part of the tool. We recommend that skating, ice fishing, and snowmobiling be eliminated from the chart. We believe that jet skiing, water skiing, high speed boating, and ATV/Dirt Biking uses are probably	The Districts have added bird watching to the CDA Worksheet. The Districts have removed skating, ice fishing, and snowmobiling from the CDA Worksheet.

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
			inappropriate recreational activities for the La Grange Project; however, it may be useful to evaluate the safety of these latter activities, since there may be some value-based disagreement about how appropriate they might be."	
Risk Assessment Methodology	CG	Page 6	"The Districts propose to use the Canadian Dam Association's risk assessment process, as outlined in the Guidelines for Public Safety around Dams to assess the risk to public safety of using Project lands and facilities for recreation. The Districts provide no justification as to why the Canadian protocol is most appropriate for the La Grange Project. We request that the Districts consider other protocols that have been used in the United States to assess risk to public safety and explain the basis for their proposal to use the Canadian Dam Association's protocol."	The CDA is a leading authority on public safety related to hydroelectric facilities. CDA's Guidelines for Public Safety Around Dams are generally applicable to facilities located throughout the United States and provide an objective and established methodology to assess public safety risks. The Districts note that while the CG requests that the Districts consider "other protocols", the CG fails to provide any examples of other protocols to assess public safety.
Risk Assessment Methodology	CG	Page 6	"We are concerned that the Districts may attempt to use the results of Step 2 of the proposed study (Assess Risk to Public Safety) to justify an actual or de facto prohibition on boating and recreation on the reservoir. A de facto prohibition could result from the Districts' finding that the risks are too high and, therefore, no public access facilities should be built. Step 3 of the proposed study is simply to prepare a report on the study results; it does not clarify whether and on what basis the Districts will make a determination and recommendation for public access and recreational facilities."	Upon completion of the study, the Districts will review results of the risk assessment with licensing participations at the Initial Study Report meeting. Depending on the results of the Recreation Access and Safety Assessment, the Districts may propose to complete a Year 2 study to assess the feasibility of potential recreation enhancements.
Risk Assessment Methodology	CG	Page 6 - 7	"If there are aspects of the Project that do create a hazard, the PSP does not describe a method for determining whether these potential hazards can be mitigated through management policies, signage, buoys, or other means…These reasonable restrictions on the public's right to navigate are commonly used on reservoirs throughout California."	Depending on the results of the Recreation Access and Safety Assessment, the Districts may propose to complete a Year 2 study to assess the feasibility of potential recreation.
Public Participation	CG	Page 7	"The Districts should include a public-participation component to this study…[a] focus group could generate new and creative ideas for providing public access to the La Grange facility."	The Districts have amended the Recreation Access and Safety Assessment to invite licensing participants to observe field work completed during the site visit. Following the site visit, the Districts propose to host a site visit debrief meeting with LPs. The Districts will prepare meeting notes summarizing discussions at the debrief meeting and circulate these notes to LPs for 30-day review and comment. Final meeting notes will be included in the Recreation Access and Safety Assessment Study Report.

Resource Area	Entity Submitting Comment	Page in Comment Letter	Comment (Quote or Paraphrase)	Districts' Response
Water Hyacinth Study Request	CG	Page 8	"We request that the Districts undertake a study to determine the most effective means of controlling the spread of water hyacinth which has proliferated within the Project area. We did not request this study in our comments on the pre-application document, which were submitted on July 22, 2014, before the extent of the water hyacinth problem became clear. The problem became more apparent and severe after July following a prolonged flow of just over 90 cfs (June 1 – October 1) coupled with high ambient temperatures."	The proliferation of water hyacinth in the lower river has a number of causes, but there is no evidence that its existence and abundance are related to the existence or operation of the La Grange Hydroelectric Project. The CG acknowledges this in their request where they state the following: "We are unaware of any existing information regarding the proliferation of water hyacinth in the Tuolumne River and the Project's contribution to conditions preferred by water hyacinth." There is no nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and the study results would not inform the development of license requirements. As a result, the request does not satisfy FERC's ILP study plan criteria as required by 18 CFR Section 5.9(b)(1) – (7). The CG states that "The Project has contributed to…creating more lentic conditions favorable to the proliferation of water hyacinth…" The San Joaquin River and its tributaries below an elevation of about 80 ft are typically characterized by warm sluggish channels, swamps, and sloughs (Moyle 2002). Therefore, even under historical conditions, the lowest reaches of the Tuolumne River had a lentic character under baseflow conditions, which was dictated by geomorphological conditions, chiefly low gradient. Again, the CG provides no evidence that the Project contributes to the proliferation of water hyacinth.
Thomas H. Terpstra	Attorney at Law	Page 1	"Due to the potentially devastating consequences of additional rate increases and the uncertainty surrounding the drought, my Clients want to ensure that each and every requirement FERC imposes is in fact necessary and appropriate under all applicable standards. Accordingly, on behalf of my Clients, I respectfully request that you proceed with extreme caution in the process of evaluating the propriety of requiring licensing of the La Grange project and in determining the scope of related studies. While my Clients appreciate the need for the Districts to comply with applicable rules and regulations, it is imperative that those standards be applied in a conservative manner to avoid unnecessarily overburdening their consumers. Thank you for the opportunity to comment."	The Districts agree that FERC should require only those studies that are necessary and appropriate under all applicable standards.

REVISED STUDY PLAN DOCUMENT

APPENDIX B

LA GRANGE HYDROELECTRIC PROJECT
CULTURAL RESOURCES STUDY PLAN

This Page is Intentionally Left Blank

STUDY PLAN

TURLOCK IRRIGATION DISTRICT
AND
MODESTO IRRIGATION DISTRICT

LA GRANGE HYDROELECTRIC PROJECT
FERC NO. 14581

Cultural Resources Study

January 2015

1.0 PROJECT DESCRIPTION

The Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts) own the La Grange Diversion Dam (LGDD) located on the Tuolumne River in Stanislaus County, California (Figures 1.0 and 2.0). LGDD is 131 feet high and is located at river mile (RM) 52.2 at the exit of a narrow canyon, the walls of which contain the pool formed by the diversion dam. Under normal river flows, the pool formed by the diversion dam extends for approximately one mile upstream. When not in spill mode, the water level above the diversion dam is between elevation 294 feet and 296 feet approximately 90 percent of the time. Within this 2-foot range, the pool storage is estimated to be less than 100 acre-feet of water.

The drainage area of the Tuolumne River upstream of LGDD is approximately 1,550 square miles. Tuolumne River flows upstream of LGDD are regulated by four upstream reservoirs: Hetch Hetchy, Lake Eleanor, Cherry Lake, and Don Pedro. The Don Pedro Project is owned jointly by the Districts, and the other three dams are owned by the City and County of San Francisco (CCSF). Inflow to the La Grange pool is the sum of releases from the Don Pedro Project (FERC No. 2299), located 2.3 miles upstream, and very minor contributions from two small intermittent streams downstream of Don Pedro Dam.

LGDD was constructed from 1891 to 1893 to replace Wheaton Dam, which was built by other parties in the early 1870s. The LGDD raised the level of the Tuolumne River to permit the diversion and delivery of water by gravity to irrigation systems owned by TID and MID. The Districts' irrigation systems currently provide water to over 200,000 acres of prime Central Valley farmland and drinking water to the City of Modesto. Built in 1924, the La Grange hydroelectric plant is located approximately 0.2 miles downstream of LGDD on the east (left) bank of the Tuolumne River and is owned and operated by TID. The powerhouse has a capacity of slightly less than 5 megawatts (MW). The La Grange Hydroelectric Project operates in a run-of-river mode. The LGDD provides no flood control benefits, and there are no recreation facilities associated with the La Grange Hydroelectric Project or the La Grange pool.

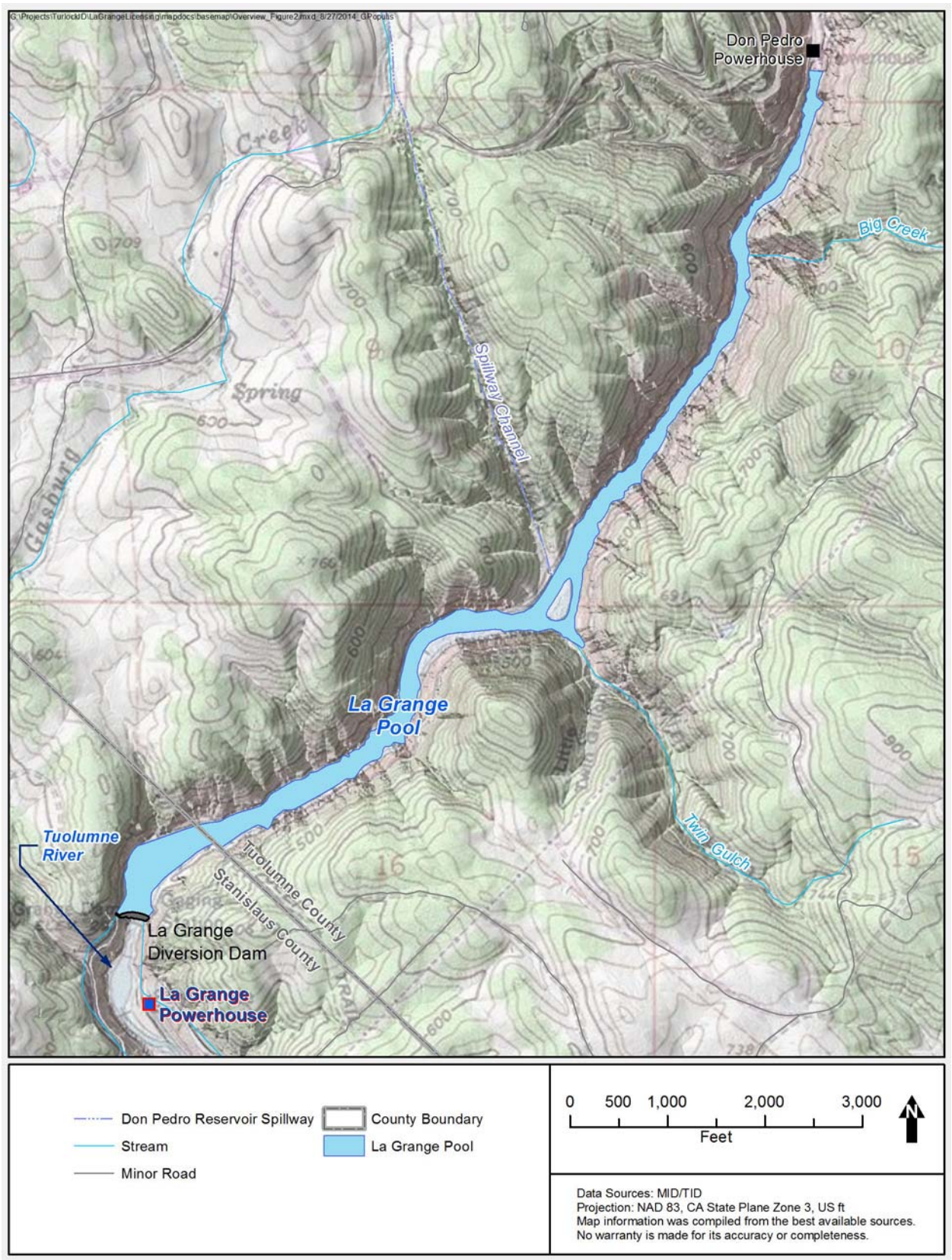

Figure 1.0. La Grange Hydroelectric Project location map.

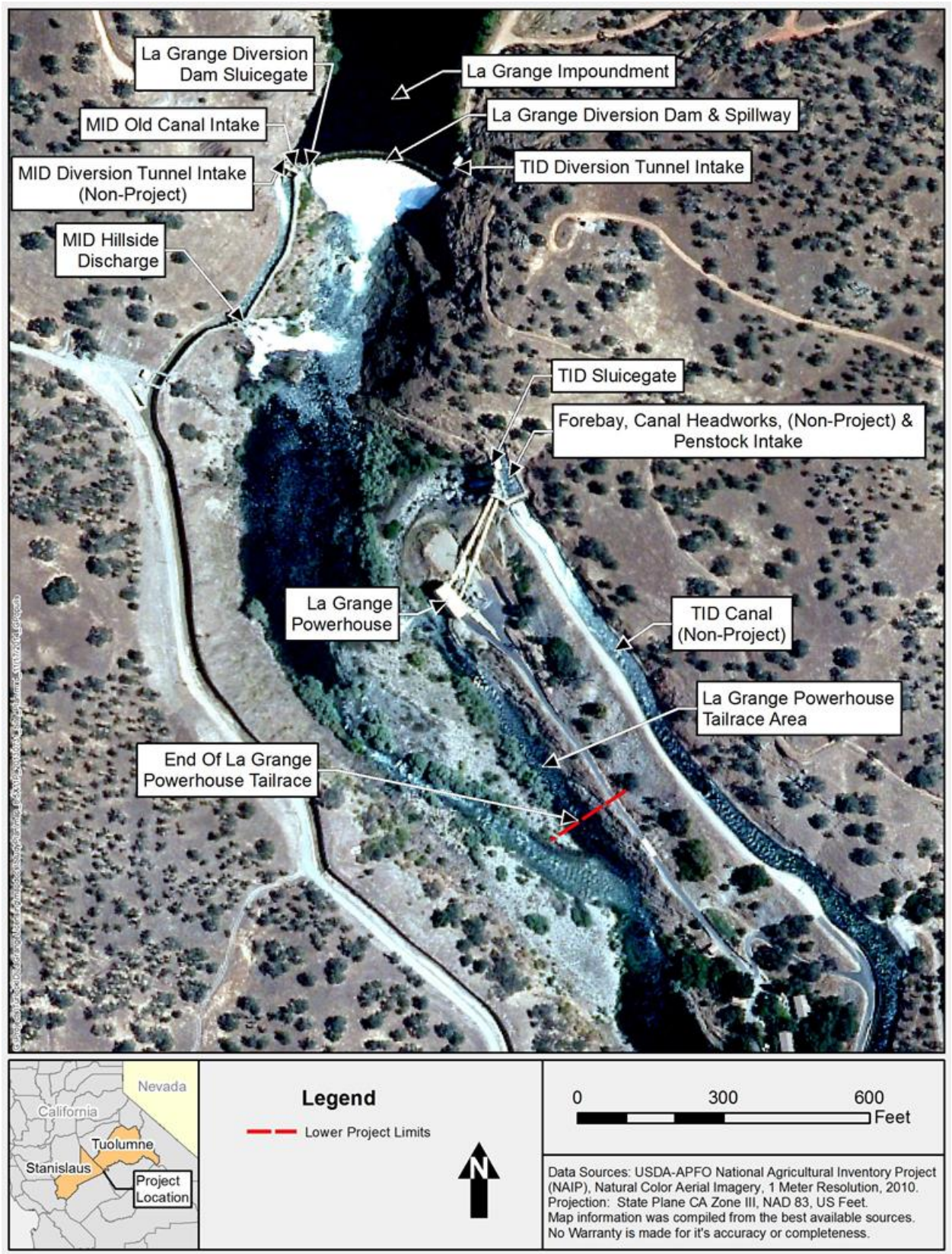

Figure 2.0. La Grange Hydroelectric Project site plan.

2.0 PROJECT NEXUS

The Districts' continued operation and maintenance (O&M) of the La Grange Hydroelectric Project may affect historic properties that are listed on or eligible for listing on the National Register of Historic Places (NRHP).

Several terms used throughout this Study Plan warrant definition.

- **Historic Properties.** This term is defined under 36 Code of Federal Regulations (CFR) § 800.16(l)(1) as any prehistoric or historic site, building, structure, object, or district, including properties of traditional religious and cultural importance, that are included in or eligible for inclusion in the NRHP. Historic properties are identified through a process of evaluation of specific criteria found at 36 CFR § 60.4.
- **Cultural Resources.** For the purpose of this study plan, this term is used to mean any prehistoric or historic district, site, building, structure, or object, regardless of its NRHP eligibility.

3.0 RESOURCE AGENCY MANAGEMENT GOALS

Issuance of a FERC license for the La Grange Hydroelectric Project may permit activities that "…cause changes in the character or use of historic properties, if any such historic properties exist…" (36 CFR § 800.16(d)). FERC must therefore comply with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations at 36 CFR 800. These regulations require the head of any federal department or independent agency having authority to license any undertaking to take into account the effects of the undertaking on historic properties. As such FERC's primary goal is to comply with Section 106.

In its Scoping Document 1, FERC designated the Districts as non-federal representatives for purposes of initiating consultation under Section 106 of the NHPA and implementing regulations found at 36 CFR § 800.2(c)(4).

Additionally, the State Historic Preservation Officer (SHPO), in accordance with Section 101(b)(3) of NHPA "…advises and assists Federal agencies in carrying out their Section 106 responsibilities…" by ensuring historic properties are taken into account early in the planning and development processes.

Study results may be used in the development of terms or conditions of any license issued by FERC for the purpose of protecting or treating impacts to historic properties that would result from continued La Grange Hydroelectric Project O&M, or for the purpose of enhancing historic properties that would be affected by continued La Grange Hydroelectric Project O&M. These terms or conditions, which are referred to collectively as protection, mitigation, and enhancement (PM&E) measures, could include development of a Historic Properties Management Plan

(HPMP)[1] that would describe and implement PM&E measures for historic properties potentially affected by continued La Grange Hydroelectric Project O&M. An HPMP is a plan for considering and managing effects on historic properties that may occur from O&M activities and establishes a decision-making process for considering those effects. Because it is not possible to determine all of the effects of various activities that may occur over the course of a license, FERC typically requires, as a license requirement, that a licensee develop and implement an HPMP that considers and manages effects on historic properties throughout the term of the license. For hydropower licensing, FERC typically completes Section 106 by entering into a Programmatic Agreement (PA) or Memorandum of Agreement (MOA) with the Advisory Council on Historic Preservation (ACHP) and the SHPO that typically requires the licensee to develop and implement an HPMP. However, it should be noted that the Section 106 process is still active throughout the life of the license, particularly regarding new activities by the license holder that have not undergone Section 106 requirements or newly identified cultural resources that also have not undergone Section 106 consideration. As such, while the HPMP and PA or MOA conclude the process needed for obtaining a FERC license, the project must continue to comply with Section 106 requirements, the guidelines for which are developed and provided in the HPMP. Additionally, FERC requires that a licensee develop the HPMP in consultation with various other federal, state, Tribal, and non-government parties that have interests in the project.

4.0 STUDY GOALS

The primary study goal is to assist FERC in meeting its compliance requirements under Section 106 of the NHPA, as amended, by determining if licensing of the La Grange Hydroelectric Project will have an adverse effect on historic properties. The objective of this study is to identify cultural resources within the area of potential effects (APE), formulate a plan to evaluate their eligibility to the NRHP, if needed, and identify La Grange Hydroelectric Project-related effects on those resources. As defined in 36 CFR 800.16(d), the APE is "...the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historical properties, if any such properties exist." At a later date, the results of the study may then be used to develop the HPMP, which will ensure that all cultural resources identified within the APE will be appropriately considered and managed during the life of the FERC license.

To identify historic properties that may be affected by the La Grange Hydroelectric Project, as required under Section 106, the Districts have defined an APE within which La Grange Hydroelectric Project-related effects could occur. It is possible that the studies implemented as part of the licensing process may identify La Grange Hydroelectric Project-related activities that have the potential to affect historic properties outside this APE. If such areas are identified, the APE will expand to incorporate these areas in accordance with 36 CFR 800.4(a)(1) in consultation with the SHPO, Tribes, and other interested parties, as appropriate.

In addition to Section 106 compliance, the study will also comply with other relevant federal laws including the National Environmental Policy Act (NEPA), the Archaeological Resources Protection Act of 1974 (16 USC 469), the American Indian Religious Freedom Act of 1978 (42

[1] While not a part of this study, the information developed by this and other relicensing studies may be used to develop an HPMP in consultation with interested parties, which would be included in the Final License Application.

USC 1996 and 1996a), the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 USC 3001), Executive Order 11593 (Protection and Enhancement of the Cultural Environment) of 1971 (16 USC 470), the American Antiquities Act of 1906, and Executive Order 13007 (Indian Sacred Sites) of 1996 (73 Federal Register 65, pp. 18293-24).

5.0 EXISTING INFORMATION AND NEED FOR ADDITIONAL INFORMATION

This section describes existing information regarding cultural resources in the vicinity of the APE. It is broken down into three primary components: (1) a brief cultural context of the APE and vicinity, to include overviews of the prehistory, ethnohistory, and history of the area; (2) a summary of a records search of known cultural resources and previously conducted cultural resources investigations in the APE and vicinity; and (3) a summary of existing information and conclusions regarding need for additional information.

5.1 Cultural Context

5.1.1 Prehistory and Archaeology

Early work in the Sierra Nevada foothills, where the La Grange Hydroelectric Project is located, consisted of compiling information and producing general cultural overviews (Elasser 1960; Heizer and Elsasser 1953). Later investigations of areas to be impacted by water projects in the foothills produced several regional cultural chronologies (Fitzwater 1962; Moratto 1972; Johnson 1967; Ritter 1970; Fitting et al. 1979; Moratto and Riley 1980). In particular, archaeological investigations for the New Melones Reservoir, located 18-19 miles north/northwest of the La Grange Hydroelectric Project on the Stanislaus River, took place during the 1960s and 1970s. A 10-volume report series issued in the 1980s provided the results of all work. The final volume (Moratto et al. 1988) provided a summary of the prehistory and history of the New Melones study area. Archaeological investigations in the late 1960s for the New Don Pedro Reservoir were more limited (Moratto 1971). Additional archaeological data has been added by excavations on Clarks Flat, about 28-29 miles north of the La Grange Hydroelectric Project, near Vallecito as part of the North Fork Stanislaus River Project (Peak and Crew 1990). The chronology presented below is based primarily on the extensive work conducted around the New Melones Reservoir and is applicable to the APE and vicinity.

