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Modesto Irrigation District
The Power to Grow

September 5, 2014

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
Proposed 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 Proposed Study Plan (PSP) in accordance with Federal Energy Regulatory Commission (FERC) regulations at 18 CFR § 5.11.

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 (CG), and the Bay Area Water Supply and Conservation Agency (BAWSCA) each filed a comment letter by the deadline of July 22, 2014. The USFWS, NMFS, SWRCB and the CG submitted a total of 16 study requests. BAWSCA submitted no study requests. All study requests have been carefully considered by the Districts in development of the PSP. The PSP contains three draft study plans.

As required by FERC's regulations at 18 CFR § 5.1 1 (e), the Districts will hold a study plan meeting on Monday, October 6, 2014 at the MID office in Modesto, California. Additional details about the meeting are included in the enclosed document and are posted on the Project's licensing website (www.lagrange-licensing.com). The purpose of this meeting is to discuss the PSP with licensing participants in order to attempt to resolve any outstanding issues on studies to be included in the Districts' Revised Study Plan.

The Districts look forward to continuing its work with the federal and state resource agencies, Indian tribes, FERC staff, local governmental authorities, non-governmental organizations, and members of the public in finalizing the study plan for the La Grange Hydroelectric Project's licensing. In accordance with 18 CFR § 5.12, comments on the PSP must be filed with FERC by December 4, 2014.

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

Sincerely,

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Attachments: La Grange Hydroelectric Project Proposed Study Plan Document

LA GRANGE HYDROELECTRIC PROJECT
FERC NO. 14581

PROPOSED STUDY PLAN

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

September 2014

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List of Acronyms

ac .....acres
ACHP .....Advisory Council on Historic Preservation
ACOE.....U.S. Army Corps of Engineers
ADOE .....Archaeological Determinations of Eligibility
AIRFA.....American Indian Religious Freedom Act
APE .....Area of Potential Effects
ARPA .....Archaeological Resources Protection Act
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
CH&SC .....California Health and Safety Code
CNDDB.....California Natural Diversity Database
CNPS.....California Native Plant Society
CPC .....California Penal Code
CORP .....California Outdoor Recreation Plan
CPRC .....California Public Resources Code
CSU.....California State University
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
NAHC.....Native American Heritage Commission
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
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
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) issued an order from the Director of the Division of Hydropower and Administration finding that the La Grange Hydroelectric 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 provide 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 development and issuance of this Proposed Study Plan (PSP) document is a formal filing required by the ILP. The PSP contains the following elements:

- summary of study requests submitted by licensing participants (LPs),
- Districts' proposed studies and study plans,
- list of LPs' study requests the Districts have not adopted and the rationale for not adopting the request, and
- schedule for the development of a Revised Study Plan (RSP) and study reports.

In accordance with ILP regulations, the PSP 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 PSP is also being made available on the Districts' licensing website (http://www.lagrange-licensing.com/).

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

1.1 General 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 1.1-1 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 south (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.