Clark Flat Phase (~7,600 BC to 4,500 BC)

Moratto suggests an initial occupation in the New Melones area sometime before 6,000 BC termed the Clarks Flat Phase, characterized by large-stemmed bifaces, a single Great Basin Transverse point (crescent) and large basalt side scrapers (Moratto et al. 1988: 506-508). The evidence of this phase, collected during the New Melones Project, was vague, but later work at CA-CAL-S275 (Peak 1987) and CA-CAL-S342 (Peak and Crew 1990) on Clarks Flat provided many more artifacts of this time period in stratigraphic context. Enough material was recovered to suggest that the Clarks Flat Phase could be divided into early and late periods. The Early Clarks Flat Phase at CA-CAL-S342, beginning at about 7,600 BC or earlier, is characterized by 13 varieties of the Western Stemmed Series points, five varieties of scrapers, notched tools,

beaked gravers, discoidals and retouched flakes (Peak and Crew 1990: 227-228). All of these types are still present in the Late Clarks Flat Phase, beginning at least by 4,800 BC, along with four more point types, five more scraper types, and the first appearance of ground-stone artifacts. The temporal separation of the two phases is established by the occurrence in separate soil strata. The cultural difference may indicate in the increase in the length and intensity of site occupation in the later period, rather than a major cultural change.

Stanislaus Phase (~4,500 BC to 3,500 BC)

At about 4,550 BC, there is an introduction of a series of broad-stemmed, concave based projectile points at CA-CAL-S342 that has been designated as the Stanislaus Broad Stemmed type. The temporally diagnostic form at CA-CAL-S342 is a shouldered, expanding stem point with a concave base. Typologically, they generally conform to the Pinto Series as defined by Campbell and Campbell (1935), Rogers (1939), Harrington (1957), Heizer and Clewlow (1969), and Hester and Heizer (1978), but there is enough variation from the norm to justify assigning a different name. A suite of five radiocarbon age determinations indicate an appearance of these Stanislaus Broad Stemmed points at about 4,550 BC and terminal use can be calculated at about 4,250 BC. Other characteristic traits are an intensive use of ground-stone implements, including subrectangular-shaped manos, atlatl weights, net weights, mesh gauges, and the use of steatite for a variety of objects. The period characterized by the presence of this point series has been termed the "Stanislaus Phase" by Peak and Crew (1990: 229-230). Most of the earlier point types persist, as do all of the other types of lithic tools. Other flaked-stone tool types make there first appearance (denticulates, adze-like tools, etc.) and the ground-stone industry includes a greater variety of milling-stone types and the use of steatite objects.

The period between 6,000 and 3,500 BC is poorly represented at the sites investigated in the New Melones Project. Moratto notes:

> *At no time during the [project] did paleoenviromental specialists conduct field surveys to inventory the relict ancient landforms paleosols most likely to harbor early and middle Holocene archaeological remains. All of the known cultural materials of such antiquity in the study area were discovered fortuitously, in so far as they occurred below younger, more visible archaeological deposits.* (Moratto et al. 1988: 509)

Texas Charley Phase (~3,500 BC to 2,500 BC)

The earliest well-defined cultural phase at CA-CAL-S286, the site that provided the bulk of the data for the New Melones cultural sequence, is the Texas Charley Phase, circa 3,500 to 2,500 BC. Characteristic artifacts are choppers, large lanceolate bifaces, a contracting-stem biface fragment, scrapers, and possibly manos. There is a lack of midden and a low incidence of artifacts, which impose minimal site use (Moratto et al. 1984: 195). A high portion of the lithic material in this phase is a high-quality chert available at quarries in the Vallecito area and Moaning Cave. There is a break in the record at CA-CAL-S286 after the Texas Charley Phase and the succeeding phase is known primarily from the other sites in the New Melones area.

Calaveras Phase (~2,500 to 1,000 BC)

The Calaveras Phase tool kit generally corresponds to the Stanislaus Phase, as defined by Peak and Crew (1990), except it is dated at about 2,500 to 1,000 BC (Moratto et al. 1984: 103). The Calaveras Phase is marked by the presence of milling stones, manos, scrapers and a wide range of chipped-stone tools, including Humboldt Concave Base, Sierra Side-notched Pinto Sloping Shoulder, Pinto Square Shoulder and Large Lanceolate projectile points. Obsidian debitage occurs in higher proportions than the earlier phases. Finds of "pestle-like objects" that do not appear to have functioned as pestles are an interesting feature of this phase. Low quantities of fire-altered rock, charcoal, and artifacts suggest that site use was limited in intensity.

Sierra Phase (~1,000 BC to 500 AD)

The Sierra Phase was found in stratum B at CA-CAL-S286, a buried midden yielding higher quantities of all types of cultural material than the lower strata. Moratto gives dates of about 1,000 BC to AD 500 for this phase (Moratto et al. 1988: 511-513). Ground stone is abundant, and includes milling stones, manos, cobble mortars, and pestles. There are numerous types of chipped-stone tools, including perforators and "double-sided" scrapers. Projectile points that characterize the phase are: Elko Eared; Elko Corner Notched, Sierra Concave Base, Bipoint, Medium Corner Notched, Triangular Contracting Stem, Medium Triangular Contracting Stem, and Sierra Side Notched forms. The maximum intensity of site use at Texas Charley Gulch occurred during this phase. The discovery of a living floor at CA-CAL-S286, the appearance of mortar and pestle technology suitable for exploiting acorns as a major food source and the density of artifact distribution all imply a "…degree of sedentism not evidenced in the older components…" (Moratto et al. 1988: 273). Stable trade relationships to both the east and west are indicated by the presence of a large amount of obsidian traded in, primarily, from the Bodie Hills source, and the use of Haliotis and Olivella beads and ornaments from the coast.

Redbud Phase (~500 AD to 1,300 AD)

The Redbud Phase, from about AD 500 to 1,300, is poorly defined at CA-CAL-S286. In fact, all of the sites in the New Melones Project area that have Sierra Phase components have little or no evidence of occupation in the Redbud Phase. The modest evidence of habitation in this phase found at a few sites in the New Melones Project area suggest a low intensity of use by small, probably mobile populations with no cultural continuity with the preceding phases. The breakdown of trade relationships (obsidian is relatively rare in components of this phase) also suggests a major cultural break. The appearance of Rosegate Series points and "possible" Gunther Barbed points is a hallmark for the introduction of the bow and arrow during this phase. Peak (1973) saw the diminished use of CA-CAL-S347 in this period as a co-occurrence with the expansion of site use at CA-CAL-S276 on Clarks Flat, perhaps due to a larger area at the latter site to accommodate a growing population. However, this does not explain the minimal evidence of the period at most other sites in the vicinity.

Horseshoe Bend Phase (~1,300 AD to 1848 AD)

The Redbud Phase is followed by a period of intensive occupation representing the Horseshoe Bend Phase of circa AD 1300 to 1848. Of 68 excavated sites in the New Melones Project area, 42 included middens, bedrock mortars and other evidence of long-term or repeated occupation dating to the Horseshoe Bend Phase. The analysis indicates:

> *…that late prehistoric times witnessed larger populations, more sedentism, tighter spatial clustering of settlements, and higher levels of both intra- and inter-site organization than in any earlier period.* (Moratto et al. 1988: 517).

Characteristics of this phase include Desert Side Notched, Cottonwood Triangular, and Gunther Barbed projectile point forms, Olivella, Saxidomus and steatite beads and a wide variety of flake tools. The use of mano and milling-stone technology continues beside the common pestle and bedrock mortar-grinding technology. In all respects this material culture is similar to that known from ethnography for the Central Sierra Miwok.

Peoria Bend Phase (~1848 AD to Present)

The post-contact archaeology of the Central Sierra Miwok is reflected in the 33 components of the Peoria Bend Phase identified in the New Melones area. This material reflects generally ephemeral occupation after AD 1848 and the introduction of many items of European manufacture into the material culture. In some cases traditional tools are made using new materials such as Desert Side Notched and Cottonwood Triangular points made on bottle glass.

5.1.2 Ethnohistory

Ethnographically, the La Grange Hydroelectric Project lies within Central Sierra Miwok territory, located in the Sierra Nevada foothills and mountains spanning the upper drainages of the Stanislaus and Tuolumne Rivers. The Central Sierra Miwok group is considered a member of the Eastern Miwok, one of the two major divisions of the Miwokan subgroup of the Utian language family (Levy 1978). The Eastern Miwok peoples belonged to five separate linguistic and cultural groups each of which had distinct language and cultural characteristics (Levy 1978). Anthropologists have categorized the Eastern Miwok into language areas according to geographical location, which consist of (1) the Bay Miwok that occupied the eastern area of the Contra Costa County extending from Walnut Creek eastward to the Sacramento-San Joaquin delta; (2) the Plains Miwok, which inhabited the lower reaches of the Mokelumne and Calaveras river drainages; (3) the Northern Sierra Miwok that occupied foothills and mountains of the Mokelumne and Calaveras river drainages; (4) the Southern Sierra Miwok, which inhabited the foothill and mountain portions of the Merced and Chowchilla drainages; and (5) the Central Sierra Miwok mentioned above (Levy 1978).

These five groups were further designated as three distinct groups based on their phonological history and structural and lexical similarity (Levy 1978). Plains and Bay Miwok are both members of a different distinct group, while the other three groups comprise a Sierra Miwok language group (Levy 1978). It has been suggested that Plains Miwok separated from the Sierra

Miwok languages around 2,000 years ago (Levy 1978). Lexicostatistical chronology and language classification suggests that ancestral Miwok occupation of the Sierra Nevada and its foothills is probably a much more recent event compared to the central California delta region, since Sierra Miwok internal time depth is estimated at around 800 years (Levy 1978).

The main political unit of the Miwok was the tribelet, which was an independent and sovereign nation that had a defined and bounded territory designating its zone of control over natural resources. Among the Sierra Miwok, tribelets included political lineage localities that made up the permanent settlements with an average population estimate of around 25 persons, as well as several semi-permanent settlements and numerous seasonally occupied campsites that were used at various times throughout the seasonal round of gathering, hunting, and fishing activities (Levy 1978). Ethnographic literature points to the presence of a chief or an assembly house in the community at the capital or principal settlement (Levy 1978). The dominant form of house was a conical structure of bark slabs, supported by posts or frameworks.

The main foci of subsistence were the gathering of wild plant foods, especially acorn, and the hunting of mammals. The Sierra Miwok traveled to higher or lower elevation levels during various seasons of the year to obtain subsistence resources unavailable in the vicinity of their permanent settlements. The inhabitants occupying the Transition Zone forest moved to higher elevations during the summer months in pursuit of deer. Those in the foothill areas would occasionally visit the plains of the central valley to hunt antelope and tule elk, which are unavailable in the mountains. Gathering of plant foods varied seasonally, as greens were gathered in the spring and were used to supplement the diet of acorns stored since the previous fall. Seeds were gathered from May to August. Pine nuts were collected after August, when the land was burned. In the late fall and early winter, acorns were gathered (Levy 1978). Meat consumption was its greatest in the winter months when plant resources were limited to stored foods (Levy 1978).

Technological skills included basket making and production of ground stone items, such as mortars and pestles used in acorn processing. Lithic technology consisted of projectile points, knives, scrapers, and expedient tools like hammer stones and choppers made from various materials, such as chert and obsidian (Levy 1978).

The Eastern Miwok in the Sacramento-San Joaquin Valley were first contacted by Spanish explorers in the second part of the eighteenth century (Levy 1978). Since then, dramatic cultural changes developed, including the transformation of previously independent tribelets into unified militias resisting forced labor, forced missionization, and displacement that was intensified by epidemics and targeted violence against the Miwok by the Spanish, which killed many thousands of Miwok persons in the first half of the nineteenth century (Levy 1978).

During the 1840s, fur trappers, gold miners, and settlers arrived in large numbers and often hostile relations arose between these newcomers and Sierra Miwok. For a brief time, Southern Sierra Miwok supplied labor for J.D. Savage's gold mining operations in the Big Oak Flat district, but as the number of non-indigenous miners increased in the region, large mining operations were shut down, and Miwok participation decreased (Levy 1978). Records indicate that at least 200 Miwok were killed by the miners during the years 1847 to 1860 (Levy 1978).

A period of confiscation of Indian lands began with the annexation of California by the U.S. (Levy 1978). Although treaties were signed by several members of the tribelets, they were never ratified by the U.S. Senate (Levy 1978). A few groups of Sierra Miwok were removed to the Fresno area but most of the Sierra Miwok population remained in rancherias scattered throughout the Sierra Nevada foothills (Levy 1978). Reliance on wage labor steadily increased and dependence on gathering and hunting diminished throughout the end of the nineteenth century and early twentieth century. Federally recognized Sierra Miwok Tribes in the immediate vicinity of the La Grange Hydroelectric Project include the Chicken Ranch Rancheria of Jamestown, California and the Tuolumne Band of Me-Wuk Indians of Tuolumne, California.

5.1.3 History

The first significant European settlement of California began during the Spanish Period (1769 to 1821) when 21 missions and four presidios were established between San Diego and Sonoma. Although located primarily along the coast, the missions dominated the majority of the California region during this period. The purpose of the missions and presidios was to establish Spanish economic, military, political, and religious control over the Alta California territory. This included the forced conversion of the native population to Spanish colonial society and Catholicism, which often consisted of subjugating Indians into a life of servitude to Spanish citizens (Castillo 1978; Cleland 1941).

The Mexican Period (1821 to 1848) began with the success of the Mexican Revolution in 1821, but changes to the mission system were slow to follow. When secularization of the missions occurred in the 1830s, the vast land holdings of the missions in California were divided into large land grants called ranchos. The Mexican government granted ranchos throughout California to Spanish and Hispanic soldiers and settlers (Castillo 1978).

The first Americans in the region were made up of teams of trappers led in 1827 by Jedediah Smith and followed by a party led by Ewing Young in 1829. The Hudson Bay Company also sent a number of trapping expeditions, including one led by Peter Ogden, to California during this period that were successful in procuring beaver furs and antelope skins. In 1844, General John C. Fremont crossed into the Central Valley and returned the following year with Kit Carson and Joseph Walker.

In 1848, the Treaty of Guadalupe Hidalgo ended the Mexican-American War and marked the beginning of the American Period (1848 to present). The discovery of gold the same year initiated the 1849 California Gold Rush, bringing thousands of miners and settlers to California. The Sierra Nevada foothills experienced a large influx of miners after 1849 (Moratto 1971:5-13). The mining communities of Chinese Camp and La Grange sprang up quickly in the 1850s and mining activities dotted the shores of the Tuolumne River.

The Gold Rush resulted in increased population and settlements in the San Joaquin Valley because the region was a natural transportation corridor that provided goods for miners. The 1850s was a period of abundant wheat harvests and the spread of open cattle grazing in the valley. Notable among these cattlemen were Henry Miller and Charles Lux, whose ranch covered more than one million acres in the Los Banos area in the 1860s.

The MID and TID were formed in 1887 and are the oldest irrigation districts in California (TID/MID 2010). The two districts were created to provide water for agricultural purposes. Today their service areas total approximately 200,000 acres of orchards, vines and row and forage crops (TID/MID 2010). The La Grange Diversion Dam was built by the Districts between 1891 and 1893 to raise the level of the Tuolumne River to permit the diversion of water from the Tuolumne River for irrigation of farmland. The La Grange Diversion Dam replaced the Wheaton Dam built by the Tuolumne Water Company in 1871. In 1924, the 2-unit La Grange powerhouse was built.

5.2 Record Search Results

To gather existing, relevant, and reasonably available information regarding cultural resources in the La Grange Hydroelectric Project APE and vicinity, the Districts requested a record search from the Central California Information Center (CCIC) of the California Historical Resources Information System at California State University, Stanislaus in Turlock. The data gathering area included the APE and a 0.25 mile buffer beyond. The record search was conducted during June 2014 and included a review of cultural resources records, previously conducted cultural resources investigations, historic maps, the NRHP, the California Register of Historic Resources, *California State Historic Landmarks* (California Department of Parks and Recreation (CDPR) 1996), *California Inventory of Historic Resources* (CDPR 1976), the California Points of Historic Interest listing (http://ohp.parks.ca.gov/listedresources/), the Directory of Properties in the Historic Property Data File (Office of Historic Preservation [OHP] current computer list dated 3-20-2014), and the Archaeological Determinations of Eligibility (Office of Historic Preservation current computer list dated 4-04-2012), the *Survey of Surveys* (CDPR 1989), and other pertinent historic data available at the CCIC for Stanislaus and Tuolumne counties.

The results of the records search are provided below and include summaries of the previously conducted cultural resources investigations, the previously documented cultural resources, along with their NRHP eligibility determinations if any have been made, and the historic features identified on historic maps within the APE and 0.25 mile buffer beyond.

5.2.1 Previous Cultural Resources Investigations

The record search identified seven previous cultural resource investigations within the 0.25 mile buffer around the APE, all of which are located within or cross the APE (Table 1.0). The investigations occurred between 1979 and 2006, and were conducted prior to a variety of different undertakings, to include proposed water control facilities improvements, recreational expansion, and transmission line disconnect and installation projects. The previous investigations covered roughly 15 percent of the APE, though many of these studies were not completed to current (2014) professional standards.

Table 1.0. Previous studies in the APE and within 0.25 miles of the APE.

Count	Author	Year	CCIC Report #	Other ID #s	Report Name and Description	Within APE (Yes/No)	Within 0.25mi of APE (Yes/No)
1	Balen, B.	1986	TO-03957	NADB-R-1366425	*Cultural Resource Inventory Report: Bloss Ranch, La Grange, California and Addendum Report.* Records search and pedestrian survey of 70% of "sensitive areas" related to the proposed recreational expansion along the south shore of Don Pedro reservoir; 25 cultural resources identified.	Yes	Yes
2	Carpenter, K.	2005	ST-05859	NADB-R-1365752	*Letter Report Regarding Turlock Irrigation District Archaeological Survey; TID Upper Main Canal.* Records search and pedestrian survey (15-30 meter transects) conducted prior to proposed replacement and rebuilding of a canal; eight previously recorded resources identified, and eight new resources were identified, though only one was within the survey area.	Yes	Yes
3	Carpenter, K.	2006	-	-	*TID Supplemental Archaeological Survey and Native American Consultation.* Native American consultation and field visit. The field visit was conducted to confirm boundaries of previously recorded resources and to make recommendations for management of those resources. Two out of three previously identified resources were relocated and two new resources identified. Avoidance recommended.	Yes	Yes
4	Jensen, P.	2004	ST-05483	NADB-R-1365367	*Archaeological Inventory Survey, M.I.D—T.I.D. Transmission Line Disconnect Project, Four Locations Crossing the Tuolumne River Near La Grange, Stanislaus County, California.* Class III-level archaeological survey conducted prior to disconnect of existing transmission line segments; no cultural resources were identified.	Yes	Yes
5	Jensen, S.	2004	ST-05458	NADB-R-1365341	*Archaeological Inventory Survey: MID's Three New Transmission Lines Project, c. 3.5 Miles of Linear Corridor Interconnecting Existing Transmission Facilities, Stanislaus County, California.* Class III-level archaeological survey conducted prior to proposed construction of linear transmission line corridor segments; no cultural resources were identified.	Yes	Yes

Count	Author	Year	CCIC Report #	Other ID #s	Report Name and Description	Within APE (Yes/No)	Within 0.25mi of APE (Yes/No)
6	JRP Historical Consulting	2005	ST-07441	NADB-R-1367806	*Historical Resources Inventory and Evaluation Report, Turlock Irrigation District, Upper Main Canal, Stanislaus County, CA.* Resource inventory and evaluation of irrigation canal prior to canal improvements/retrofitting.	Yes	Yes
7	Napton, L.K. and Greathouse, E.A.	1979	ST-00881	NADB-R-1361724	*Cultural Resource Reconnaissance of the Turlock Main Canal, Turlock Irrigation District, Stanislaus County, California.* Pedestrian survey conducted prior to construction of proposed canal improvements; three archaeological resources were identified.	Yes	Yes

5.2.2 Previously Recorded Cultural Resources

The records search identified four previously documented cultural resources within 0.25 miles of the APE (Table 2.0). Of these four resources, two are prehistoric archaeological resources and two are built environment resources. The prehistoric resources represent occupation and tool manufacturing locations, and contain bedrock milling features, habitation debris, lithic debitage, and burials. The built environment resources consist of the La Grange Diversion Dam and the TID Upper Main Canal. Only one of the four resources is located within the APE, while the other three are within 0.25 miles of the APE. Of the four resources, one resource has been evaluated as ineligible for inclusion on the NRHP and three resources remain unevaluated for the NRHP.

Table 2.0. Previously recorded sites within the APE and within 0.25 miles of the APE.

Count	Site Number (Primary No. / Trinomial)	CCIC Project No., Recorder and Year, or Associated Report Authors and Year	Description	NRHP Evaluation	Within APE (Yes/No)	Within 0.25mi of APE (Yes/No)
1	P-50-115/ CA-STA-29	Hewes and Hassey 1939	**Prehistoric.** Native American occupation and burial site.	Unevaluated	No	Yes
2	P-50-1890/ CA-STA-417H	Larson and Johnson 2003	**Built.** Snake Ravine/TID Upper Main Canal.	Ineligible	No	Yes
3	P-50-258/ CA-STA-173	Heizer and Heizer 1949	**Prehistoric.** Native American occupation and burial site.	Unevaluated	No	Yes
4	P-50-550	Hata 1979	**Built. No form.** La Grange Dam, designated State Point of Historical Interest #STA-003.	Unevaluated	Yes	Yes

5.2.3 Potential Historic Resources Identified on Historic Maps

Historic-period USGS topographic quadrangles and General Land Office (GLO) plats were reviewed during the records search to identify locations of potential historic-era sites and features within the APE and within 0.25 miles of the APE (Table 3.0). This resulted in the identification of roughly 13 historic period features that may be present within the APE. These features include the La Grange Diversion Dam, a gaging station, a powerhouse, two transmission lines, one unimproved road, a jeep trail, La Grange Diversion Dam road, canals, a tunnel, and two structures.

Table 3.0. Historic maps reviewed within the APE and within 0.25 miles of the APE.

Map	Map Date	Features within the APE (Note: the same features are referenced on multiple maps)	Features within 0.25 mi of APE
La Grange, CA, 7.5' USGS Quadrangle	1962	Powerhouse, transmission line, two structures, La Grange Dam, a gaging station, La Grange Dam Road, one unimproved road, and a jeep trail	Transmission lines, three structures, a gaging station, La Grange Dam Road, seven unimproved roads, and a jeep trail
Merced Falls, CA, 15' USGS Quadrangle	1962	Powerhouse, two transmission lines, one structure, La Grange Dam, a gaging station, La Grange Dam Road, one unimproved road, and a jeep trail	Transmission lines, three structures, a gaging station, La Grange Dam Road, seven unimproved roads, and a jeep trail
Sonora, CA, 30' USGS Quadrangle	1897	La Grange Dam, two canals, and one tunnel	Two canals and one tunnel
Township 3S, Range 14E GLO plat	1867	No features	No features
County Map of Stanislaus, CA	1906	Dam, two canals, one improved road	Two canals, one improved road
County Map of Tuolumne, CA	1907	Dam, two canals	Two canals

5.3 Summary and Conclusions

The records search indicates that the La Grange Hydroelectric Project APE and vicinity is relatively sensitive for prehistoric and historic-era archaeological properties and for built environment resources. The records search also indicates that some areas within the APE have been subject to previous cultural surveys. However, the research also revealed that many areas within the APE have not yet been surveyed for cultural resources. To accomplish this, and to meet the study plan objective, additional archival research and field surveys are necessary. This study plan will be used to guide efforts in acquiring the additional information.

6.0 STUDY METHODS

This section is broken down into the following parts: (1) a description of the APE, which is the study area; (2) general concepts that apply to the study; and (3) study specific methods to be used to implement the study and accomplish the study goals.

6.1 Area of Potential Effects

For the La Grange Hydroelectric Project, the APE has been initially defined as lands immediately downstream of the LGDD including the La Grange Hydroelectric Project Powerhouse, tailrace, and La Grange Hydroelectric Project access roads. The APE may be modified after consultation with interested parties if the consultation results in the identification of additional lands that may be affected by La Grange Hydroelectric Project-related activities outside of these areas. The APE falls entirely on private lands. The APE is contained on the La Grange, CA, USGS 7.5-minute Topographic Quadrangle, within Township 3 South and Range 14 East. The study area that will be investigated to accomplish the current study is the APE. The APE map is provided here as Attachment A.

6.2 General Concepts

The following general concepts apply to the study:

- Personal safety is an important consideration of each fieldwork team. The Districts and their consultants will perform the study in a safe manner.
- The Districts will make a good faith effort to obtain permission in advance of performance of the study to access private property where needed.
- Field crews may make minor modifications in the field to adjust to and accommodate actual field conditions and unforeseeable events. Any modifications made will be documented and reported in the draft study report.

6.3 Study Methods

The study approach will consist of the following seven steps:

Step 1 - Obtain SHPO Approval of APE

As required under Section 106, pursuant to 36 CFR § 800.4(a)(1), the Districts will submit maps depicting the APE to the SHPO for formal review, comment, and concurrence[2]. Once approved, the maps and SHPO's concurrence letter will be filed with FERC.

The Districts may request that SHPO concur with a modified APE during the study if the Districts determine that the La Grange Hydroelectric Project affects historic properties outside the previously SHPO-approved APE.

[2] Participating Tribes and agencies will be provided the opportunity to review and comment on the APE as part of consultation efforts related to this study plan.

Step 2 - Archival Research

Information has been obtained from the record search that identified previous cultural surveys and recorded archaeological and historic-era properties within or adjacent to the APE. Archival research will also be conducted at the repositories listed below to obtain additional information specific to the prehistory and history of the APE, the La Grange Hydroelectric Project hydroelectric system in whole, and its individual features. The results of the archival research will serve as the basis for preparing the prehistoric and historic contexts against which cultural resources may be evaluated. Previous NRHP evaluations of resources, if they exist, will be used as much as possible. The places to be contacted and/or visited for archival research may include, but is not restricted to the following:

- Bancroft Library, University of California, Berkeley
- Bureau of Land Management, Mother Lode Field Office Data Files
- Turlock Museum and Archives
- Modesto Museum and Archives
- Tuolumne County Assessor's and Recorder's Offices
- Tuolumne County Historical Society
- Stanislaus County Assessor's and Recorder's Offices
- Stanislaus County Historical Society
- Oral Histories of Project Personnel and/or Local Residents, Historians, or Enthusiasts
- Turlock Irrigation District and Modesto Irrigation District

Step 3 - Field Survey

FERC is required to make a good faith effort to identify historic properties that may be affected by the proposed federal undertaking (i.e., licensing of the La Grange Hydroelectric Project) (36 CFR § 800), which does not include identifying past La Grange Hydroelectric Project related effects, other than noting present resource conditions in order to determine their existing level of integrity. A comprehensive and intensive field survey will be completed in accordance with the Secretary of Interior's Standards and Guidelines for Identification (NPS 1983). All lands within the APE will be inventoried at this level, unless lands are inaccessible and/or it is determined unsafe to do so by the Districts. Areas that cannot be inventoried will be identified in the resulting survey report in text and maps, with an explanation for survey exclusion.

The field survey will be directly supervised in the field by qualified, professional archaeologists (i.e., individuals who meet the Secretary of the Interior's Standards for professional archaeologists).

Locations of previously recorded cultural resources will be verified and the resources re-recorded only if their existing resource records or other documentation do not meet current standards for recording, or if the condition and/or integrity of the property has changed since its previous

recording. Newly discovered cultural resources, including isolated finds, will be fully documented following the recordation procedures outlined in *Instructions for Recording Historical Resources* (OHP 1995a), which utilizes state of California Department of Parks and Recreation forms CDPR 523 A-L. Prehistoric isolates will be defined as three or less artifacts (flakes, groundstone, etc.) per 50 square meters. Prehistoric isolated features will not be treated as isolated finds, but will be recorded as a site. Historic isolates will be defined on a case by case basis, depending on the types of historic resources identified within the APE. A sketch map for each resource recorded or re-documented (unless it is an isolate) will be drawn to scale and the property photographed. The locations of all cultural resources documented during the survey will be plotted by the Districts' cultural resources specialist or cultural consultant onto the appropriate USGS 1:24,000-scale topographic map at the time of discovery. Field personnel will use a Global Positioning System (GPS) receiver to document the location of cultural resources (including isolates) recorded during the survey, which will be plotted onto the appropriate USGS topographic quadrangle using the Universal Transverse Mercator (UTM) coordinate system. GPS data related to recordation of historic properties will adhere to CDPR specifications for accuracy and site specific procedures. All artifacts encountered during the field survey will be left in place; no artifacts will be collected during the field survey.

Inventory of Historic-Era Built Environment. A field inspection, documentation, and subsequent NRHP evaluation (see below) of any historic-era built environment resources will be undertaken by qualified, professional individuals meeting the Secretary of the Interior's Standards for Architectural and Engineering Documentation. Individual components will be recorded or re-recorded to meet current CDPR standards. This will include digital color photography and sketch maps of each built resource and each associated feature. All built environment resources identified within the APE and constructed in 1976 or older will be documented as part of this study. As this study is scheduled for completion by 2016 and resources constructed in 1976 or older will be 50 years old or older when the study is complete.

Discovery and Treatment of Human Remains. If an inadvertent discovery of human remains occurs on federal lands[3], the person making the discovery shall follow the procedures outlined in 43 CFR § 10(4)(b) of NAGPRA and the guidance provided by the ACHP, requiring that they immediately notify the federal land managing agency, who will contact the affected Tribes, as appropriate, by telephone, and provide written confirmation of the discovery. On federally-administered land, NAGPRA responsibilities cannot be delegated to FERC or to the Districts. All work in the immediate area of the discovery will cease and the area will be secured to protect the remains. The federal land managing agency is responsible for consulting with the affected Tribes to contact the lineal descendent and ascertain the cultural affiliation, as outlined in NAGPRA under 43 CFR § 10(14), in order to otherwise abide by NAGPRA to determine the disposition of the discovered human remains (43 CFR § 10[6]).

On privately owned lands, the California Penal Code, California Health and Safety Code, and California Public Resources Code, also prohibit damage, defacement, or disinterment of human remains without legal authority, and establish civil and criminal penalties for actions associated with private landholdings. If an inadvertent discovery of human remains occurs on private lands during the study, the person making the discovery shall immediately contact the county coroner

[3] No federal lands are currently within the proposed APE.

and the affected Tribes, as appropriate, by telephone, and provide written confirmation of the discovery. All work in the immediate area of the discovery will cease and the area will be secured to protect the remains. The coroner will confirm that the find is indeed human and requires no further investigation, per California Health and Safety Code Section 7050.5, and contact the Native American Heritage Commission, who will identify and contact the most likely descendent. The most likely descendent and private land owners should then consult with one another regarding the disposition of the discovered human remains, pursuant to California Public Resources Code Section 5097.98. The Districts may facilitate such discussion, but cannot force discussion or otherwise enforce recommendations made by any party if they are not the subject land owner.

Step 4 – Tribal Field Visit

As defined above, historic properties may include properties of traditional religious and cultural importance. To identify resources that may be of traditional religious and cultural importance to local Native American Tribes, the Districts will invite these groups to attend a field visit to the La Grange Hydroelectric Project and/or provide any information regarding such locations in the area. The purpose of the visit would be to provide Tribal representatives the opportunity to examine locations within the APE and/or prehistoric archaeological sites encountered during the field survey, and for the Districts' contractor to then obtain information from the Tribal representatives regarding the importance of these locations.

For the La Grange Hydroelectric Project, the Districts will utilize the list of Tribal contacts associated with the nearby Don Pedro Project (see Table 4.0). Additional groups that might be identified by FERC or the Native American Heritage Commission subsequent to issuance of this study plan will be added to the list and contacted by the Districts.

Table 4.0. Tribal contact list.

Buena Vista Rancheria Roselynn Lwenya, Ph.D Environmental Resources Director 1418 20th Street, Suite 200 Sacramento, CA 95811	Buena Vista Rancheria Rhonda Morningstar Pope Chairperson 1418 20th Street, Suite 200 Sacramento, CA 95811
Central Sierra Me-Wuk Cultural & Historic Reba Fuller, Spokesperson PO Box 699 Tuolumne, CA 95379	Chicken Ranch Rancheria of Me-Wuk Melissa Powell, Chairperson P.O. Box 1159 Jamestown, CA 95327
Chicken Ranch Rancheria of Me-Wuk Melissa Ralston, Cultural Resources Coordinator P.O. Box 1159 Jamestown, CA 95327	Picayune Rancheria of the Chukchansi Indians Nancy Ayala, Chairperson 46575 Road 417 #A Coarsegold, CA 93614
Picayune Rancheria of the Chukchansi Indians Mary Motola, Cultural Specialist 46575 Road 417 #A Coarsegold, CA 93614	Southern Sierra Miwuk Nation Lois Martin, Chairperson P.O. Box 186 Mariposa, CA 95338

Southern Sierra Miwuk Nation Jay Johnson, Spiritual Leader 5235 Allred Road Mariposa, CA 95338	Southern Sierra Miwuk Nation Les James, Spiritual Leader P.O. Box 186 Mariposa, CA 95338
Tuolumne Band of Me-Wuk Indians Kevin Day, Chairperson P.O. Box 699 Tuolumne, CA 95379	Tuolumne Band of Me-Wuk Indians Rob Cox, Cultural Resources Department P.O. Box 699 Tuolumne, CA 95379
Tuolumne Band of Me-Wuk Indians Vicki Stone, Cultural Coordinator P.O. Box 699 Tuolumne, CA 95379	Tuolumne Band of Me-Wuk Indians Reba Fuller, Spokesperson P.O. Box 699 Tuolumne, CA 95379

Step 5 - National Register of Historic Places Evaluation

During field documentation of each cultural resource identified in the APE, the Districts will document the condition of each resource to assist in identifying potential and existing La Grange Hydroelectric Project-related effects and level of integrity. All previously unevaluated cultural resources that are currently being, or would be negatively affected by the La Grange Hydroelectric Project will be evaluated at this phase if possible, based on the documented remains, background research, and other pertinent information. The NRHP evaluations will be submitted to the SHPO for concurrence. Any NRHP evaluations completed for resources located on federal agency lands will be submitted to the appropriate agency for review prior to obtaining SHPO concurrence. Resources requiring further cultural resources management consideration beyond the study will be identified and included in the Districts' PM&Es for implementation, likely under a FERC-approved HPMP, unless more immediate action is deemed necessary to address La Grange Hydroelectric Project-related effects.

The Districts will utilize the National Register criteria for all resources to be evaluated, which are defined in 36 CFR 60.4, and which include the following:

> ***National Register Criteria for Evaluation.*** *The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and*
>
> *(a) that are associated with events that have made a significant contribution to the broad pattern of our history;*
> *(b) that are associated with the lives of persons significant in our past;*
> *(c) that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;*
> *(d) that have yielded, or may be likely to yield, information important to prehistory or history.*

As well, properties not normally considered for listing in the National Register (i.e., cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historical buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years) may qualify if they are contributing elements of districts that do meet the criteria for evaluation or for which the *Criteria Considerations* found at 36 CFR 60 may be applied.

Step 6 - Identify and Assess Potential Effects on National Register-Eligible Properties

As required under 36 CFR § 800.5, the Districts will identify and assess, in consultation with the SHPO and potentially affected Indian Tribes, any adverse effects on historic properties or potential historic properties resulting from La Grange Hydroelectric Project O&M. Adverse effects are defined as follows:

> *An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative (36 CFR § 800.5(a)(1).*

Step 7 - Reporting

The Districts will prepare a technical report prepared to current professional standards consistent with the Archaeological Resource Management Report (ARMR) Guidelines (OHP 1995b). The report will include the following sections: (1) Study Goals and Objectives, (2) Environmental and Cultural Setting, (3) Methods and Analysis, (4) Results, (5) Discussion; and (6) Conclusions. Upon completion of the field studies, cultural maps provided with the Districts' report will clearly depict the following on USGS 1:24,000 topographic maps: the study areas examined; inventory coverage, including intensity of coverage; and locations of cultural resources identified within the study areas.

Copies of the final report and detailed locations of identified properties may be withheld from public disclosure in accordance with Section 304 (16 U.S.C. 4702-3) of the NHPA (as amended). Concurrence of report recommendations will be sought from the SHPO. Draft versions of the report will be provided to Tribes and other parties, as appropriate. If any portion of the documentation is deemed too sensitive for distribution by the affected Tribes, the Districts will work with the concerned groups for an appropriate outcome, which could include withholding information from distribution.

The results of the study will also be reported in Exhibit E of the License Application, which will include a summary of the information and findings of the study plan. Figures and other pertinent

data supporting the summary in Exhibit E will be appended to the License Application. The cultural records and other sensitive information will be included in a confidential appendix withheld from public disclosure, in accordance with Section 304 (16 U.S.C. 4702-3) of the NHPA as amended.

7.0 SCHEDULE

The Districts anticipate the following schedule to complete the study plan. The schedule assumes that FERC issues its Study Plan Determination by February 2, 2015, and that the study is not disputed by a mandatory conditioning agency.

- Obtain SHPO Approval of the APE..... January 2015
- Archival Research/Field Work .....February – April 2015
- Tribal Field Visit..... April 2015
- NRHP Evaluation/Identify and Assess Effects.....April – May 2015
- Report Preparation ..... June – September 2015
- Report Submittal to Tribes.....October 2015
- Report Submittal to SHPO..... December 2015
- Initial Study Report Issuance..... February 2016

8.0 CONSISTENCY OF METHODOLOGY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICES

The proposed study methods discussed above are generally consistent with the study methods followed in several recent relicensing projects (i.e., Don Pedro Hydroelectric Project, FERC No. 2299; Merced River Hydroelectric Project, FERC No. 2179; Yuba-Bear Hydroelectric Project, FERC No. 2266). The methods presented in this study plan also are consistent with the ACHP's guidelines for compliance with the requirements of Section 106 of the NHPA found at 36 CFR 800.

9.0 LEVEL OF EFFORT AND COST

Study plan implementation costs are estimated to be $90,000.

10.0 REFERENCES

California Department of Parks and Recreation (CDPR). 1976. California Inventory of Historic Resources. On file, Central California Information Center, Turlock, California.

_____. 1989. Survey of Surveys; A summary of California's historical and architectural resource surveys pamphlet. On file, Central California Information Center, Turlock, California.

_____. 1996. California State Historic Landmarks. On file, Central California Information Center, Turlock, California.

Campbell, E.W.C., and W.H. Campbell. 1935. The Pinto Basin Site. Southwest Museum Papers 9. Los Angeles, California.

Castillo, Edward. 1978. The Impact of Euro-American Exploration and Settlement. Pp 99-127 IN Handbook of North American Indians, Vol.8, California. Smithsonian Institution, Washington.

Cleland, Robert G. 1941. The Cattle on a Thousand Hills: Southern California, 1850-1870. Huntington Library, San Marino, California.

Elasser, A.B. 1960. The Archaeology of the Sierra Nevada in California and Nevada. University of California Archaeological Survey Reports 51:1-93. Berkeley, California

Fitting, J.J., Costello and H.Crew (compilers). 1979. Cultural Resources Mitigation Program, New Melones Lake Project, Phase 1 (draft report).

Fitzwater, R.J. 1962. Final Report on Two Seasons Excavations at El Portal, Mariposa County, California. University of California Archaeological Survey Annual Report 1961-1962:235-282. Los Angeles.

Harrington, M.R. 1957. A Pinto Site at Little Lake, California. Southwest Museum Papers 17. Los Angeles, California.

Heizer, R.F. and C.W. Clewlow, Jr. 1969. Projectile Points from Hidden Cave (NV-CH-15). Churchill County, Nevada. In Papers on Great Basin Prehistory, pp.59-88. University of California Archaeological Survey Reports 71. Berkeley, California.

Heizer, R.F. and A.B. Elsasser. 1953. Some Archaeological Sites and Cultures of the Central Sierra Nevada. University of California Archaeological Survey Reports 21: 1-42, Berkeley, California.

Heizer, R.F. and T.R. Hester. 1978 Great Basin Projectile Points: Forms and Chronology. Press Publications in Archaeology, Ethnology, and History 10. Socorro, New Mexico. Ballerina Press.

Johnson, J.J. 1967. The Archaeology of the Comanche Reservoir Locality, California. Sacramento Anthropological Society. Sacramento, California.

Levy, R.C. 1978. In Handbook of North American Indians, Vol. 8: California, edited by Robert F. Heizer. Washington, D.C.: Smithsonian.

Modesto Irrigation District and Turlock Irrigation District (TID/MID). 2010. Background section of the Don Pedro Project Relicensing (FERC No. 2299) Public Website. Modesto Irrigation District and Turlock Irrigation District. [Online] URL: www.donpedro-relicensing.com/background.aspx (Accessed July 2010).

Moratto, M.J. 1971. A Study of Prehistory in the Tuolumne River Valley, California. Treganza Anthropology Museum Papers, Number 9. San Francisco State University.

_____. 1972. Study of Prehistory on the Southern Sierra Foothills, California. Unpublished Ph.D dissertation, Department of Anthropology, University of Oregon.

Moratto, M.J. and L.M. Riley. 1980. Balsam Meadow: Archaeological Testing at Six Sites in Eastern Fresno, County. Ms. On file, Southern California Edison Company, Rosemead, California.

Moratto, M.J., L.H. Shoup, and J.D. Tordoff. 1988. Culture Change in the Central Sierra Nevada, 8000 B.C.-A.D. 1950. Final Report of the New Melones Archaeological Project, edited by M.J. Moratto, 9:1-626. U.S. National Park Service and National Technical Information Service, Washington, D.C. (Also available from Coyote Press.)

Moratto, M.J., M.R. Arguelles, S.K. Goldberg, S. O'Brien, L.M. Riley, and W.L. Singleton. 1984. New Melones Archaeological Project, California: Indian Sites 04-Cal-s-286, 04-Cal-S-347, and 04-Cal-S-461. Final Report of the New Melones Archaeological Project 4(1-3):1-1600. U.S. National Park Service and National Technical Information Service, Washington D.C. (Also available on CD from Coyote Press, Salinas, California.)

Office of Historic Preservation (OHP). 1995a. Instructions for Recording Historical Resources. Sacramento, California. On file, Office of Historic Preservation, Sacramento, California.

_____. 1995b. Archaeological Resource Management Reports (ARMR): Recommended Contents and Format. Sacramento, California. On file, Office of Historic Preservation, Sacramento, California.

Peak, A.S. 1973. New Melones Archaeological Project, Calaveras and Tuolumne Counties, California: Phase III. National Park Service, Tucson, Arizona.

Peak, A.S. and H. Crew. 1990. Cultural Resource Studies North Fork Stanislaus River Hydroelectric Development Project, Vol. II: An Archaeological Data Recovery Project at CA-Cal-S342, Clarks Flat, Calaveras County, California. Northern California Power Agency, Roseville, California.

Ritter, E.W. 1970. Northern Sierra Foothill Archaeology. In Papers on California and Great Basin Prehistory, edited by E.W. Ritter, P.D. Schulz, and R. Kautz, pp. 171-184. University of California, Center for Archaeological Research Publications 2. Davis, California.

Rogers, M.J. 1939. Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. San Diego Museum of Man Papers 3. San Diego, California.

U.S. Department of Interior, National Park Service (NPS). 1983. Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines in the Federal Register, September 29, 1983 (48FR44716). Department of the Interior, Washington, D.C.