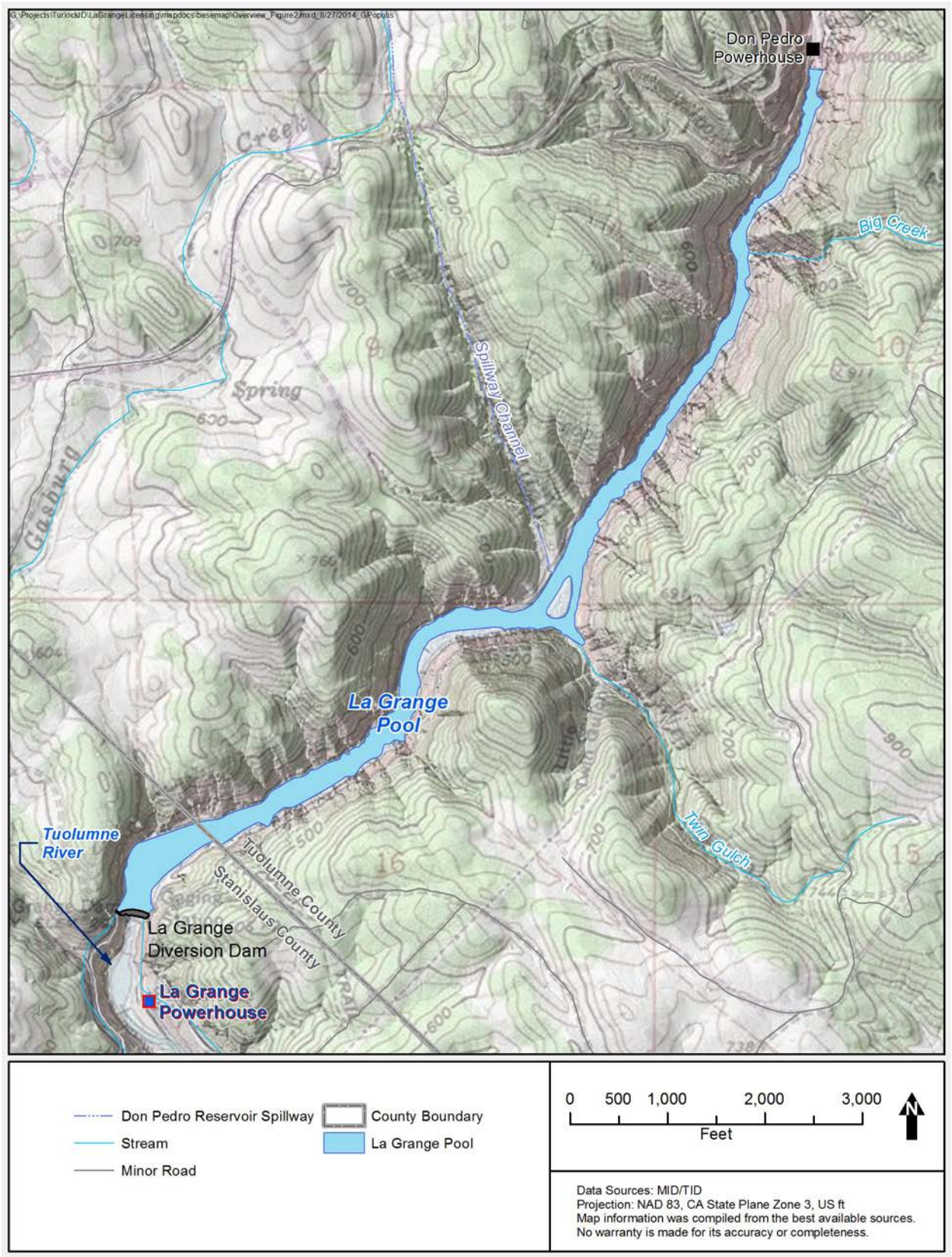

Figure 1.1-1. La Grange Hydroelectric Project location map.