ATTACHMENT A

AREA OF POTENTIAL EFFECTS MAP

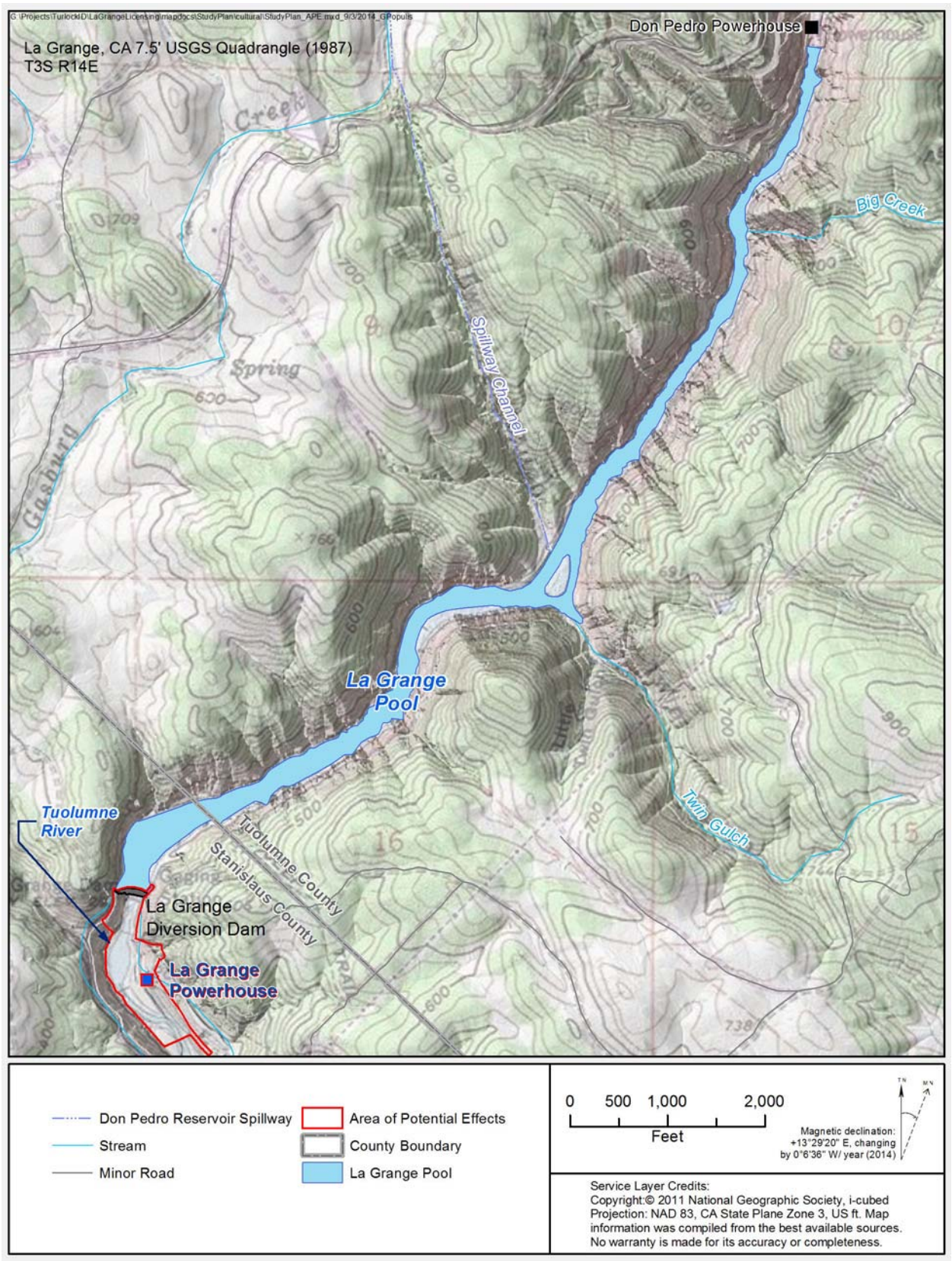

Figure A-1. Area of Potential Effects Map.

REVISED STUDY PLAN DOCUMENT

APPENDIX C

RECREATION ACCESS AND SAFETY ASSESSMENT STUDY PLAN

This Page is Intentionally Left Blank

RECREATION ACCCESS AND SAFETY ASSESSMENT STUDY PLAN

TURLOCK IRRIGATION DISTRICT
AND
MODESTO IRRIGATION DISTRICT

LA GRANGE HYDROELECTRIC PROJECT
FERC NO. 14581

Recreation Access and Safety Assessment

January 2015

1.0 PROJECT DESCRIPTION

The Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts) own the La Grange Diversion Dam (LGDD) located on the Tuolumne River in Stanislaus County, California (Figures 1.0 and 2.0). LGDD is 131 feet high and is located at river mile (RM) 52.2 at the exit of a narrow canyon, the walls of which contain the pool formed by the diversion dam. Under normal river flows, the pool formed by the diversion dam extends for approximately one mile upstream. When not in spill mode, the water level above the diversion dam is between elevation 294 feet and 296 feet approximately 90 percent of the time. Within this 2-foot range, the pool storage is estimated to be less than 100 acre-feet of water.

The drainage area of the Tuolumne River upstream of LGDD is approximately 1,550 square miles. Tuolumne River flows upstream of LGDD are regulated by four upstream reservoirs: Hetch Hetchy, Lake Eleanor, Cherry Lake, and Don Pedro. The Don Pedro Project is owned jointly by the Districts, and the other three dams are owned by the City and County of San Francisco (CCSF). Inflow to the La Grange pool is the sum of releases from the Don Pedro Project (FERC No. 2299), located 2.3 miles upstream, and very minor contributions from two small intermittent streams downstream of Don Pedro Dam.

LGDD was constructed from 1891 to 1893 to replace Wheaton Dam, which was built by other parties in the early 1870s. The LGDD raised the level of the Tuolumne River to permit the diversion and delivery of water by gravity to irrigation systems owned by TID and MID. The Districts' irrigation systems currently provide water to over 200,000 acres of prime Central Valley farmland and drinking water to the City of Modesto. Built in 1924, the La Grange hydroelectric plant is located approximately 0.2 miles downstream of LGDD on the east (left) bank of the Tuolumne River and is owned and operated by TID. The powerhouse has a capacity of slightly less than 5 megawatts (MW). The La Grange Hydroelectric Project operates in a run-of-river mode. The LGDD provides no flood control benefits, and there are no recreation facilities associated with the La Grange Hydroelectric Project or the La Grange pool.

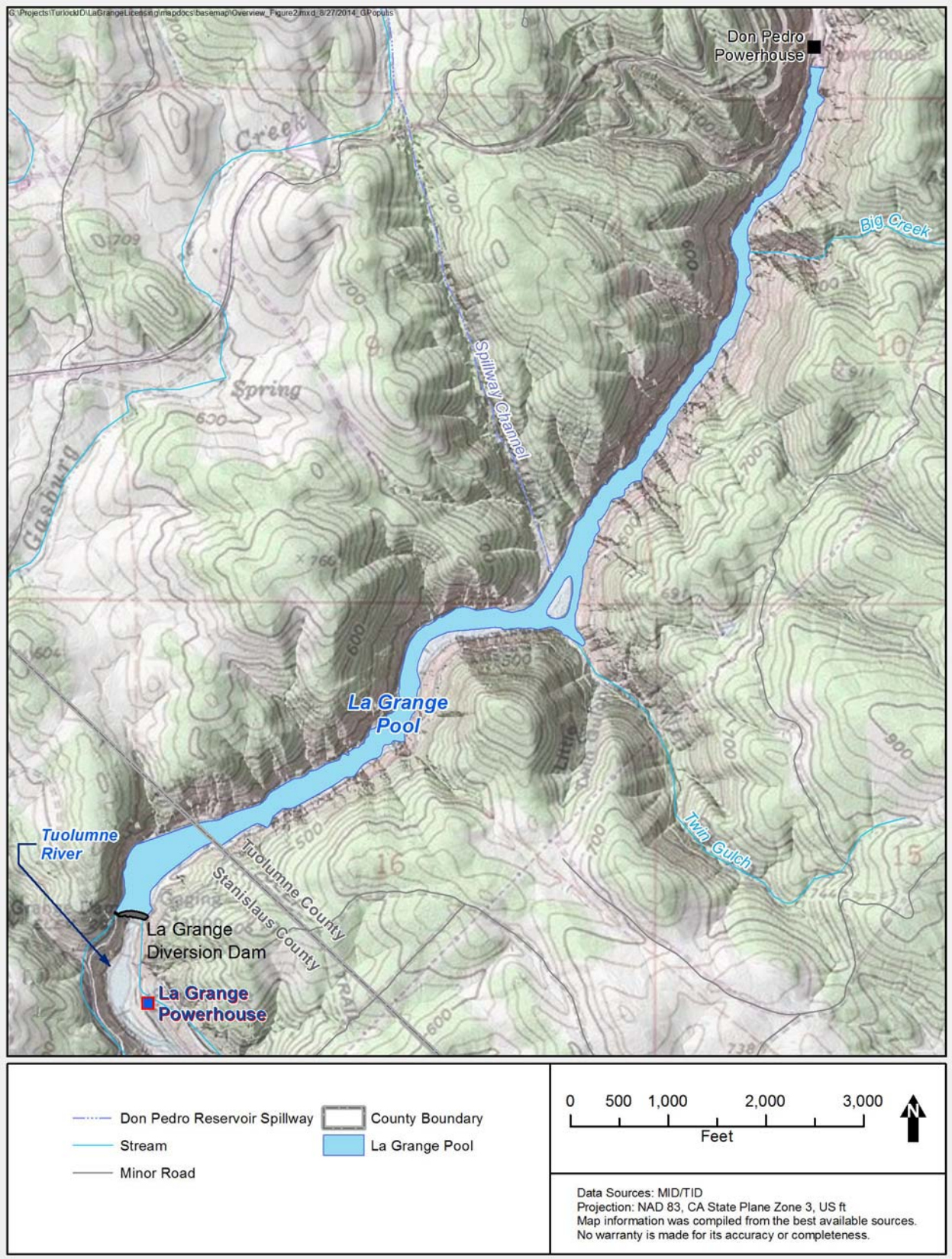

Figure 1.0. La Grange Hydroelectric Project location map.

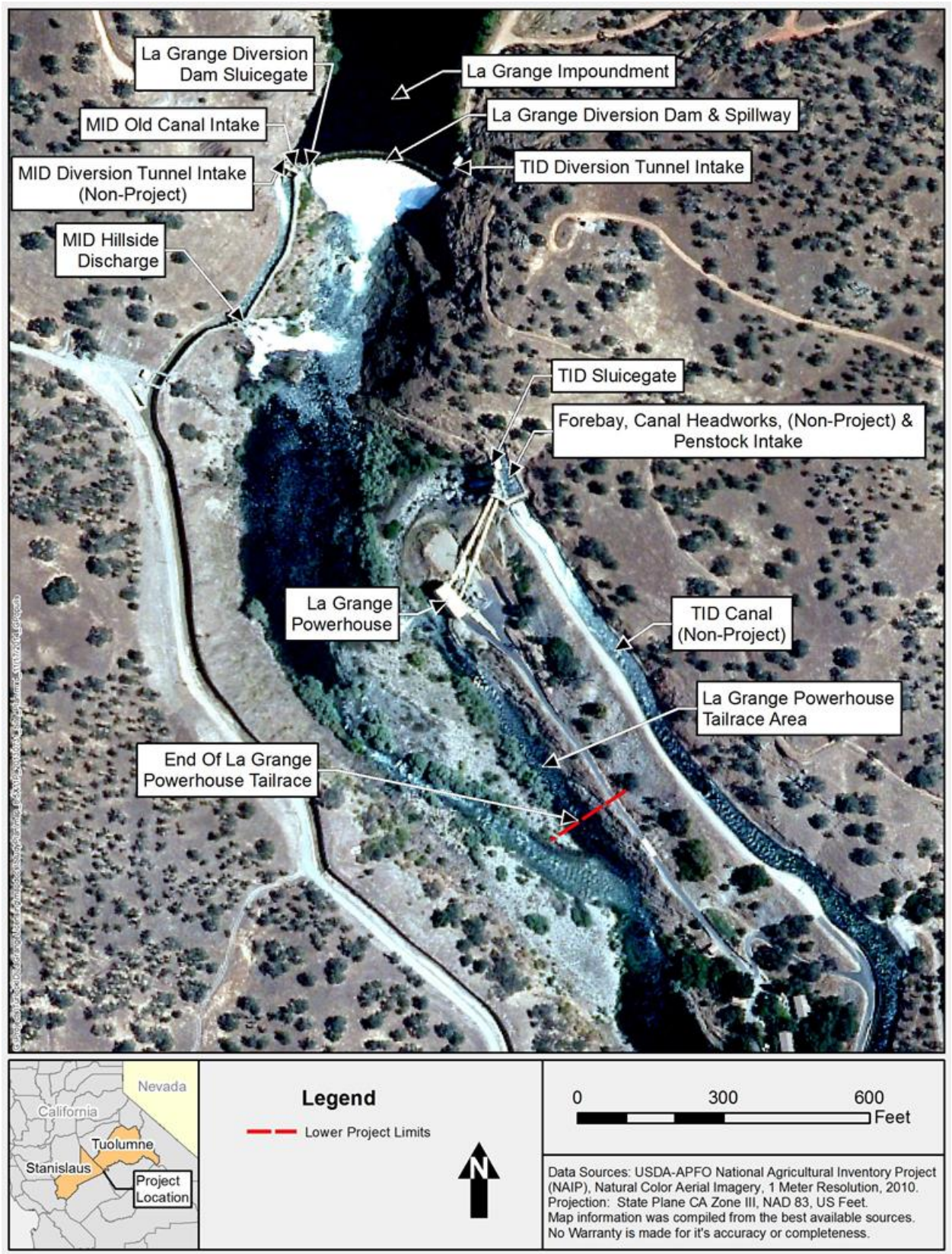

Figure 2.0. La Grange Hydroelectric Project site plan.

2.0 STUDY REQUESTS AND PROJECT NEXUS

Federal Energy Regulatory Commission (FERC) regulations require that the license application include a description of existing recreation facilities to be continued and maintained during the term of the license, new measures or facilities proposed by the applicant for the purpose of enhancing recreational opportunities at the Project, and measures to ensure the safety of the public in its use of Project lands and waters. Recreation is a recognized project purpose at FERC-licensed projects under Section 10(a) of the Federal Power Act.

On October 6, 2014, the Districts held a study plan meeting for the La Grange Hydroelectric Project. The purpose of the meeting was to discuss with licensing participants the Districts' Proposed Study Plan (PSP) in order to attempt to resolve any outstanding issues on studies to be included in the Revised Study Plan. Based on discussions at the study plan meeting, the Districts have made several changes to the Recreation Access and Safety Assessment Study Plan. In response to discussion at the PSP meeting, the Districts have amended the Canadian Dam Association Risk Assessment Form to better reflect activities that may take place at the Project (see Section 7.0 activities), and have amended this study plan to clarify that, depending on the results of this Recreation Access and Safety Assessment, the Districts may develop a Year 2 facilities siting assessment for those recreational activities identified during the Year 1 study as being able to safely occur at the Project.

3.0 RESOURCE AGENCY MANAGEMENT GOALS

Management plans that cover recreation resources within the general vicinity of the Project include the California Department of Parks and Recreation's California Outdoor Recreation Plan (CORP), including the Survey on Public Opinions and Attitudes in Outdoor Recreation; the U.S. Department of Interior (DOI), USFWS Recreational Fisheries Policy; the Tuolumne County General Plan; and the Stanislaus County General Plan. Below is a summary of the recreation needs identified in the management plans applicable to the Project vicinity.

3.1 California Outdoor Recreation Plan

The 2008 CORP identifies and prioritizes outdoor recreation opportunities and constraints most critical in California. The plan lists the following seven major priority areas that comprise the state's strategy for meeting California's outdoor recreation needs:

- Projects that provide opportunities for the top 15 outdoor recreation activities identified in the latent demand scoring in the survey of Public Opinions and Attitudes on Outdoor Recreation in California (see Table 1.0 below).
- Projects that provide or improve outdoor recreation opportunities in the geographic region.
- Projects that provide outdoor recreation activities for children.
- Projects that provide outdoor recreation opportunities for those underserved communities.
- Projects that support the wetland priorities being pursued by the state's wetland preservation organizations.

- Projects that support the goals of California's Recreation Policy of (a) adequacy of recreation; (b) opportunities; (c) leadership in recreation management; (d) recreation's role in a healthier California; (e) preservation of natural and cultural resources; and (f) accessible recreation experiences.
- Projects that develop the trail corridors identified in the 2002 California Recreational Trails Plan and its scheduled update.

Table 1.0 California's recreation activities with high latent demand.

Rank	Activity	Rank	Activity
1	Walking for fitness or pleasure	9	Attending outdoor cultural events
2	Camping in developed sites with facilities such as toilets and tables	10	Off-highway vehicle use
3	Bicycling on paved surfaces	11	Driving for pleasure, sightseeing, driving through natural scenery
4	Day hiking on trails	12	Camping at primitive sites
5	Picnicking in picnic areas	13	Swimming in a pool
6	Beach activities	14	Wildlife viewing, bird watching, viewing natural scenery
7	Visiting outdoor nature museums, zoos, gardens, or arboretums	15	Outdoor photography
8	Visiting historical or cultural sites		

Source: California Department of Parks and Recreation (CDPR) 2013

3.2 Survey on Public Opinions and Attitudes in Outdoor Recreation in California 2009

The 2009 Survey on Public Opinions and Attitudes in Outdoor Recreation in California (POAOR) (CDPR 2009), an element of the CORP, identified the following types of park and recreation facilities and services as the most important for Californian adults:

1) Play activity areas for tots and young children.
2) Wilderness type areas where no vehicles or development are allowed.
3) Areas and facilities for environmental and outdoor education programs.
4) Multi-use turf areas for field sports such as softball, baseball, soccer, and/or football.
5) Picnic sites for large groups.
6) Trails for multiple, non-motorized activities such as hiking, mountain biking, or horseback riding.
7) Hard surface trails for biking, jogging, and fitness walking.

3.3 Tuolumne County General Plan

The Tuolumne County General Plan (1996) is made up of two categories - the seven mandated elements and an unlimited number of optional elements. The mandatory elements are: Land Use, Circulation, Housing, Conservation and Open Space, Noise, and Safety. Currently, the

General Plan encompasses the following sections under optional elements: Cultural Resource, Economic Development, Agricultural, Recreation, Community Identity, Air Quality, and Public Facilities and Services (TID/MID 2011).

The Recreation Element focuses on the needs associated with its visitors and local residents as well as identifying acquisition funding sources and developing and maintaining parks and recreational facilities. There are seven goals associated with the Recreation Element:

- Provide an adequate supply and equitable distribution of recreation facilities for residents;
- Cooperate with other public agencies and private enterprise to provide park and recreation facilities;
- Further the goals of other General Plan elements in the acquisition and development of lands for recreation facilities and opportunities;
- Address the impacts of new developments on the County's recreational facilities;
- Acquire, manage, and develop recreational lands according to principles which protect private property rights, maximize cost efficiency, promote accessibilities by all residents, advocate safety, and encourage public participation;
- Develop a broad-based financing program with a wide variety of revenue sources which equitably distributes and/or reduces the cost of providing new recreation facilities; and
- Provide for the ongoing acquisition, construction, and maintenance of recreation facilities.

3.4 Stanislaus County General Plan

The Stanislaus County General Plan (1994) consists of seven mandatory elements and as many optional elements as the local jurisdiction deems desirable. The mandatory elements include Land Use, Circulation, Housing, Open Space, Conservation, Safety, and Noise. Since the Open Space and Conservation Elements have overlapping requirements, they have been combined in the Stanislaus County General Plan. The County has also adopted one optional element, the Agricultural Element (Stanislaus County 1994).

The Land Use Element focuses on the general distribution and general location and extent of the uses of the land for housing, business, industry, open space, including agriculture, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds, solid and liquid waste disposal facilities, and other categories of public and private uses of land. The following goals may be pertinent to the La Grange pool and Project area:

- Provide for diverse land use needs by designating patterns which are responsive to the physical characteristics of the land as well as to environmental, economic, and social concerns of the residents of Stanislaus County.
- Foster stable economic growth through appropriate land use policies.
- Ensure that an effective level of public service is provided in unincorporated areas.

4.0 STUDY GOALS

The goals of this study are: (1) to identify and characterize public use and potential recreation opportunities in the study area, and (2) to assess the public safety risk of identified recreation opportunities in the study area. Depending upon the results of the study, the Districts may develop a Year 2 facilities siting assessment related to potential safe recreational activities identified during the Year 1 study.

5.0 EXISTING INFORMATION AND NEED FOR ADDITIONAL INFORMATION

There are no recreation facilities associated with the Project or located along the reach of the Tuolumne River between Don Pedro Dam and La Grange Diversion Dam. Public access to this reach of the Tuolumne River has been historically limited to occasional use by the adjacent private property owners. All existing information on recreational use along the La Grange pool and in the immediate area below La Grange Diversion Dam, and the safety risks associated with recreational use, is anecdotal. It would be inappropriate to evaluate recreational enhancements at the Project without first evaluating whether it is safe for the public to utilize the potential recreational resources at the Project. This study plan focuses on identifying potential recreation access and an associated safety assessment to inform FERC's assessment of recreation potential at the Project. Depending upon the results of the study, the Districts may propose a Year 2 facilities siting assessment for those recreational activities identified during the Year 1 study as being able to safely occur at the Project.

6.0 STUDY AREA

The study area includes the Tuolumne River from RM 51.8 (which is approximately 200 feet downstream of where the La Grange Hydroelectric Project tailrace meets the bypass reach) upstream to Don Pedro Dam, located at RM 54.8. The study area includes any potential public access ways that may exist along the east (left) bank of the Tuolumne River along this reach.