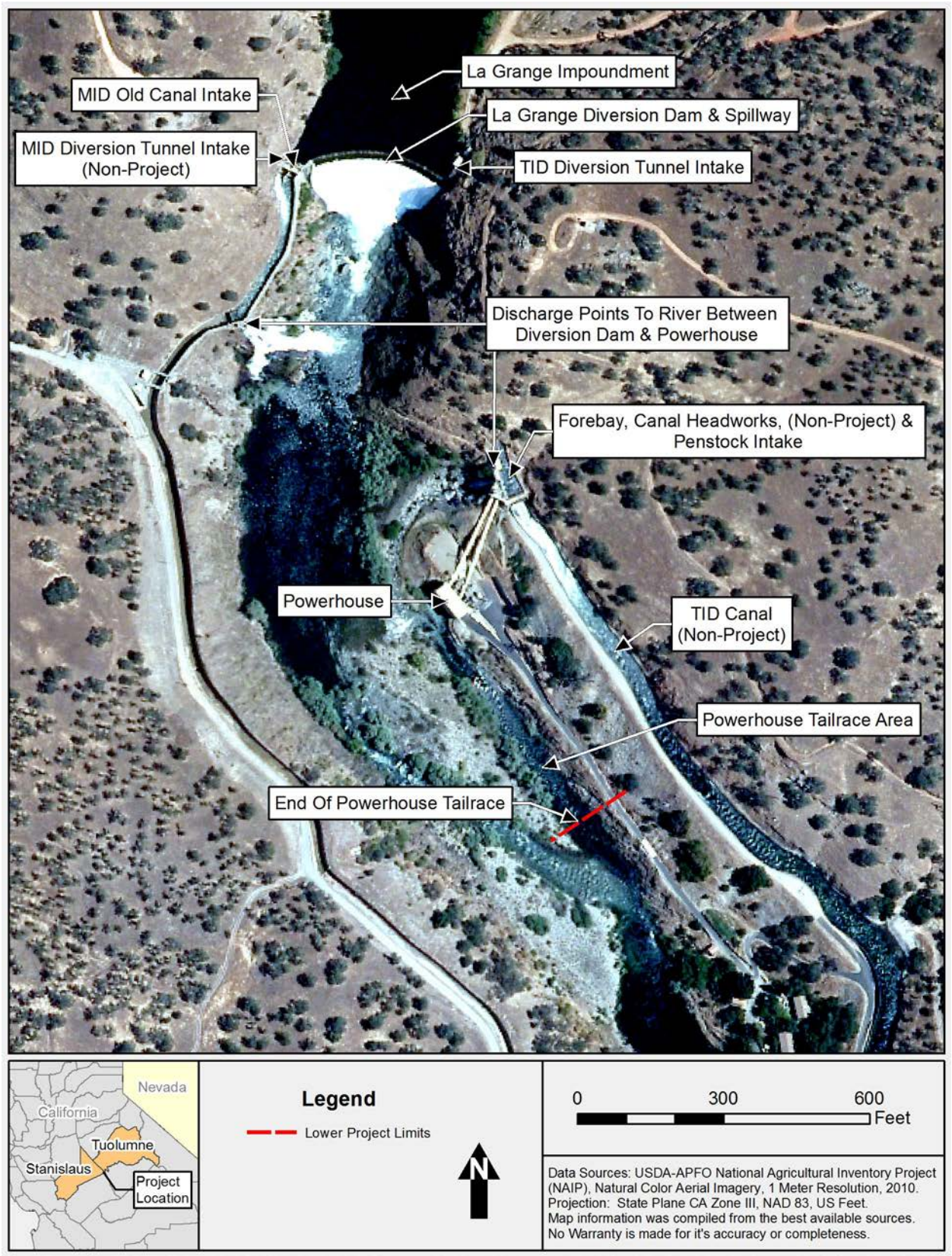

Figure 1.1-2. La Grange Hydroelectric Project site plan.

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 5.6 and 5.5, 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] (CG), 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 CG submitted a total of 16 study requests. BAWSCA submitted no study requests. In addition to study requests, entities also filed numerous comments on the SD1 and PAD. The Districts are providing responses to several of these comments at this time (Appendix A) and reserve the right to provide additional comments with the RSP or the final license application.

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, the California Department of Fish and Wildlife (CDFW), SWRCB, California Sportfishing Protection Alliance, Tuolumne River Trust, CCSF, and Friends of the River attended the meeting.

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 filed a letter to the Districts extending the deadline for comments to March 21, 2014.

[3] 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 are collectively the "Conservation Groups", except where otherwise noted.

On March 21, 2014, NMFS and the CG[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. FERC established March 24, 2014 as the pre-filing process start date for the ILP on April 17, 2014.

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

1.3 Districts' Ongoing Studies and Data Collection Activities

Extensive information on 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 the studies is provided in Tables 1.3-1 and 1.3-2.

[4] In this instance only, the "Conservation Groups" refers to the following organizations: 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.

Table 1.3-1. Studies performed by the Districts during the current license term of the Don Pedro Hydroelectric Project.

Study No.	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 No.	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 No.	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 No.	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 No.	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 1.3-2. 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-12	*Oncorhynchus mykiss* Habitat Survey
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	Habitat Suitability Curves for Splittail and Lamprey
Additional Information Submitted in Support of 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.

2.0 LICENSING PARTICIPANTS' STUDY REQUESTS

Four LPs filed timely study requests as summarized in Table 2.0-1.

Table 2.0-1. Licensing participant study requests filed with FERC.