7.0 STUDY METHODS

Step 1 – Identify and Describe Existing Public Access and Potential Recreation Opportunities in the Study Area

Public Access Review

Using existing aerial photographs and property ownership data, existing public access routes will be identified via desktop study and then confirmed with a site visit. Observations during a site visit will be used to produce descriptions of each public access route, including route length, terrain, and a qualitative description of the route. Photographs will be taken to augment the written descriptions.

Recreation Opportunity Identification

Site characteristics in the study area will be assessed for recreation potential using existing aerial photography, topography data, and property ownership data; and observations made and documented during a site visit. Site characteristics to be assessed will include proximity to improved public roads, topography and bank slope, existing access and use, and property ownership. Site conditions will be detailed quantitatively, described narratively, and photographed.

Public Involvement

As described above, a site visit will be conducted as part of the Public Access Review and Recreation Opportunity Identification. Licensing participants will be invited to this field site visit. At the conclusion of the site visit, the Districts will be available for a debrief meeting with licensing participants to discuss observations during the site visit. The Districts will prepare meeting notes summarizing discussions at the debrief meeting and circulate these notes to licensing participants for 30-day review and comment. Final meeting notes will be including in the Recreation Access and Safety Assessment Study Report.

Step 2 – Assess Risk to Public Safety

The Canadian Dam Association's (CDA's) risk assessment process, as outlined in the Guidelines for Public Safety Around Dams (CDA 2011), will be used to assess the risk to public safety of using Project lands and facilities for recreation. The risk assessment process will include the following seven steps:

1) **Establish Boundaries of Site Components (Areas)** – Boundaries will be established around Project components (e.g., La Grange pool and tailwater) that may be used for recreation.

2) **Identify Potential Recreation Activities within Each Component** – Information will be obtained regarding the types and level of existing and potential public activities associated with each component, where applicable Recreation activities to be assessed upstream and downstream of the La Grange Diversion Dam include the following:

    - Fishing from a boat
    - Boating (under power)
    - Canoeing
    - Kayaking
    - Swimming
    - Diving
    - Fishing from the shore
    - Walking
    - Climbing
    - Camping
    - Bird watching

For a complete list of recreation activities that will be considered, please see the sample Risk Assessment Form in Attachment A.

3) **Identify Hazards within Each Component** – Through site visit observations, information will be obtained regarding hazards within each component.

4) **Identify Existing Risk Treatments (Measures) and Their Effectiveness** – Through site visit observations, current risk treatment (measures) will be evaluated.

5) **Assign Incident Likelihood Ratings (ILR)** – ILR will be assigned (Table 2.0).

Table 2.0. Incident Likelihood Ratings (ILR).

Description	Definition of Likelihood	ILR
Very Frequent	More than 10 occurrences[1] in the hazardous area in any one of the last 3 years, ***or*** 25 or more occurrences in total in the last 3 years	5
Frequent	More than 2 occurrences in the hazardous area in any one of the last 3 years	4
Occasional	Any occurrences in the hazardous area in the last 6 years	3
Possible	Any occurrences in the hazardous area in the last 10 years	2
Remote	No known occurrences in last 10 years	1

1. Occurrence refers to the presence of members of the public (non-workers or contractors) in the hazardous area of the component under consideration, whether or not an "incident" occurs. Occurrences are estimated from known incidents, anecdotal evidence, and additional knowledge about public presence in the area.

6) **Assign Incident Consequence Ratings (ICR) –** ICR will be assigned (Table 3.0).

Table 3.0. Incident Consequence Ratings (ICR).

Anticipated Incident Consequence	Anticipated Nature of Public Exposure to Identified Hazard/Hazardous Area	ICR
Fatality	Fatality	5
Critical	Permanent Partial or Total Disability	4
Major	Medical Treatment; Stranding (rescue required)	3
Minor	First Aid; or Stranding (self-rescue possible)	2
Insignificant	No attention Required	1

7) **Determine Risk Rating and Assign Risk Level** – Risk level will be assigned (Table 4.0).

Table 4.0. Risk rating and assign risk level.

ILR		ICR				
		Insignificant	Minor	Major	Critical	Fatality
		1	2	3	4	5
Remote	**1**	Low	Low	Low	Low	High
Possible	**2**	Low	Low	Low	Medium	High
Occasional	**3**	Low	Low	Medium	Medium	High
Frequent	**4**	Low	Medium	Medium	High	High
Very Frequent	**5**	Medium	Medium	High	High	High

A sample Risk Assessment Form is presented in Attachment A to this plan.

Step 3 – Prepare Report

A study report will be prepared that summarizes the results of the Year 1 study, including a discussion of the potential need, if any, to develop a Year 2 facilities siting assessment for those recreational activities identified during the Year 1 study as being able to safely occur at the Project.

8.0 SCHEDULE

The Districts anticipate the following schedule to complete the study plan. The schedule assumes that FERC issues its Study Plan Determination by February 2, 2015, and that the study is not disputed by a mandatory conditioning agency.

- Step 1 and Step 2 ..... March – July 2015
- Step 3 ..... August – October 2015
- Initial Study Report Issuance ..... February 2016

9.0 CONSISTENCY OF METHODOLOGY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICES

The CDA is a leading authority on public safety related to hydroelectric facilities. CDA's Guidelines for Public Safety Around Dams are generally applicable to facilities located throughout the United States and provide an objective and established methodology to assess public safety risks.

10.0 LEVEL OF EFFORT AND COST

The Districts estimate the cost to complete this study to be $50,000.

11.0 REFERENCES

California Department of Parks and Recreation (CDPR). 2013. Turlock Lake State Recreation Area. [Online] URL: http://www.parks.ca.gov/. (Accessed March 26, 2013).

——. 2009. Complete Findings for the Survey on Public Opinions and Attitudes on Outdoor Recreation in California. Sacramento, California. September 1998.

Canadian Dam Association (CDA). 2011. Guidelines for Public Safety Around Dams.

Stanislaus County. 1994. Stanislaus County General Plan. [Online] URL: http://www.co.stanislaus.ca.us/planning/pl/general-plan.shtm. (Accessed March 26, 2013).

Tuolumne County. 1996. Tuolumne County General Plan Policy Documents. [Online] URL: http://www.co.tuolumne.ca.us/index.aspx?NID=185. (Accessed January 16, 2014).

Turlock Irrigation District and Modesto Irrigation District (TID/MID). 2011. Pre-Application Document Volume II of II, Don Pedro Project (FERC No. 2299). Turlock Irrigation District and Modesto Irrigation District, Turlock and Modesto, California.

This Page is Intentionally Left Blank

RECREATION ACCESS AND SAFETY ASSESSMENT STUDY PLAN

ATTACHMENT A

SAMPLE RISK ASSESSMENT FORM

This Page is Intentionally Left Blank

CDA Public Safety Around Dams Risk Assessment Tool

Date	Name	Signature

UPSTREAM LOCATION (Define)

Describe the boundary of the Component:

Location Name	

Risk Level at the Time of Assessment

Activity Location within the Hazardous Area	Activity Description	Potential Hazard																									Risk Reduction Measures Present at the Time of Assessment													Risk Assessment				Comments
		Rapidly increasing in water levels	Rapidly increasing water flows	Strong currents or undertows	Frequently dry riverbed	Presence of spillway with sluicegate	Automatic Emergency Operation of Spillway Gate	Presence of spillway with stop-logs	Presence of overflow spillway or dam	Presence of discharge valve/pipe	Submerged hydraulic jump	Submerged underwater structures	Remote control flow equipment	Automatic control flow equipment	Steep or slippery banks	Falling from height >3 metres	Pinching or crushing	Thin ice	Changing flow/depth may result in Stranding	Floating debris	Flow or level changes as a result of maintenance	Unsecured mechanical/electrical equipment	Unsecured or exposed live electrical conductors	Inadequate guardrails/handrails for public	Open holes or tripping	Other (define)	Other (define)	Signage	Public Education (Local Initiatives)	Safety Buoys	Safety Booms	Audible Danger Signalling Devices	Visual Danger Signalling Devices	Fencing	Barricades (Vehicle or People)	Security Patrols	24/7 Video Surveillance	Operational Controls (Procedures)	Write a letter to the Adjacent Property Owner	Other (define)	Other (define)	Incident Likelihood Rating (ILR)	Incident Consequences Rating (ICR)	Risk Rating	Risk Level	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	1	2	3	4	5	6	7	8	9	10	11	12	13	14	ILR	ICR	RR	RL	
From Water / Ice	Fishing from Boat																																											
	Boating (under power)																																											
	Sailing																																											
	Windsurfing																																											
	Canoeing/Kayaking/Rowing																																											
	Waterskiing																																											
	Swimming																																											
	Jet Ski																																											
	Scuba Diving																																											
	Swimming/Diving																																											
	~~Skating~~																																											
	~~Ice fishing~~																																											
	~~Snowmobiling~~																																											
From Shore/Structure	Fishing from Shore																																											
	Walking																																											
	Climbing																																											
	Camping																																											
	Picnicking																																											
	ATV / Dirt Biking																																											
	Hiking																																											
	Skiing																																											
	Snowshoeing																																											
	Driving																																											
	Biking																																											
	Scuba Diving																																											
	Swimming / Diving																																											
	Accessing electrical equipment																																											
	Accessing mechanical equipment																																											
	Bird watching																																											

CDA Public Safety Around Dams Risk Assessment Tool

UPSTREAM LOCATION (Define)

Anticipated (Current or Expected) Risk Level

As a result of recent risk reduction measures implemented or additional risk reduction measures to be implemented in the immediate future

Additional Risk Reduction Measures have recently been implemented or will be implemented in the immediate future													Risk Characterization				Comments (Includes assumptions, conclusions or observations)
Signage	Public Education (Local Initiatives)	Safety Buoys	Safety Booms	Audible Danger Signalling Devices	Visual Danger Signalling Devices	Fencing	Barricades (Vehicle or People)	Security Patrols	24/7 Video Surveillance	Operational Controls (Procedures)	Write a letter to the Adjacent Property Owner	Other (define)	Other (define)	Incident Likelihood Rating (ILR)	Incident Consequences Rating (ICR)	Risk Rating	Current or Expected Risk Level	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	ILR	ICR	RR	RL	

Revised: October 15, 2011

REVISED STUDY PLAN DOCUMENT

APPENDIX D

LA GRANGE HYDROELECTRIC PROJECT
FISH PASSAGE ASSESSMENT STUDY PLAN

This Page is Intentionally Left Blank

REVISED STUDY PLAN

TURLOCK IRRIGATION DISTRICT
AND
MODESTO IRRIGATION DISTRICT

LA GRANGE HYDROELECTRIC PROJECT
FERC NO. 14581

Fish Passage Assessment

January 2015

1.0 PROJECT DESCRIPTION

The Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts) own the La Grange Diversion Dam (LGDD) located on the Tuolumne River in Stanislaus County, California (Figures 1.0 and 2.0). LGDD is 131 feet high and is located at river mile (RM) 52.2 at the exit of a narrow canyon, the walls of which contain the pool formed by the diversion dam. Under normal river flows, the pool formed by the diversion dam extends for approximately one mile upstream. When not in spill mode, the water level above the diversion dam is between elevation 294 feet and 296 feet approximately 90 percent of the time. Within this 2-foot range, the pool storage is estimated to be less than 100 acre-feet of water.

The drainage area of the Tuolumne River upstream of LGDD is approximately 1,550 square miles. Tuolumne River flows upstream of LGDD are regulated by four upstream reservoirs: Hetch Hetchy, Lake Eleanor, Cherry Lake, and Don Pedro. The Don Pedro Project is owned jointly by the Districts, and the other three dams are owned by the City and County of San Francisco (CCSF). Inflow to the La Grange pool is the sum of releases from the Don Pedro Project (FERC No. 2299), located 2.3 miles upstream, and very minor contributions from two small intermittent streams downstream of Don Pedro Dam.

LGDD was constructed from 1891 to 1893 to replace Wheaton Dam, which was built by other parties in the early 1870s. The LGDD raised the level of the Tuolumne River to permit the diversion and delivery of water by gravity to irrigation systems owned by TID and MID. The Districts' irrigation systems currently provide water to over 200,000 acres of prime Central Valley farmland and drinking water to the City of Modesto. Built in 1924, the La Grange hydroelectric plant is located approximately 0.2 miles downstream of LGDD on the east (left) bank of the Tuolumne River and is owned and operated by TID. The powerhouse has a capacity of slightly less than five megawatts (MW). The La Grange Hydroelectric Project (La Grange Project or Project) operates in a run-of-river mode. The LGDD provides no flood control benefits, and there are no recreation facilities associated with the La Grange Project or the La Grange pool.

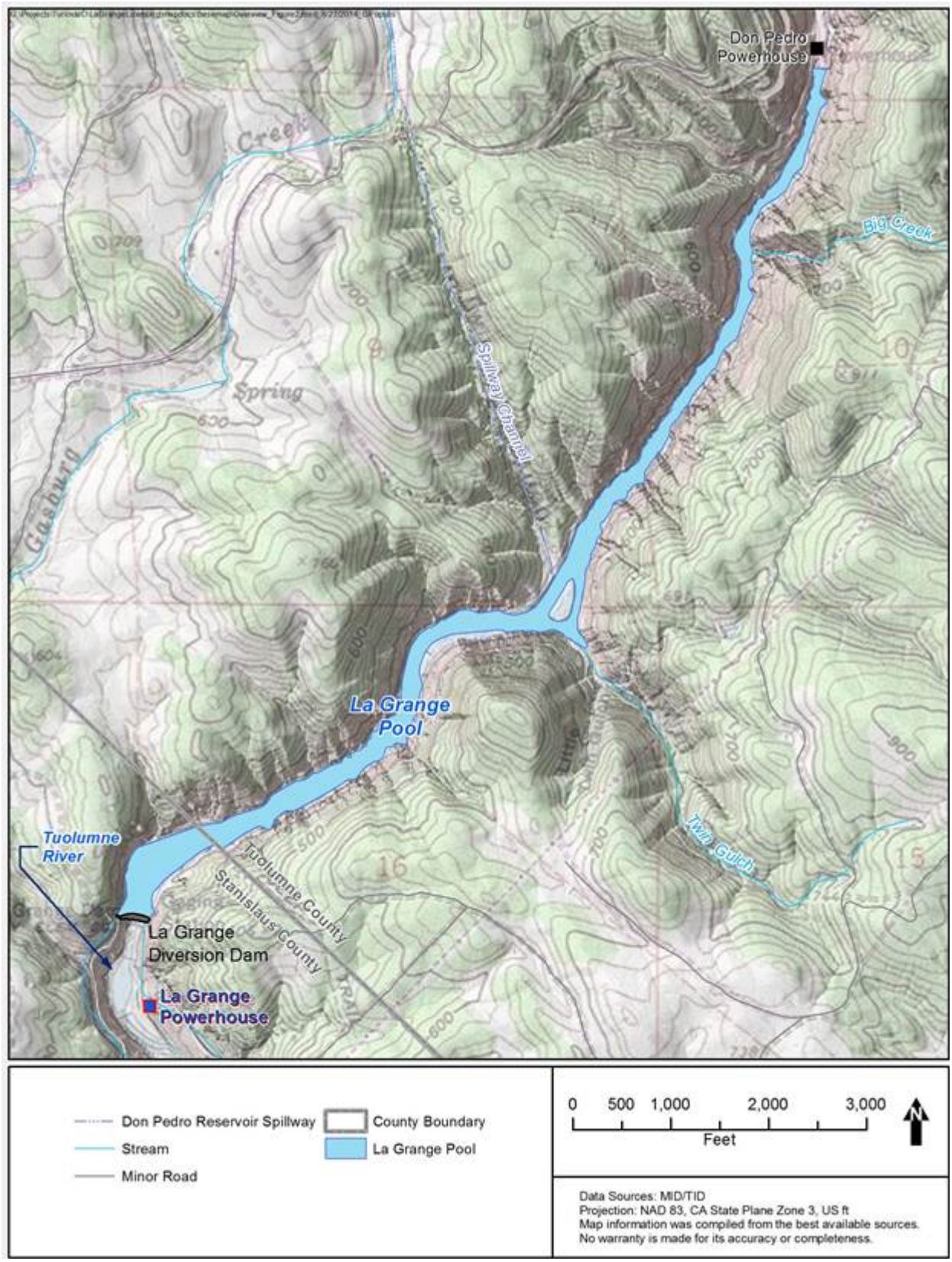

Figure 1.0. La Grange Hydroelectric Project location map.

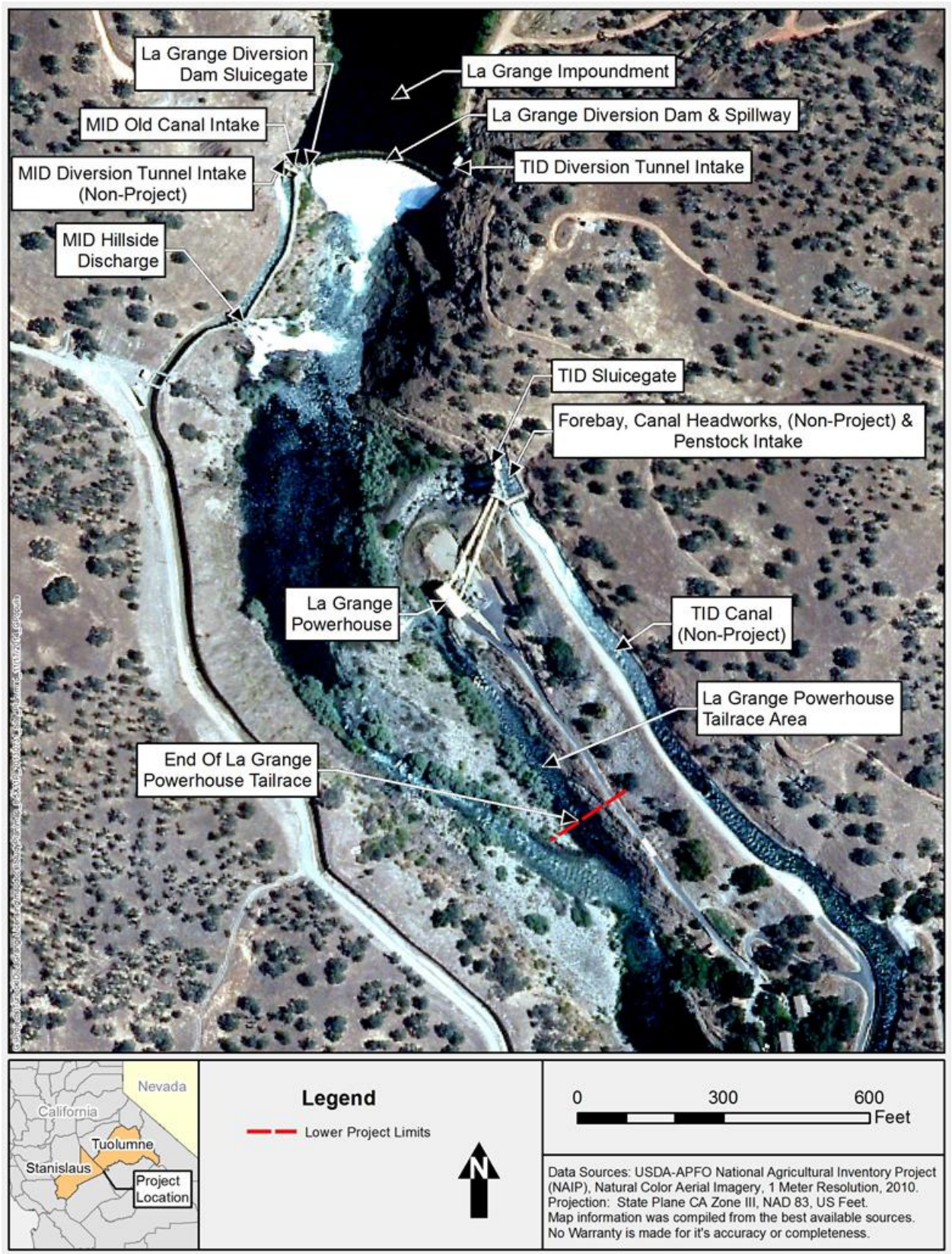

Figure 2.0. La Grange Hydroelectric Project site plan.

2.0 STUDY REQUESTS, PROJECT NEXUS, AND INFORMATION NEEDED

The Fish Passage Assessment contains three related elements that together comprise the entire study plan: (1) Fish Passage Facilities Assessment; (2) Upper Tuolumne River Basin Habitat Assessment; and (3) Habitat Assessment and Fish Stranding Observations below La Grange Diversion Dam and Powerhouse. A discussion of the need for information and the potential Project nexus is provided below for each study element. As explained below, the Districts continue to assert that certain elements of the Licensing Participants' (LPs) study requests, and this revised study plan, do not meet FERC's study plan criteria. While the Districts reserve their rights relative to any FERC order in this regard, the Districts do agree to execute the studies described below and herein in collaboration with LPs.

2.1 Fish Passage Facilities Assessment

Resource agencies and Conservation Groups (CGs) requested that the Districts undertake extensive studies of anadromous fish passage facilities at the LGDD as part of the licensing process for the La Grange Project. Specifically, these entities requested that the Districts undertake investigations of upstream and downstream fish passage facilities at both LGDD and the Districts' Don Pedro Dam located upstream of LGDD. Although the Districts do not believe that studies of fish passage facilities meet FERC's study criteria specified in its regulations governing the Integrated Licensing Process (ILP) (see 18 C.F.R. Part 5, Section § 5.9), the Districts are willing to collaborate with licensing participants and FERC staff to perform certain investigations of upstream and downstream anadromous fish passage facilities at the Districts' La Grange and Don Pedro developments as described herein. The Districts are willing to conduct an initial two-year, phased evaluation to (1) develop in cooperation with LPs' initial biological design criteria for fish passage facilities, (2) gather hydrologic data and engineering information in cooperation with licensing participants to inform conceptual upstream and downstream passage facility layouts, (3) identify and discuss the pros and cons of potential fish passage alternatives, and (4) for select passage alternatives, develop preliminary functional design information, facility sizing, site plans, layouts, and initial cost estimates. In addition, any significant additional information needs required to develop reliable facility functional designs, construction cost estimates, and annual operation and maintenance (O&M) costs would be identified and defined.

The Districts continue to point out that the La Grange Project is not a FERC-licensed facility, and it remains uncertain whether FERC will issue a license for it, or if issued, the Districts would accept the license. The resource agencies and CGs have contended in their study requests for the La Grange Project that performing a study of installing fish passage facilities at just the La Grange Project would be of little value. Hence, the resource agencies and CGs are requesting fish passage studies within the La Grange proceeding that encompass both La Grange and Don Pedro facilities. The Districts contend that they cannot be compelled at this point in the Don Pedro relicensing process to study fish passage at Don Pedro, by proxy or otherwise, since Don Pedro is not a barrier to upstream adult migration. Any study of fish passage under the La Grange proceeding must only involve the La Grange facilities in order to meet FERC's seven study criteria. It has not been shown, and no evidence has been offered by any party, that fish

passage at La Grange is necessary to support viable salmon and/or steelhead populations on the Tuolumne River. The potential availability of suitable salmon or steelhead habitat above LGDD or Don Pedro Reservoir would be a sufficient justification for fish passage studies at La Grange *only* if there were not adequate habitat downstream of the La Grange Project. Substantial information has been provided in the Don Pedro Final License Application indicating that there is abundant salmon and steelhead habitat below LGDD, and no party has provided any evidence to the contrary.

Therefore, the Districts continue to assert that an assessment of fish passage facilities at LGDD constitutes a study of a mitigation measure, the need for which has not been adequately demonstrated by the resource agencies or CGs. It has been FERC's policy that costly studies of mitigation measures are not appropriate until a need for the measure has been demonstrated; that is, a project effect has been determined. Just as it is inappropriate to require a licensee to provide mitigation for entrainment mortality unless there is evidence that a fishery population is being adversely affected (*see, e.g., City of New Martinsville v. FERC*, 102 F. 3d 567 (D.C. Cir. 1996), *Tower Kleber Limited Partnership*, 91 FERC ¶ 61,172 (2000)), it is inappropriate to require applicants to undertake costly studies of mitigation measures until some evidence of a need for the mitigation measure has been demonstrated.

While the LGDD may appear to be a barrier to anadromous fish migration, there is no evidence presented in the resource agencies' or CGs' study requests showing that significant numbers of anadromous fish are being prevented from migrating upstream or, more to the point, that *any* upstream migrants are being prohibited from spawning or rearing in the Tuolumne River. Indeed, there is no evidence presented in any study request that indicates anadromous fish are even reaching the LGDD or even the La Grange powerhouse, and that if a few actually reach these locations, they are not moving back downstream to spawn.

Even the National Marine Fisheries Service' (NMFS) study request only goes as far as stating that the La Grange powerhouse and LGDD are "potential" barriers to adult salmon. The salmon population found in the Tuolumne River is a fall-run Chinook (*Oncorhynchus tshawytscha*) population. There is no evidence of an anadromous spring-run Chinook or steelhead (*Oncorhynchus mykiss*) population in the Tuolumne River. NMFS only identifies the potential that populations of these two anadromous species *might* at some future time occur in the Tuolumne River; however, there currently are no approved plans or approved funding for reintroduction of spring-run Chinook in the Tuolumne River basin, and, as noted, there is no evidence of a steelhead run in the Tuolumne River. Moreover, studies undertaken as part of the Don Pedro Hydroelectric Project relicensing demonstrate that there is sufficient spawning and rearing habitat in the lower Tuolumne River downstream of LGDD to meet the resource agencies' fall-run Chinook population goals, and the lower river supports a growing *O. mykiss* population. Proposing to provide upstream and downstream fish passage for spring-run Chinook and steelhead on the Tuolumne River, at a cost of many millions of dollars, is not warranted based on an uncertain and highly speculative projection that populations of these fish may at some future time exist in the Tuolumne River. Indeed, providing such upstream and downstream passage facilities at LGDD or Don Pedro based on the mere hope that such fish might someday be present and might someday make use of such facilities is the very type of "Field of Dreams"

justification ("If you build it, they will come.") that the courts have found to be legally inadequate. *See Bangor Hydro-Electric Co. v. FERC*, 78 F.3d 659, 664 (D.C. Cir. 1996).

In their Proposed Study Plan document filed with FERC and LPs on September 4, 2014, and in the Proposed Study Plan Meeting held on October 6, 2014, the Districts indicated their view that a step-wise approach to the question of the need for fish passage at LGDD was warranted, with the first step consisting of exploring whether, and to what extent, LGDD constitutes an actual barrier to anadromous fish migration. For this assessment, the Districts defined a two-year study to determine the number and timing of anadromous fish approaching and holding (i.e., not returning back downstream to spawning habitat) at LGDD.

In their request for studies, resource agencies and CGs have proposed a two-year study plan that they assert is necessary to evaluate anadromous fish passage at both LGDD and the Don Pedro Project. The Districts acknowledge that conducting the Districts' proposed fish barrier study filed in the PSP as a prerequisite to beginning an evaluation of upstream and downstream passage facilities would further extend the study period; therefore, in the spirit of cooperation, the Districts are willing to undertake the two-year study of fish passage facilities in parallel with its two-year study of the need for fish passage instead of conducting these studies sequentially, *i.e.*, conducting the study of fish passage facilities after completing the study of the need for fish passage contingent upon a need being established. To this end, the Districts have combined their original fish barrier study with the LPs' requests for studies of fish passage facilities. The study plan contained in this document is consistent with this in-parallel performance of the work. The Districts agree to undertake this "in-parallel" study approach, as described further below, as a voluntary action on their part in an attempt to foster a collaborative investigation of issues related to fish passage on the Tuolumne River. The fact that the Districts are agreeing to undertake this "in-parallel" study approach at this time should not be construed in any way as a waiver of the Districts' position that anadromous fish passage studies are premature unless and until a need for such facilities has been demonstrated by substantial evidence, and the Districts specifically reserve their right to advance this position at any time.

2.2 Upper Tuolumne River Basin Habitat Assessment

NMFS's Recovery Plan identifies the upper Tuolumne River above Don Pedro Reservoir as a candidate area for reintroduction of Central Valley steelhead and spring-run Chinook salmon (NMFS 2014). However, little information exists to reliably assess the current quantity and quality of suitable habitat for the adult, egg, fry, and juvenile life stages of these salmonid species in the upper Tuolumne River watershed. NMFS has requested information on upstream fish migration barriers and water temperatures in the upper basin to inform its decision making in the context of potential Federal Power Act (FPA) 10(j) recommendations, section 18 fishway prescriptions, and Endangered Species Act (ESA) consultation. For the reasons discussed below, the Districts do not believe that this request satisfies the study criteria requirements mandated by FERC's ILP process. Nevertheless, as with the fish passage facilities assessment, the Districts are willing to voluntarily conduct a two-year, phased assessment of physical barriers and temperature conditions in the upper Tuolumne River, as described in subsequent sections of this plan, and in cooperation with licensing participants.

Because the La Grange Project does not affect in any way habitat in the upper Tuolumne River, the request to study habitat in upstream reaches does not satisfy the ILP's project nexus criterion. NMFS' study request states that "…*this study will primarily focus on an evaluation of historic habitat, to inform a potential reintroduction that will likely target the historic salmonid habitat above Don Pedro Reservoir as called for in NMFS Recovery Plan (NMFS 2014).*" NMFS' Recovery Plan is based on the idea that prior to the construction of Wheaton Dam ca. 1878 and La Grange Dam in 1893, habitat in the upper Tuolumne River was suitable for spring-run Chinook and steelhead. To the extent that NMFS's requested study is an assessment of "historic habitat", the study request is considered an assessment of pre-Project conditions, and as a result, is inconsistent with FERC's definition of baseline. In any event, it is apparent that any study conducted under current conditions is a study of today's habitat conditions, which are markedly different from historical conditions (e.g., due to upstream water resource development and climate change to name two significant changes occurring over the last 130 years). NMFS' Recovery Plan did not have the benefit of prior field study or research to determine whether suitable habitat still exists above Don Pedro Reservoir; therefore, NMFS's current study request constitutes baseline research to identify whether, and the extent to which, suitable habitats may exist to support its Recovery Plan.

NMFS requires information to support judgments made as part of its Recovery Plan development and to inform its decision-making regarding the suitability of upstream habitats. In its December 22, 2011, Study Plan Determination for the Don Pedro Hydroelectric Project, FERC stated with respect to essentially the identical study request that "*the suitability of upstream habitat for anadromous salmonids, as it relates to recovery planning under NMFS guidelines, pertains to management decisions and actions which most appropriately fall under NMFS jurisdiction. For these reasons, we conclude that a study of upriver populations and habitat is not warranted.*" The Districts continue to agree with FERC staff's December 2011 determination that it is the responsibility of the fisheries management agencies, not the license applicant, to conduct the research needed to understand the conditions in river reaches for which the agencies are proposing significant fish introduction programs, especially when the proposed project does not affect that habitat in any respect.

Nonetheless, to more fully support licensing participants in their development of information to supplement the proposed fish passage studies described above, to provide further useful information, to document important river conditions between Early Intake and the upstream end of the Don Pedro Reservoir, and to foster collaboration among all parties, the Districts will cooperate with licensing participants by conducting certain studies of this reach, as described further in this study plan.

2.3 Habitat Assessment and Fish Stranding Observations Below LGDD and Powerhouse

Licensing Participants requested information related to the operation of the La Grange Project and associated "five flow conduits" (i.e., La Grange powerhouse, LGDD spillway, TID sluicegate, MID hillside discharge, and LGDD sluicegate) because these "flow conduits" are asserted to have the potential to influence fish behavior and movement in the vicinity of the La Grange Project, as upstream migrating fish may be attracted to different sources of flow. LPs

believe that the discharge patterns resulting from flows passed at the La Grange Project have the potential to attract, and then possibly strand, fish in multiple locations. The Districts have been asked to document flows, characterize physical habitat, and observe fish behavior in the immediate vicinity of the La Grange Project.

The Districts agree that Project operations have the potential to affect anadromous fish behavior, to the extent that anadromous fish may be present in the immediate area of Project facilities, thereby establishing a reasonable project nexus. Although the Districts have previously presented information on flow variability downstream of the La Grange Project (see Don Pedro Project Update Study Report, January 2014), NMFS' study request identifies the need for information on discharges associated with two conduits, i.e., the MID hillside discharge and the LGDD sluicegate that were not individually evaluated as part of the previous study under the Don Pedro relicensing proceeding. As such, the Districts agree to conduct a two-year evaluation of flows, associated habitat attributes, and observations of salmonids in the immediate area of the Project under certain flow conditions, as described further below.

3.0 RESOURCE AGENCY MANAGEMENT GOALS

The Districts contend that four agencies have resource management goals related to Chinook salmon and steelhead and/or their habitat: (1) U.S. Department of Interior, Fish and Wildlife Service (USFWS); (2) NMFS; (3) California Department of Fish and Wildlife (CDFW); and (4) State Water Resources Control Board (SWRCB).

A goal of the USFWS (2001) Anadromous Fish Restoration Program, as stated in Section 3406(b)(1) of the Central Valley Project Improvement Act, is to double the long-term production of anadromous fish in California's Central Valley rivers and streams. Objectives in meeting this long-term goal include: (1) improve habitat for all life stages of anadromous fish through provision of flows of suitable quality, quantity, and timing, and improved physical habitat; (2) improve survival rates by reducing or eliminating entrainment of juveniles at diversions; (3) improve the opportunity for adult fish to reach spawning habitats in a timely manner; (4) collect fish population, health, and habitat data to facilitate evaluation of restoration actions; (5) integrate habitat restoration efforts with harvest and hatchery management; and (6) involve partners in the implementation and evaluation of restoration actions.

NMFS has developed Resource Management Goals and Objectives for species listed under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §1801 et seq.) and the Endangered Species Act (ESA) (16 U.S.C. §1531 et seq.), as well as anadromous species that are not currently listed but may require listing in the future. NMFS' (2009) Public Draft Recovery Plan for Sacramento River Winter-run Chinook salmon, Central Valley Spring-run Chinook salmon, and Central Valley steelhead (Draft Recovery Plan) outlines the framework for the recovery of ESA-listed species and populations in California's Central Valley. For Central Valley steelhead, the relevant recovery actions identified by NMFS for the Tuolumne River are to: (1) conduct habitat evaluations, and (2) manage cold water pools behind La Grange and Don Pedro dams to provide suitable water temperatures for all downstream life stages of *O.mykiss*. For Chinook salmon, the relevant goals are to enhance the Essential Fish Habitat downstream of LGDD and achieve a viable population of Central Valley fall/late fall-run

Chinook salmon in the Tuolumne River. NMFS' spring-run Chinook salmon conceptual recovery scenario for the Southern Sierra Nevada Diversity Group includes reintroduction of spring-run Chinook salmon to candidate areas of the Tuolumne River above Don Pedro Dam.

CDFW's mission is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. CDFW's resource management goals, as summarized in restoration planning documents such as Restoring Central Valley Streams: A Plan for Action (Reynolds et al. 1993), are to restore and protect California's aquatic ecosystems that support fish and wildlife, and to protect threatened and endangered species under California Fish and Wildlife Code (Sections 6920–6924).

SWRCB has responsibility under the federal Clean Water Act (33 U.S.C. §11251–1357) to preserve and maintain the chemical, physical, and biological integrity of the State's waters and to protect water quality and the beneficial uses of stream reaches consistent with Section 401 of the federal Clean Water Act, the Regional Water Quality Control Board Basin Plans, State Water Board regulations, the California Environmental Quality Act, and any other applicable state law.

4.0 SUMMARY OF STUDY OBJECTIVES

The proposed La Grange Project Fish Passage Assessment has the following objectives to be achieved using a phased approach over the course of two consecutive study years (study phases are described in Methods [Section 6] and Schedule [Section 7]).

1. Fish Passage Facilities Assessment:

    a. Concept-level fish passage alternatives: Identify and develop concept-level alternatives for upstream and downstream passage of Chinook salmon and steelhead at the La Grange and Don Pedro dams. Specific objectives are listed below:

        1. Obtain available information to establish existing baseline conditions relevant to impoundment operations and siting passage facilities.
        2. Obtain and evaluate available hydrologic data and biological information for the Tuolumne River to identify potential types and locations of facilities, run size, fish periodicity, and the anticipated range of flows that correspond to fish migration.
        3. Formulate and develop preliminary sizing and functional design for select, alternative potential upstream and downstream fish passage facilities.
        4. Develop Class-V opinions of probable construction cost and annual O&M costs for select fish passage concept(s).

    b. La Grange Project fish barrier assessment: Evaluate the potential impact of the LGDD and the La Grange powerhouse as barriers to upstream migration of adult fall-run Chinook salmon and, if they occur, steelhead, including documentation of the

proportion of the fall-run Chinook salmon population that may migrate upstream to these facilities and an evaluation of potential impacts on spawning of these fish. Specific objectives are listed below:

1. Determine the number of fall-run Chinook salmon and steelhead migrating upstream to the LGDD and the La Grange powerhouse during the 2015/2016 and 2016/2017 migration seasons.
2. Compare the number of fall-run Chinook salmon and steelhead migrating upstream to the LGDD and the La Grange powerhouse to total escapement during the 2015/2016 and 2016/2017 migration seasons.
3. Document carcass condition (egg retention) to evaluate pre-spawn mortality rates of fall-run Chinook salmon and steelhead migrating upstream to the LGDD and the La Grange powerhouse, which do not move back downstream to spawn.
4. Implement formal documentation of incidental fish observations in the vicinity of the LGDD, La Grange powerhouse tailrace, and TID sluicegate channel.

2. Upper Tuolumne River Basin Habitat Assessment: Conduct an assessment of certain habitat characteristics of the Tuolumne River upstream of the Don Pedro Hydroelectric Project Boundary.

   a. Barriers to Upstream Anadromous Salmonid Migration:

      1. Compile results from any relevant prior studies and conduct field surveys to identify barriers (both complete and partial) to upstream anadromous salmonid migration in the mainstem Tuolumne River upstream of the Don Pedro Project Boundary and tributaries, including the North, Middle, and South forks of the Tuolumne River, Cherry Creek, and the Clavey River.
      2. Characterize and document the physical structure of each barrier under base flow and spawning migration flow conditions.

   b. Water Temperature Monitoring and Modeling:

      1. Use existing data to characterize the thermal regimes of the upper Tuolumne River and tributaries from the Don Pedro Project Boundary to CCSF's Early Intake, including the North, Middle, and South forks of the Tuolumne River, Cherry Creek, and the Clavey River. Identify locations where temperatures appear to be suitable for salmonids.
      2. Depending on the availability of information, logistical feasibility, and safety, install data loggers to obtain additional information in locations for which existing data are inadequate.
      3. Develop and test a computer model to simulate existing thermal conditions in the Tuolumne River between Early Intake and the Don Pedro Reservoir.

c. Upstream Habitat Characterization:

1. Summarize data from the upper Tuolumne River habitat suitability evaluation being conducted by NMFS; data will be used, if applicable, to complement the barrier assessment and temperature studies identified above.
2. Identify additional information needs following completion of barrier assessment, temperature assessment, and review of available data from the NMFS study.

3. Habitat Assessment and Fish Stranding Observations below LGDD and Powerhouse:

a. Develop Hydrologic Data for Flow Conduits at the La Grange Project:

1. Continue existing monitoring of discharges associated with the La Grange powerhouse, LGDD spillway, and the TID sluicegate.
2. Conduct two years of monitoring of the MID hillside discharge and LGDD sluicegate.
3. Based on existing information, to the extent available, characterize the magnitude and rate of flow and stage changes when project conduits are shut down.

b. Collect Topographic, Depth, and Habitat Data in the Vicinity of the La Grange Project Facilities:

1. Survey longitudinal profiles and transects along the channel thalweg in the La Grange powerhouse tailrace channel, TID sluicegate channel, and the mainstem river channel upstream of where it joins the tailrace channel.
2. Measure water depths at a flow of approximately 25 cfs in the mainstem river channel upstream of where it joins the tailrace channel and at approximately 75 to 100 cfs in the La Grange powerhouse tailrace channel and the TID sluicegate channel.
3. Map substrate and habitat in the reaches where longitudinal profiles are surveyed, delineating pools, runs, high- and low-gradient riffles, step-pools, and chutes.
4. Map patches of spawning-sized gravels in the tailrace and mainstem upstream of the tailrace that are greater than 2 m^2.
5. Conduct pebble counts in riffles, runs, and pool tailouts to document substrate particle size distribution in these habitats.

c. Assess Fish Presence and Potential for Stranding: Conduct periodic direct visual observations in the TID sluicegate channel downstream to the confluence of the

La Grange powerhouse tailrace and the main channel of the Tuolumne River to assess the presence and potential stranding of salmonids.

5.0 NEED FOR ADDITIONAL INFORMATION

5.1 Fish Passage Facilities Assessment

Historically, both fall- and spring-run Chinook salmon occurred in the Tuolumne River basin. Currently, however, only a fall-run Chinook salmon population is present in the Tuolumne River. Central Valley spring-run Chinook salmon, currently listed as threatened, were proposed as endangered by NMFS on March 9, 1998. NMFS (1998) concluded that the Central Valley spring-run Chinook salmon ESU was in danger of extinction and native spring-run Chinook salmon are extirpated from the San Joaquin River Basin.

As a result, the fish barrier component of this study will focus on the potential stranding of fall-run Chinook and any steelhead that may be present. Adult fall-run Chinook salmon migration in the Tuolumne River extends upstream to the vicinity of the LGDD and occurs from September through December, with peak migration activity occurring in October and November (TID/MID 2013b). Spawning occurs in late October to early January, soon after fish enter the river. Spawning occurs in the gravel-bedded reach (upstream of RM 24) where suitable spawning substrates exist. Egg incubation and fry emergence occur from October through early February. Juvenile fall-run Chinook have a relatively short freshwater rearing period before they emigrate to the ocean.

Since the completion of Don Pedro Dam in 1971, spawner estimates have ranged from 40,300 in 1985 to 77 in 1991 (TID/MID 2010, Report 2009-2). From 1971 to 2013, the date of the peak weekly live spawner count has ranged from October 31 (1996) to November 27 (1972), with a median date of November 12 (TID/MID 2010, Report 2009-2). Since fall 2009, escapement monitoring has been conducted at a counting weir established at RM 24.5, near the downstream end of the gravel-bedded reach (TID/MID 2010, Report 2009-8). Since 1971, CDFW has conducted annual salmon spawning surveys. In addition to CDFW's work, the Districts have studied fall-run Chinook salmon on the lower Tuolumne River through annual seine surveys conducted since 1986, annual snorkel surveys since 1982, fish weir counts since 2009, and more recently as part of the Don Pedro Hydroelectric Project relicensing process.

O. mykiss exhibits two life history forms: a resident form commonly known as rainbow trout, and an anadromous form commonly known as steelhead. Central Valley steelhead begin to enter fresh water in August and peak spawning occurs from December through April. After spawning, adults may survive and return to the ocean. Steelhead progeny rear for one to three years in fresh water before they emigrate to the ocean where most of their growth occurs. Spawning by resident rainbow trout in the Central Valley coincides with steelhead and interbreeding is possible. Although low numbers of anadromous *O. mykiss* have been documented in the Tuolumne River (Zimmerman et al. 2009), there is no empirical scientific evidence of a self-sustaining "run" or population of steelhead currently in the Tuolumne River. As a result, while *O. mykiss* are not specifically being investigated as part of this study, weir counts will extend

through at least April, flows permitting, and any apparent anadromous *O. mykiss* encountered at the weir during the study will be recorded.