Licensing Participant	Date of Comment Letter	Requested New Study
Conservation Groups	July 22, 2014	• Fish Passage • Upper Tuolumne Habitat Suitability • Recreational Access and Facilities Feasibility
National Marine Fisheries Service	July 22, 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

2.1 General Approach to Evaluating Study Requests

The Districts carefully reviewed each comment letter and study request. The Districts' response to each study request generally falls into one of the following three categories:

(1) Sufficient existing information is deemed to be available to address the goals of the study.
(2) The Districts believe that a portion of the study request meets the ILP's seven criteria, adopted that portion, and included it in a study plan.
(3) The Districts believe that the study request does not meet the requirements of the ILP's seven study criteria and, therefore, did not adopt the study request.

Many of the individual study requests consist of multiple studies within a single study request. Where the Districts deemed that a majority of an individual study request met the ILP criteria, the study request was accepted and incorporated into a draft study plan. Where the Districts deemed that the overwhelming majority of the study request did not meet the ILP criteria, the

request was not adopted and an explanation of the rationale for not adopting is provided (see Section 4.0-Districts' Response to Study Requests Not Adopted by the Districts). Where a study request was not supported by an attempt to address the ILP criteria, the study request was not adopted.

2.2 ILP Study Request Criteria

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 are met. These study plan criteria are:

(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; and
(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.

A study request must meet all of the criteria. The Districts evaluated each individual study request in light of the ILP criteria. Section 3.0 summarizes the study requests adopted and Section 4.0 summarizes the study requests not adopted.

3.0 DISTRICTS' PROPOSED STUDIES

This section presents the Districts' proposed studies to support the preparation of the license application and the associated applicant-prepared National Environmental Policy Act document. Draft study plans have been prepared for review and comment based on the Districts' review of the study requests submitted by LPs and the Districts' assessment of information needs. The Districts contend the information developed by these studies, when combined with existing information as summarized in the Districts' PAD and other ongoing data gathering activities (see Section 1.3), will provide information needed to evaluate the effects of La Grange Hydroelectric Project operations, maintenance and management activities to environmental resources and inform the development of license requirements.

Table 3.0-1. Districts' draft study plans.

Study Title	LPs' Study Request Adopted or Adopted in Part
Cultural Resources Study	Districts proposed in PAD.
Recreation Access and Safety Assessment	CG - Recreational Access and Facilities Feasibility Study Request
Fall-Run Chinook Salmon Migration Barrier Study	NMFS, CG and 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' study plan is provided in Appendix B of this PSP.

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 associated with recreational use, is anecdotal. The proposed study will identify potential recreational uses at the Project. 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. 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 Districts' study plan is provided in Appendix C of this PSP.

3.3 Fall-Run Chinook Salmon Migration Barrier Study

A necessary first step in any fish passage assessment is to establish the extent to which a structure (i.e., in this case, the LGDD and the La Grange Hydroelectric Project powerhouse) is actually acting as a barrier to upstream migration. The primary purpose of passing an anadromous fish upstream is to allow access to suitable habitat not available below the barrier. For example, if few fish are reaching the barrier or reach the barrier but then move back downstream to available habitat, then fish passage would serve little purpose at potentially great expense. The proposed Fall-run Chinook Salmon Migration Barrier Study is the necessary precursor study to undertaking a full upstream and downstream fish passage study. The proposed study will evaluate the potential impact of the LGDD on upstream migration of adult fall-run Chinook salmon by documenting the actual occurrence of fall-run Chinook salmon, and the proportion of the population, being blocked by LGDD and facilities, if any. The specific information obtained by this study will:

- Determine the number of fall-run Chinook salmon migrating upstream to the LGDD and the powerhouse during the 2015/2016 and 2016/2017 migration seasons.
- Compare the number of fall-run Chinook salmon migrating upstream to the LGDD and the powerhouse and not returning to downstream habitat, to total escapement during 2015/2016 and 2016/2017 migration seasons.
- Document carcass condition (egg retention) to evaluate pre-spawn mortality rates of fall-run Chinook salmon migrating upstream to the LGDD and the powerhouse (and do not move back downstream to spawn).

The Districts' study plan is provided in Appendix D of this PSP.