NMFS has also requested information to aid in evaluating what would constitute safe, effective, and timely upstream and downstream anadromous fish passage at both the La Grange Project and the Don Pedro Project. NMFS and the CGs contend that suitable habitat for anadromous salmonids may exist upstream of Don Pedro Reservoir and that fish passage evaluations of just the La Grange Project facilities would probably not adequately inform the development of alternatives for safe and effective fish passage to adequate amounts of upstream habitat (i.e., fish would need to be passed upstream of the Don Pedro Project to make a fish passage program feasible). Currently there is inadequate information upon which to base consideration of fish passage.

As noted in Section 2.1 of this study plan, the Districts do not believe that fish passage studies are warranted at this point in the La Grange Project licensing. Nevertheless, the Districts agree to undertake an initial two-year, phased (phases described in the Methods section of this plan) evaluation to (1) identify the biological design criteria for potential fish passage, (2) gather information that would inform the siting and sizing of conceptual upstream and downstream fish passage facilities (3) identify and evaluate potential fish passage alternatives, (4) for select fish passage alternatives, develop preliminary functional layouts and cost estimates, and (5) identify any additional information needs.

5.2 Upper Tuolumne River Basin Habitat Assessment

NMFS's Recovery Plan identifies the upper Tuolumne River basin above Don Pedro Reservoir as a candidate area for reintroduction of Central Valley steelhead and spring-run Chinook salmon (NMFS 2014). Currently, there is insufficient information available to assess the quantity and quality of suitable habitat for these salmonid species in the upper Tuolumne River and tributaries below Early Intake. Resource agencies and CGs have requested information on the potential presence of upstream fish migration barriers and water temperatures in the upper basin to inform decision-making in the context of FPA sections 10(a) and 10(j) recommendations, section 18 fishway prescriptions, and any required ESA consultation.

As discussed in detail in Section 2.2 of this study plan, the Districts do not believe that these study requests satisfy the study criteria requirements mandated under FERC's ILP regulations, and as such, cannot be FERC-ordered studies within the context of either the La Grange licensing or the Don Pedro relicensing. Nevertheless, the Districts agree to voluntarily conduct a two-year, phased investigation of migration barriers, temperature conditions, and general habitat conditions in the upper Tuolumne River and appropriate tributaries below CCSF's Early Intake.

5.3 Habitat Assessment and Fish Stranding Observations below LGDD and Powerhouse

The operation of the La Grange Project and the five flow conduits used to pass flow to the lower Tuolumne River have the potential to influence fish behavior and movement in the immediate vicinity of the La Grange Project. Resource agencies and CGs believe that the La Grange

Project's discharge pattern has the potential to strand fish in multiple locations, and NMFS has requested flow estimates, characterizations of physical habitat, and fish behavior observations in the immediate vicinity of the La Grange Project.

The Districts agree that flows passed at the La Grange Project might affect fish behavior in the immediate vicinity of the Project facilities. Flow data are available for three of the Project conduits, i.e., the La Grange powerhouse, the LGDD spillway, and the TID sluicegate, which have been presented as part of the Don Pedro relicensing proceeding (see Don Pedro Project Updated Study Report, January 2014). However, systematic flow records for the MID hillside discharge and the LGDD sluicegate do not exist. The Districts will continue to record flow data as they currently do and will also collect two years of operational and flow records at the two conduits where data are currently unavailable (i.e., MID hillside discharge and the LGDD sluicegate). There is also limited information available on physical habitat conditions and fish behavior in the immediate vicinity of the La Grange Project facilities, and as such, the Districts will conduct an evaluation of certain habitat attributes and observations of fish in the immediate area of the Project under the flow conditions specified further below.

6.0 STUDY AREA AND METHODS

6.1 Study Area

6.1.1 Fish Passage Facilities Assessment

The concept-level assessment of upstream and downstream fish passage alternatives will encompass the Tuolumne River from immediately below the LGDD to the upstream limit of the Don Pedro Project Boundary. The study area for the fish barrier assessment will consist of the Tuolumne River channel opposite the La Grange powerhouse tailrace and the La Grange tailrace just downstream of the powerhouse. For incidental fish observations, the study area will include the immediate vicinity of the LGDD, the La Grange powerhouse tailrace channel, and the TID sluicegate channel.

6.1.2 Upper Tuolumne River Basin Habitat Assessment

Field surveys to identify barriers to the upstream migration of anadromous salmonids will be conducted along the mainstem Tuolumne River upstream of the Don Pedro Project Boundary, the North, Middle, and South forks of the Tuolumne River, Cherry Creek, and the Clavey River. Provisional temperature monitoring locations (locations to be refined following review of existing information) may be located in portions of the following rivers/reaches: the mainstem Tuolumne River between Early Intake and Don Pedro Reservoir, the Clavey River, Cherry Creek, and the North, Middle, and South forks of the Tuolumne River. Potential habitat characteristics above the Don Pedro Project Boundary and additional habitat information needs will be assessed based on the results of the barrier assessment, temperature evaluation, and NMFS's habitat suitability analysis, which is expected to be available in fall 2015.

6.1.3 Habitat Assessment and Fish Stranding Observations below LGDD and Powerhouse

Flow records will continue to be collected for the La Grange powerhouse, LGDD spillway, and TID sluicegate. Flows from the MID hillside discharge and the LGDD sluicegate will be estimated based on gate position and reservoir water levels. Topographic surveys, depth assessments, and fish habitat mapping/substrate evaluation will be conducted in the La Grange tailrace channel, the TID sluicegate channel, and the mainstem Tuolumne River from where it joins the tailrace channel upstream to the LGDD plunge pool. The total length of stream channel to be assessed is approximately 0.5 miles. Direct visual observations of salmonids will be conducted in the TID sluicegate channel. Greater detail regarding specific study locations is presented in the Methods section below.

6.2 Study Methods

6.2.1 Fish Passage Facilities Assessment

6.2.1.1 Concept-Level Fish Passage Alternatives

The evaluation of concept-level upstream and downstream fish passage alternatives will occur in two phases. Phase 1 (conducted in 2015) will involve collaborative information gathering and evaluation of facility siting, sizing, general biological and engineering design parameters, and operational considerations. Phase 2 (conducted in 2016) will involve the development of preliminary functional layouts and site plans, estimation of preliminary capital and O&M costs, and identification of any additional significant information needs for select passage alternatives.

Task 1: Evaluation of General Biological and Engineering Design Parameters and Alternatives Identification (2015)

In 2015, an evaluation of upstream and downstream fish passage facilities general design criteria and considerations will be conducted by the Districts in collaboration with LPs. The collaborative process will consist of three workshops held in 2015. Workshops will be conducted following FERC's issuance of its Study Plan Determination (February 2015) and are preliminarily suggested to occur in April, July, and October of 2015. Workshop dates will be finalized in consultation with LPs. Existing information will be gathered and summarized to characterize (1) relevant physical characteristics of existing project(s) facilities; (2) relevant project operations and potential limitations associated with those operations; (3) descriptions of local topography and geology, as necessary; (4) the physical environment in the areas of potential facilities locations; (5) Chinook and steelhead life-histories and periodicities[1]; (6) basin hydrology as it pertains to fish periodicities and developing passage facilities; (7) potential land ownership issues; (8) an account of applicable NMFS and CDFW fish passage facility biological and engineering design criteria and any potential limitations resulting from adherence to those criteria; (9) assessment of the relative effects of handling on fish passage options evaluated; and (10) other information affecting siting, sizing, general design, and operation of potential fish passage facilities.

[1] Because there are no spring-run Chinook or steelhead runs in the Tuolumne River, periodicities will be based on existing information from other nearby basins or historical records.

Following the synthesis of the information described above, identification and initial sizing of potential upstream and downstream fish passage facilities will be conducted. Based on this, the Districts and LPs will mutually select potential passage alternatives for which preliminary siting and functional layouts will be developed. Initial sizing, siting, and layouts should be able to be ready for LP review prior to the issuance of the Initial Study Report (ISR) required by the ILP regulations. Factors to be considered when identifying potential passage alternatives will include, but not necessarily be limited to, (1) distance (travel time) to and from the La Grange Project; (2) ease of accessibility for vehicles and/or boats; (3) the availability and cost of providing electrical service; (4) the extent to which construction, maintenance, and operation of the facility could interfere with river or reservoir recreation, (5) potential water quantity and quality concerns; (6) potential predation issues; (7) any relevant siting and/or land ownership limitations and the need for possible easements; and (8) to what extent conditions are compatible with implementation of available fish passage technologies.

Task 2: Preliminary Functional Layouts and Cost Estimates (2016)

In 2016, the Districts will develop functional site layouts, general design parameters, and associated Class-V opinions of probable construction and O&M costs for select fish passage alternatives developed in collaboration with LPs in 2015. Considerations addressed during the development of preliminary functional layouts for upstream passage alternatives will include, but not necessarily be limited to, (1) major facility siting and sizing components; (2) water supply infrastructure; (3) fish collection, acclimation, and holding facilities; (4) fish transport infrastructure and vehicles (if needed); (5) debris management; (6) fish attraction flows; (7) instrumentation and control equipment; (8) an explanation of how the proposed design complies with NMFS and CDFW fish passage criteria; and (9) identification of any additional information needs.

Considerations addressed during the development of preliminary functional layouts for downstream passage alternatives will include, but not necessarily be limited to, (1) major siting and sizing components; (2) fish sampling, acclimation, and holding facilities; (3) fish transport infrastructure and vehicles (if needed); (4) fish capture and debris management technologies; (5) provision of fish attraction flows; (6) guidance nets/curtains; (7) anchorage and flotation provisions (if needed); (8) dewatering facilities; (9) instrumentation and control equipment; (10) an explanation of how the proposed design complies with NMFS and CDFW fish passage criteria; and (11) identification of any additional information needs.

Task 3: Documentation and Reporting

A report will be produced to summarize all biological and engineering considerations, the identification of potential fish passage alternatives, the development of functional layouts, siting, and sizing information, and Class-V opinions of probable construction and annual O&M costs for selected fish passage alternatives.

6.2.1.2 La Grange Project Fish Barrier Assessment

The proposed study will evaluate the potential for the LGDD and the La Grange powerhouse to be barriers to the upstream migration of anadromous fish (i.e., fall-run Chinook and, if they occur, steelhead) or an impediment to their spawning during the 2015/2016 and 2016/2017 migration seasons by:

- Operating a fish counting weir to determine the number of anadromous fish migrating upstream to the LGDD and the La Grange powerhouse,
- Comparing to total escapement the number of anadromous fish migrating upstream to the LGDD and the La Grange powerhouse (i.e., above the counting weir) and not returning to downstream spawning habitat,
- Documenting carcass condition (egg retention) to evaluate pre-spawn mortality rates of anadromous fish migrating upstream to the LGDD and the La Grange powerhouse (i.e., those that do not return to downstream spawning habitat), and
- Document fish observations in the immediate vicinity of the LGDD, La Grange powerhouse, and in the TID sluicegate channel.

The study consists of three tasks beginning with planning and permitting, followed by two years of field data collection, and then data analysis and reporting. Each of these tasks is described in the following sections.

Task 1: Planning and Permitting

Permits will be required to operate the fish counting weir in the vicinity of the La Grange Project, including a Section 4d take authorization for Central Valley steelhead from NMFS, a Streambed Alteration Agreement and Scientific Collector Permit amendments from CDFW, and a Section 404 permit (which could involve a requirement for a CWA Section 401 permit) from the U.S. Army Corps of Engineers. Existing permits may be amended to include operation of the proposed new counting weir near the La Grange Project facilities. In some cases new permits may need to be obtained. Permits are expected to take six months to obtain, and some permit applications must be submitted prior to FERC's Study Plan Determination. For instance, Section 4d take authorizations are issued on a calendar-year basis, with applications due each fall for the coming year. Due to this timeline, a 4d take authorization was requested in October 2014 to allow counting weir monitoring to begin in fall 2015.

Equipment will be obtained or fabricated in preparation for field data collection, with the primary components consisting of a weir and a video system. The weir will be designed to allow unimpeded upstream and downstream fish passage. No fish will be handled at the weir.

Task 2: Field Data Collection

To collect Year-1 data, a fish counting weir consisting of two segments will be installed in the Tuolumne River in late August/early September of 2015 and be operated through at least April 2016, flows permitting. The same monthly schedule will be followed in the 2016/2017 season to

collect Year-2 data. One weir segment will be placed downstream of the large pool below LGDD in the Tuolumne River main channel, and the second segment will be placed just below the La Grange powerhouse in the tailrace channel. The counting weirs will be operated to determine the number of migrating fish that move upstream of the weirs. The total number of migrating fish exhibiting upstream migration behavior will be defined as the net difference between upstream and downstream fish counts at the weir. Sampling will end approximately 5-10 days following the spring pulse flow. In addition to monitoring Chinook salmon, any *O.mykiss* encountered at the counting weir during the sampling period will be recorded. Monitoring methods will be similar to those employed at the weir operated since 2009 at RM 24.5 (Becker et al. 2014). Continued monitoring at the downstream site (RM 24.5) will be used to determine total escapement to the Tuolumne River for comparison to the number of fish approaching the LGDD or the La Grange powerhouse and not moving back downstream to estimate the extent to which the La Grange facilities are actually a barrier to upstream migration and spawning. Hourly water temperature and instantaneous dissolved oxygen data will be collected at the weir.

Salmon encountering barriers to migration may experience pre-spawn mortality. During carcass surveys conducted to estimate salmon escapement, CDFW examines female salmon carcasses for egg retention to estimate pre-spawn mortality of Chinook salmon. Assessments have been conducted in several Central Valley streams in some years, but it is more common for the data not to be collected due to a lack of available funding and staff. CDFW has documented low levels of pre-spawn or partial-spawn mortality of fall-run Chinook in the Tuolumne River during surveys conducted in 1993, 1999, 2008, 2013, and 2014 (CDFW 2014).

To evaluate the potential effect of the LGDD and the La Grange powerhouse on the spawning of upstream migrants, the Districts propose to conduct weekly surveys above the counting weir during 2015/2016 and 2016/2017 to assess the presence/absence of live Chinook salmon, spawning activity or carcasses, and to evaluate egg retention in female carcasses. Similar to egg retention evaluations conducted by CDFW, fresh female carcasses will be classified as spent if few eggs are remaining, as partially spent if a substantial amount of the eggs remain (i.e., 50% to nearly full), and unspent if the ovaries appear nearly full of eggs (Guignard 2005, Snider et al. 2002). The location, date, and time of discovery; sex; and presence of fin clips will be recorded for each carcass. The Districts will collect each anadromous salmonid carcass found upstream of the weir, freeze it, and then deliver it to the CDFW office in La Grange.

Observations of fish above the counting weir and in the TID sluicegate channel will be conducted twice daily (times will vary as a function of existing workload) by project operators in the immediate vicinities of the LGDD, La Grange powerhouse, and within the TID sluicegate channel. Observations will be recorded on standardized datasheets, which will include the following information:

- Date and time of observation;
- Approximate discharge and conduit status at time of observation;
- Powerhouse output at time of observation;
- Number of fish observed and their approximate size;

- Identification of species, if possible; at a minimum each fish will be identified as either a salmonid or non-salmonid
- Locations of fish (to be indicated on a previously-generated base map);
- Description of general fish behaviors, such as moving upstream or downstream, spawning, holding in one specific location, or leaping/jumping;
- Notation of any observations of fish swimming into the La Grange powerhouse tailrace;
- Notation of any observations of fish swimming into the TID sluicegate channel; and
- Notation of any redds that become dewatered, and the duration of any dewatering, due to a change in powerhouse operations.

Task 3: Data Management, Analysis, and Report Preparation

Weir monitoring data will be downloaded or entered into a database frequently during the field data collection periods, error checked, and summarized. Data will include images of passing fish and corresponding information such as date, time, and direction of passage, species, and estimated fish size; instream conditions (i.e., water temperature and turbidity); and weir performance. Raw data will be summarized to determine daily upstream and downstream weir counts and the total number of fish exhibiting persistent upstream migration behavior (upstream counts minus downstream counts). The total number of fish exhibiting persistent upstream migration behavior will be divided by total escapement determined at the lower weir (at RM 24.5). Any spawning activity, live Chinook salmon or *O. mykiss*, or carcasses observed upstream of the weir will be reported. Egg retention rates will be reported for any female Chinook salmon carcasses observed. Datasheets on incidental observations of fish in the vicinity of the LGDD, La Grange powerhouse, or TID sluicegate channel will be input into an electronic database, summarized, and included as part of reporting. Preliminary results for the majority of the fall-run Chinook migration period during the first year of monitoring (i.e., September 2015/December 2016) may be able to be provided in the Initial Study Report in February 2016. Based on the results of the 2015/2016 study season, modifications to the study may be made prior to implementation of the 2016/2017 study season. Comprehensive reporting of the results from the two-year study will be submitted in September 2017. The location of any dewatered redds, and the duration of any dewatering due to a change in powerhouse operations, will be recorded. NMFS, USFWS, and CDFW will be notified within 1-day of observation of dewatered redds.

6.2.2 Upper Tuolumne River Basin Habitat Assessment

6.2.2.1 Barriers to Upstream Anadromous Salmonid Migration

Task 1: Review Existing Survey Results

The first step in the migration barrier assessment of the upper Tuolumne River basin (i.e., upstream of the Don Pedro Project Boundary) will consist of a compilation and review of results from any relevant prior studies. An attempt will be made to locate, access, and compile readily available and relevant existing data. This information review and synthesis will occur in 2015.

Task 2: Conduct Field Surveys (2015 and 2016)

After reviewing existing information, a field survey will be conducted to identify barriers in the mainstem and North, Middle, and South forks of the upper Tuolumne River, as well as Cherry Creek, and the Clavey River. Field crews will identify complete and partial barriers to upstream salmonid migration using definitions agreed upon with LPs.

In 2015, the following information will be recorded during base flow conditions at each barrier identified either through the use of existing information or during the field surveys: (1) global positioning system (GPS) coordinate points; (2) measured height of each barrier; (3) measured length and estimated maximum and average depth of any plunge pools at the base of barriers; (4) measured average water velocity (with a hand-held current meter) at the apex of the barrier, if measurements can be made safely, or estimated velocity if measurements cannot be made; (5) slope of the barrier; (6) measured (or estimated if measurement is unsafe) maximum and average depth of the fish exit point on the upstream side of the barrier; (7) an assessment of adjacent channel features that might be inundated at higher flows; and (8) a photograph of the barrier from one or more (as determined by field crews) designated photo-points.

In 2016, the same information (i.e., the eight items identified in the preceding paragraph) will be recorded at each barrier during flows typical of the spring-run Chinook and steelhead migration seasons. Because there are no spring-run Chinook or steelhead populations in the Tuolumne River, periodicities will be based on existing information from other nearby basins or historical records. Identification of migration flow periods will account for the travel time that would be needed for spring-run Chinook or steelhead to complete their upstream migration to the upper basin.

Task 3: Reporting

Preliminary results of the migration barrier assessment activities (i.e., conducted in 2015) may be able to be provided in the Initial Study Report in February 2016. Based on the results of the 2015 study season, modifications to the study may be made prior to implementation of the 2016 study season. An updated technical report summarizing the results of activities described in Tasks 1 and 2 will be submitted in the February 2017 Updated Study Report. The report will include maps showing the locations of all barriers and photo documentation of conditions at the barriers under base flow and migration flow conditions.

6.2.2.2 Water Temperature Monitoring and Modeling

Task 1: Identify, Synthesize, and Interpret Existing Water Temperature and Flow Data

In 2015, existing information, to the extent it is available, will be used to characterize the thermal regimes of the upper Tuolumne River below CCSF's Early Intake and in the following tributaries upstream to the location of the first barrier to anadromous fish migration: the North, Middle, and South forks of the Tuolumne River, Cherry Creek, and the Clavey River. Based on these data, a collaborative effort will be undertaken with LPs to identify locations and seasons where

temperatures appear to be suitable for anadromous salmonids. Attachment A includes a table summarizing available temperature data in the study area. These data, and other data sources, if identified, will be used to inform the collaborative effort.

Task 2: Install Data Loggers

In 2015, a workshop will be held with LPs to identify locations where useful temperature and river stage monitoring stations could be established. Potential locations for deploying temperature and stage data loggers will be selected, as needed, to provide a general characterization of accessible areas that appear to have thermal regimes suitable for supporting multiple life-stages of Chinook and steelhead under a range of hydrologic conditions, based on data collected under Task 1.

The following provisional data-logger deployment numbers and locations are suggested (these may change depending upon further review of existing information and coordination with LPs): (1) four to five monitoring stations in the mainstem Tuolumne River, depending on the number of data-loggers installed by NMFS in 2014; (2) two stations in the Clavey River; (3) two stations in Cherry Creek; and (4) up to two stations in each of the South, Middle, and North forks of the Tuolumne River. Data logger locations would be spaced at intervals sufficient to generally characterize the thermal regime at each location. Water temperatures would likely be measured at 30-minute intervals from the time of data logger deployment in summer 2015 to the time loggers are retrieved in October 2016. Data would be downloaded at intervals, depending on conditions in the field. Depending upon the availability of existing flow data, stage data may be supplemented by flow measurements sufficient to develop approximate stage-discharge rating curves.

Task 3: Water Temperature Modeling

In 2016, existing flow, temperature, meteorological, and channel geometry data–augmented as necessary by results from data loggers deployed as part of Task 2 and any flow/stage data collected by the Districts–will be used to develop a water temperature model to simulate the thermal regimes in the Tuolumne River and reaches of tributaries below Early Intake, including the South, Middle, and North forks of the Tuolumne River, Cherry Creek, and the Clavey River that are accessible to anadromous salmonids.

Preliminarily, the RMA-2 and RMA-11 suite of models appear to be suitable for simulating conditions in the study area. The RMA models can model both flow and temperature in extremely steep reaches and report sub-daily water temperature. Use of the RMA-2 (v8.0 or later) for hydrodynamics and RMA-11 (v8.0 or later) for water temperature would represent the river reaches in a one-dimensional, depth- and laterally-averaged, finite element scheme. RMA-2 calculates velocity, water surface elevation, and depth at defined nodes of each grid element in the geometric network representing the river. Following model development, model calibration will be completed, along with sensitivity analyses. The model will then be used to simulate existing conditions under 2015-2016 flow conditions.

Task 4: Reporting

Raw temperature data from data loggers will be provided annually in spreadsheet format to licensing participants. Preliminary results of temperature monitoring activities (i.e., conducted in 2015) will be provided in the Initial Study Report in February 2016. The Updated Study Report (February 2017) will include: (1) the synthesis of existing temperature data, (2) a summary of temperature measurements made with data-loggers (e.g., average, maximum, and 7DADM temperatures), and (3) a description of temperature model development, calibration, sensitivity analyses, and simulation of existing conditions.

6.2.2.3 Upstream Habitat Characterization

Task 1: Collaborative Review of Results from NMFS LiDAR/Hyperspectral Remote Sensing Study

Data from the upper Tuolumne River LiDAR and hyperspectral remote sensing-based habitat evaluation being conducted by NMFS may be used, to the extent applicable, to complement the barrier and temperature assessments described above. According to NMFS personnel, initial data are expected to be available in spring 2015 and a full report in fall 2015. Therefore, review of and incorporation of relevant information from the NMFS study into this component of the Districts' study will occur in fall of 2015 in collaboration with NMFS and other LPs.

Task 2: Identification of Additional Information Needs

Based on the completed barrier assessment, NMFS's habitat assessment, and preliminary temperature information, the Districts will work with LPs to identify additional information needed to assess upstream habitat conditions.

6.2.3 Habitat Assessment and Fish Stranding Observations below LGDD and Powerhouse

6.2.3.1 Develop Hydrologic Data for Flow Conduits at the La Grange Project

Task 1: Flow Records for Project Conduits

The Districts will continue to estimate flows as they currently do for the La Grange powerhouse, LGDD spillway, and TID sluicegate. Beginning in March 2015, flows at the MID hillside discharge and the LGDD sluicegate will be estimated by recording gate opening and reservoir water levels, or another appropriate and suitable method of estimating flow.

The flow data from each of the five potential flow points will be summarized as follows:

- A daily time-series of approximate flows at each of the five flow points during the two-year monitoring period (when/if discharges are occurring).
- A record, by year and month, of the number of days the La Grange powerhouse is offline for at least some part of the day.

- A record, by year and month, of the number of days the La Grange tailrace channel does not receive any flow for at least some part of the day (i.e., no discharge through the powerhouse or TID sluicegate channel).
- A record, by year and month, of the number of days when the mainstem channel opposite the powerhouse does not receive any discharge for at least some part of the day (i.e., no discharge through the MID hillside discharge, the LGDD spillway, or the LGDD sluicegate).

Task 2: Reporting

Existing data for the La Grange powerhouse, the LGDD spillway, and the TID sluicegate will be summarized, and additional flow data collected at the MID hillside discharge and the LGDD sluicegate will be provided to LPs, in spreadsheet format, for 2015 and 2016.

6.2.3.2 Collect Topographic, Depth, and Habitat Data in the Vicinity of the La Grange Project Facilities

Task 1: Topographic Surveys

In 2015, topographic surveys will be conducted during low-flow periods in the La Grange tailrace channel, the TID sluicegate channel (to the point upstream of where the sluicegate channel meets the nearly vertical hill slope), and the mainstem Tuolumne River from where it joins the tailrace channel upstream to the LGDD plunge pool. Longitudinal profiles along the channel thalweg will be collected. Measurement points will be located at 10-foot intervals along each longitudinal profile. In addition, topographic points will be documented to characterize the large cobble and bedrock island that separates the La Grange tailrace channel from the mainstem channel. At each data point along the longitudinal profile, data will be tied to a common horizontal and vertical datum. Data will be collected on foot and by boat as necessary.

Task 2: Evaluation of Water Depths

During the longitudinal profile data collection (described above), field crews will measure the maximum water depth in the channels. In addition, a visual estimate of average depth will be made. Water depth measurement and observation will be conducted at typical low flows, i.e. 25 cfs in the Tuolumne River main channel and about 75 to 100 cfs in the La Grange Project tailrace channel and TID sluicegate channel. Data will be collected on foot and by boat as necessary.

Task 3: Salmonid Habitat Mapping and Substrate Assessment

Habitat unit maps will be generated for the sections of channel identified in Task 1. Maps will be delineated into polygons corresponding to the following macrohabitat types: pools, step-pools, runs, high-and low-gradient riffles, and chutes. All patches of spawning gravel that are greater than 2 m^2 in area will be delineated on the habitat maps. The total length of stream channel that will be mapped (for all sections identified in Task 1) will be about 0.5 miles. All habitat mapping will be conducted by the same field crew members to reduce observer bias.

During habitat surveys, pebble counts will be conducted in riffles, runs, and pool tailouts, and from these counts D50 and D84 statistics will be developed for the relevant habitat units. All substrate counts will be conducted by the same field crew member(s) to reduce observer bias.

Task 4: Reporting

A brief technical memorandum describing the methods employed in the field, along with schematics documenting longitudinal profiles, a tabular summary of depth measurements, habitat maps, and a table of D50 and D84 values will be provided in the Initial Study Report in February 2016.

6.2.3.3 Assess Fish Presence and Potential for Stranding

Task 1: Observation methods

Daytime, direct visual observation of fish presence will be made from August 2015 through April 2016 and August 2016 through April 2017 any time that a flow change occurs in the TID sluicegate channel. In addition, if during these periods the La Grange powerhouse trips offline, biologists will be notified to report to the site for observation of the sluiceway and tailrace channels. Observations will occur during any flow transition from the time of maximum flow in the sluicegate channel through the subsequent closing of any of the sluice gates and until complete cessation of the sluicegate flow release. Fish observations will be integrated into the Districts' existing protocol as described below.

- Station or unit trips, or powerhouse is shut down.
- TID sluicegate(s) open immediately; auxiliary flow valve at sluicegates also is opened (either remotely or locally).
- Remote system operations center tries to restart the powerhouse or unit (Note: about 80 percent of the time, the powerhouse can be restarted very quickly by the remote operator).
- If unable to restart, a local operator is dispatched to the site to help diagnose the problem and restart the turbine-generator(s) locally, and remote system operator sends an email to a TID biologist or an on-call backup biologist, who arrives at site as soon as practicable.
- Upon station or unit restart, auxiliary flow valve remains open until the biologist arrives on site to inspect the TID sluiceway channel and tailrace for fish.
- If fish are observed, data are recorded to document the fish location, estimated length, and species; photo(s) will taken to document occurrences of fish; any fall-run Chinook observed will be relocated to tailrace; if *O. mykiss* are observed, a NMFS-approved protocol will be initiated.
- Once the sluiceway channel is cleared of any fish present, the auxiliary flow valve of the sluicegates is shut down.

Task 2: Reporting

The timing and duration of direct visual observations, details of all salmonid observations, and the photographic record of physical conditions during changes in flow and any incidences of trapped or stranded salmonids will be provided in the Initial Study Report in February 2016 and in the Updated Study Report in February 2017.

7.0 SCHEDULE

The Districts anticipate the following schedules for completion of the study components. The schedules assume that FERC will issue its Study Plan Determination in early February 2015, and that the study elements will not be subject to dispute resolution.

7.1 Fish Passage Facilities Assessment

7.1.1 Concept-Level Fish Passage Alternatives

- Collaboration on biological and engineering considerations.....April – December 2015
- Fish passage consultation workshops .....April, July, and October 2015
- Functional design drawings and cost estimates ..... March 2016 – November 2016
- Initial study report.....February 2016
- Updated study report.....February 2017

7.1.2 La Grange Project Fish Barrier Assessment

- Planning and permitting.....October 2014 – July 2015
- Fieldwork ..... September 2015 – April/May 2016; September 2016 – April/May 2017
- Incidental fish observations at Project Facilities ..... September 2015 – May 2017
- Data entry, QA/QC, and analysis.....September 2015 – August 2017
- Initial study report .....February 2016
- Updated study report .....February 2017
- Final study report ..... September 2017

7.2 Upper Tuolumne River Basin Habitat Assessment

7.2.1 Barriers to Upstream Anadromous Salmonid Migration

- Compile and review existing data.....March – May 2015
- Conduct field surveys .....August 2015 – June 2016
- Initial study report.....February 2016
- Updated study report .....February 2017

7.2.2 Water Temperature Monitoring and Modeling

- Synthesize and interpret existing water temperature data.....March – May 2015
- Licensing participant workshop..... June 2015

- Install temperature data loggers ..... June – September 2015
- Temperature data collection……..... June 2015 – October 2016
- Initial study report..... February 2016
- Water temperature modeling..... March 2016 – November 2016
- Updated study report ..... February 2017

7.2.3 Upstream Habitat Characterization

- Review of results from NMFS Upstream Habitat Study[2] ..... September/October 2015
- Incorporation of results from NMFS study with barrier study and interim temperature data and identification of additional information needs ..... February 2016

7.3 Habitat Assessment and Fish Stranding Observations below LGDD and Powerhouse

7.3.1 Flow and Habitat Measurements

- Initiate flow recording at project conduits ..... April 2015 – December 2016
- Collect topographic, depth, and habitat data..... August – November 2015
- Data entry, QA/QC, and analysis..... September 2015 – June 2017
- Initial study report..... February 2016
- Updated study report..... February 2017

7.3.2 Fish Stranding Observations

- Fish observations in TID sluicegate and tailrace channels ..... August 2015 – April/May 2016
- Data entry, QA/QC, and summarizing..... September 2015 – December 2016
- Initial study report..... February 2016
- Updated study report..... February 2017

8.0 CONSISTENCY OF METHODOLOGY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICES

8.1 Concept-Level Fish Passage Alternatives and La Grange Project Fish Barrier Assessment

The preliminary functional layouts, siting and sizing of facilities, and Class-V opinions of probable construction cost for upstream and downstream passage measures will be developed according to NMFS criteria (NMFS 2008), industry standards, and general approaches used in the Pacific Northwest, where a wide range of fish passage technologies have been designed and deployed. Direct fish counts conducted at weirs or other fixed points constitute a well established and commonly used technique often employed during FERC licensing proceedings to determine the abundance of migrating adult salmon. A counting weir has been operated annually since 2009 at RM 24.5 to estimate fall-run Chinook salmon escapement to the Tuolumne River.

[2] NMFS has stated that data will be available in spring 2015, and a final report is currently scheduled for fall 2015.

8.2 Upper Tuolumne River Basin Habitat Assessment

The methods proposed for identifying and analyzing fish barriers in the upper Tuolumne River and tributaries are consistent with what is done in salmonid-bearing streams in the western United States, as evidenced by their similarity to the approach proposed by NMFS in its study request. The temperature modeling methods proposed in this study plan are consistent with those applied widely in the United States, including (i.e., using the same model as) the SWRCB's Sacramento River Temperature Modeling Project and the Klamath River Total Maximum Daily Load (TMDL) from Link River Dam to Keno Dam.

8.3 Habitat Assessment and Fish Stranding Observations below LGDD and Powerhouse

Measurements of physical conditions along transects are commonly made in a wide variety of fish habitat studies and can be considered routine. Habitat unit typing will be based on standard definitions of what constitutes a particular habitat (consistent with EHM, Hankin and Reeves, Frissell, etc.). Pebble counts will be performed according to commonly applied standards (e.g., Wolman), with substrate sizes as typically defined for California streams. Characterizations of substrate composition (i.e., D50 and D84 statistics) represent an approach applied universally throughout North America and were recommended by NMFS in its study request. Direct observations of fish will be conducted according to specifications provided by NMFS in its study request, and field biologists will rigorously document all observations.

9.0 LEVEL OF EFFORT AND COST

The implementation cost of this study plan is estimated to be $1.6 million.

10.0 REFERENCES

CDFW (California Department of Fish and Wildlife). 2014. Comments on La Grange Hydroelectric Project Federal Energy Regulatory Commission Project No. 14581 Tuolumne River [comments submitted on the TID/MID La Grange Hydroelectric Project Preliminary Study Plan (PSP)].

Becker, C. J. Guignard, and A. Fuller. 2014. Fall Migration Monitoring at the Tuolumne River Weir. 2013 Annual Report. Submitted to Turlock Irrigation District and Modesto Irrigation District.

Fry, D. 1961. King salmon spawning stocks of the California Central Valley, 1940–1959. California Fish and Game 47:55–71.

Fry, D. H., Jr., and A. Petrovich, Jr. 1970. King salmon (*Oncorhynchus tshawytscha*) spawning stocks of the California Central Valley, 1953-1969. Anad. Fish. Admin. Rept. 70-11.

Guignard, J. 2005. Stanislaus River Fall Chinook Salmon Escapement Survey 2004. Prepared by California Department of Fish and Game For United States Bureau of Reclamation Contract # R0440003. Available at: http://www.sjbfish.com/srfg/docs/2004_DFG_Stanislaus_Escapement_Report.pdf

Healey, M.C. 1991. Life history of Chinook salmon (*Oncorhynchus tshawytscha*). Pages 311-393 *in* C. Groot and L. Margolis, editors. Pacific salmon life histories. University of British Columbia Press.

Kondolf, G.M., and M.G. Wolman. 1993. The sizes of salmonid spawning gravels. Water Resources Research 29:2275-2285.

National Marine Fisheries Service (NMFS). 1998. Factors Contributing to the Decline of Chinook Salmon: An Addendum to the 1996 West Coast Steelhead Factors for Decline Report. Portland, Oregon: Protected Resources Division, National Marine Fisheries Service.

_____. 2008. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon.

_____. 2009. Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead. Sacramento Protected Resources Division. October 2009. 273 pp.

_____. 2014. Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter□run Chinook Salmon and Central Valley Spring□run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead. NMFS, West Coast Region, Sacramento, CA. July 2014.

Reynolds, F.L., T.J. Mills, R. Benthin, and A. Low. 1993. Restoring Central Valley streams: a plan for action. California Department of Fish and Game, Inland Fisheries Division, Sacramento.

Snider, B., B. Reavis, R.G. Titus and S. Hill. 2002. Upper Sacramento River Winter-Run Chinook Salmon Escapement Survey, May-August 2001. California Department of Fish and Game, Habitat Conservation Division, Native Anadromous Fish and Watershed Branch Stream Evaluation Program. Available at: http://docs.streamnetlibrary.org/StreamNet_References/CAsn90626.pdf

Turlock Irrigation District and Modesto Irrigation (TID/MID). 2010. 2009 Report of Turlock Irrigation District and Modesto Irrigation District Pursuant to Article 58 of the License for the Don Pedro Hydroelectric Project, No. 2299. March 2010.

_____. 2013a. Spawning Gravel in the Lower Tuolumne River Study Report (W&AR-04). Attachment to Don Pedro Hydroelectric Project Updated Study Report. December 2013.

_____. 2013b. Salmonid Population Information Integration and Synthesis Study Report (W&AR-05). Attachment to Don Pedro Hydroelectric Project Draft License Application. December 2013.

U.S. Department of Interior, Fish and Wildlife Service (USFWS). 2001. Final Restoration Plan for the Anadromous Fish Restoration Program: A Plan to Increase Natural Production of Anadromous Fish in the Central Valley of California. U.S. Fish and Wildlife Service, Anadromous Fish Restoration Program (U.S.). Core Group, 100 pp.

Zimmerman, C.E., G.W. Edwards, and K. Perry. 2009. Maternal origin and migratory history of steelhead and rainbow trout captured in rivers of the Central Valley, California. Transactions of the American Fisheries Society 138(2):280–291.

ATTACHMENT A

EXISTING UPPER TUOLUMNE RIVER TEMPERATURE MONITORING SITES

Existing Upper Tuolumne River Temperature Monitoring Sites.

Site Locations	Source[3]	Tuolumne River Mile	Coordinates (Decimal °)		Period of Record	
			Latitude	Longitude	Start Date	End Date[4]
Tuolumne River, downstream of O'Shaughnessy Dam	CCSF	TR117.3	37.9449	-119.7911	4/29/09	1/28/13
Tuolumne River, downstream of Preston Falls	CCSF	TR109.3	37.8858	-119.8912	4/26/07	1/15/14
Tailrace of Kirkwood Powerhouse	CCSF	TR105.6	37.8771	-119.9535	4/29/09	10/4/11
Tuolumne River at Early Intake	CDFW	TR105.0	37.8751	-119.9643	7/19/05	1/28/13
Tuolumne River, downstream of Early Intake Diversion Dam	CCSF	TR104.6	37.8788	-119.9691	4/23/07	9/14/10
Upstream of Cherry Lake	CCSF	CC16.1	38.0313	-119.9012	4/24/07	9/5/08
Cherry Creek, downstream of Cherry Dam	CCSF	CC10.5	37.9618	-119.9181	4/23/07	3/29/13
Cherry Creek, downstream of Cherry Dam	CCSF	CC09.4	37.9490	-119.9253	4/23/07	11/4/09
Cherry Creek, upstream of Eleanor Creek confluence	CCSF	CC07.1	37.9362	-119.8970	4/24/07	8/5/12
Cherry Creek, downstream of confluence with Eleanor Creek	CCSF	CC07.0	37.9353	-119.8967	4/24/07	8/15/12
Cherry Creek, upstream of Dion Holm Powerhouse	CCSF	CC01.2	37.8943	-119.9630	4/23/07	6/26/12
Cherry Creek Power House	CDFW	CC00.6	37.8956	-119.9709	4/27/05	1/29/13
Eleanor Creek, upstream of Miguel Creek confluence	CCSF	EC01.8	37.9543	-119.8815	4/24/07	6/6/12
Eleanor Creek, downstream of Miguel Creek confluence	CCSF	EC01.7	37.9534	-119.8810	4/24/07	6/6/12
Eleanor Creek, downstream of Miguel Creek confluence	CCSF	EC01.7	37.9533	-119.8808	4/24/07	6/6/12
Eleanor Creek, downstream of Miguel Creek confluence	CCSF	EC01.7	37.9531	-119.8810	4/24/07	6/6/12
Eleanor Creek, upstream of Cherry Creek confluence	CCSF	EC00.0	37.9362	-119.8966	4/24/07	4/26/12
Miguel Creek, upstream of Eleanor Creek confluence	CCSF	MC00.0	37.9541	-119.8811	4/24/07	6/6/12
Tuolumne River, downstream of Cherry Creek confluence	CCSF	TR103.7	37.8884	-119.9752	4/23/07	9/14/10
Tuolumne River, downstream of Cherry Creek confluence	CCSF	TR103.5	37.8869	-119.9766	4/23/07	12/21/13
Tuolumne River downstream of Lumsden Bridge	NMFS	TR098.0	N 37 50.784	W 120 02.168	7/30/14	Present
Tuolumne River, upstream of South Fork	CCSF	TR097.1	37.8404	-120.0466	4/25/07	4/6/13
Tuolumne River above the South Fork	CDFW	TR097.0	37.8403	-120.0472	4/27/05	1/29/13
South Fork Tuolumne River near 1N10 Bridge	CCSF	SFT00.2	37.8375	-120.0473	4/25/07	11/5/09

[3] Entity that collected data. For NMFS data sites, recently placed logger locations were provided by NMFS, but data are not yet available.

[4] End Date reported is based on data files that the Districts have obtained. During the course of the study, the Districts will confirm whether more recent data from any of these sites may be available.

Site Locations	Source[3]	Tuolumne River Mile	Coordinates (Decimal °)		Period of Record	
			Latitude	Longitude	Start Date	End Date[4]
South Fork of the Tuolumne River near confluence	CDFW	SFT00.2	37.8376	-120.0473	4/27/05	6/15/12
South Fork Tuolumne River near confluence	NMFS	SFT00.2	N 37 50.241	W 120 02.824	7/30/14	Present
Tuolumne River below the South Fork	CDFW	TR096.5	37.8361	-120.0537	4/27/05	1/28/13
Tuolumne River Downstream of Lumsden Campground	NMFS	TR096.4	N 37 50.129	W 120 03.327	7/30/14	Present
Tuolumne River, upstream of Clavey River	UC Davis	TR091.1	37.8632	-120.1163	4/25/09	5/8/10
Tuolumne River, upstream of Clavey River	NMFS	TR091.1	N 37 51.753	W 120 06.975	7/31/14	Present
Clavey River at 1N04 Bridge	CCSF	CR16.9	37.9851	-120.0534	4/23/07	10/21/10
Clavey River, upstream of Tuolumne River confluence	UC Davis	CR00.3	37.8663	-120.1132	4/25/09	8/30/09
Clavey River upstream of Tuolumne River	NMFS	CR00.1	N 37 51.878	W 120 06.934	7/31/14	Present
Tuolumne River downstream of Grapevine Creek	NMFS	TR088.4	N 37 53.063	W 120 08.961	8/1/14	Present
Tuolumne River, downstream of Indian Creek confluence	UC Davis	TR088.1	37.8853	-120.1547	4/26/09	5/9/10
Tuolumne River at Indian Creek Trail	MID/TID	TR083.0	37.8838	-120.1536	10/1/10	12/10/12
Tuolumne River downstream of Mohecan Bar	NMFS	TR081.9	N 37 53.728	W 120 14.567	8/1/14	Present
North Fork Tuolumne above Tuolumne River	UC Davis	NFT00.1	37.8980	-120.2540	4/26/09	8/30/09
Tuolumne River, upstream of Ward's Ferry	CCSF	TR079.4	37.8830	-120.2809	4/25/07	10/25/11
Tuolumne River upstream of Wards Ferry Bridge	CDFW	TR078.7	37.8807	-120.2918	5/24/05	11/22/11
Tuolumne River at Wards Ferry	USGS	TR078.5	37.8783333	120.2947222	12/5/13	Present