4.0 DISTRICTS' REPLY TO STUDY REQUESTS THAT WERE NOT ADOPTED

This section provides the Districts' reply to study requests the Districts contend do not meet the seven study plan criteria under § 5.9(b) of FERC's ILP regulations, are inconsistent with FERC policy and court precedents related to the Federal Power Act (FPA), or request information that is already available. Section 4.1 discusses each study request that was not adopted by the Districts and provides an initial explanation of why the study request was not adopted.

A total of 16 individual studies were requested by four LPs (Table 2.0-1). A number of these study requests were similar in purpose and scope. Under the governing regulations for the ILP, a study request must meet each of seven criteria provided in § 5.9(b) of FERC's regulations. While most of the study requests attempted to address the ILP's seven criteria, where the Districts did not adopt a requested study, it was generally for one or more of the following reasons.

Studies of pre-project conditions. FERC and the reviewing courts have held that existing conditions are the proper baseline in the context of licensing. The LGDD has been in existence and a part of the Tuolumne River for over 120 years and logically represents existing conditions. Additionally, attempting to predict what conditions would be today if the Project had not been built may lead to unsupported speculation and considerable uncertainty. Hence, existing conditions are the baseline for comparison under the FPA, ESA and NEPA.

Need for information. If a study requests information which is already available, the Districts have not adopted the study request and have identified where the existing information may be found.

Lack of connection between Project operations and an effect on a resource (5.9(b)(5)). Under FERC policy and regulations, a study request must demonstrate a reasonable connection between Project operations and an actual effect on the resource to be studied. This "nexus" between the Project's operation and a resource impact must not amount to mere speculation, but have a basis in fact and be informed by evidence-based professional judgment.

Study request constitutes basic research and/or is not likely to inform the development of license conditions (5.9(b)(5)). FERC regulations indicate that a study request must specify how the study will inform the development of license requirements. It is not the purpose of licensing to begin or support programs of multi-year environmental research at an applicant's expense, and studies should recognize the time frames available under the ILP. A study request must show how the results of the study will provide information relevant to evaluating a project's impacts and not just contribute to general knowledge of a resource.

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

In addition to the 16 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.

- CG, 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."

- CG, 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."

- CG, 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."

- CG, page 5: "The Districts should provide sufficient information...to evaluate the project's contribution to conditions suitable for invasive vegetation [in particular water hyacinth (*Eichhornia crassipes*)] and potential mitigation measures."

Since none of these study requests attempted to address any of the seven criteria, they were not adopted by the Districts.

4.2 Study Requests Not Adopted by the Districts That Did Attempt to Address the ILP Study Criteria

A number of LPs submitted study requests that attempted to address the seven ILP criteria, but which the Districts assert are not justified for one or more of the reasons identified in Section 4.0 above. Each of the requests not adopted is discussed in the following sections.

4.2.1 Federal Agencies

4.2.1.1 NMFS

- *NMFS: Effects of the Project and Related Activities on Fish Passage for Anadromous Fishes*

The Districts have 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. NMFS did not request a study of upstream and downstream fish passage at the La Grange facilities alone, but at both La Grange and Don Pedro. The Districts can only surmise that NMFS believes that providing such passage at La Grange only would be of little value. This would be consistent with the statement made by the Conservation Groups that "[t]here would likely be little benefit to providing fish passage at La Grange diversion dam alone, since fish that passed La Grange diversion dam would be immediately blocked by Don Pedro Dam, with no significant increase in spawning or rearing habitat for anadromous salmonids." Anadromous salmonid passage at La Grange Diversion Dam would also expose fish to potential injury or mortality associated with both upstream and downstream passage facilities. Such a risk would not be offset by a potential gain because of the lack of habitat in the La Grange pool. Moreover, as FERC has already found in its Don Pedro Project Study Plan Determination of December 2011 the Don Pedro Project does not currently act as a barrier to fish passage, nor is it reasonably foreseeable that this status would change in the near future. NMFS can exercise its reservation of authority to prescribe fish passage in the Don Pedro Project license to ensure that fish passage at Don Pedro Dam can be addressed in the future.

Further, the fish passage study proposed by NMFS is actually a study of a potential PM&E measure, and according to FERC's ILP criteria, such a study should not be undertaken unless it has been demonstrated that the La Grange Hydroelectric Project is indeed a barrier to fish passage under current conditions (i.e., FERC's definition of environmental baseline). Because of this, as discussed in Section 3.3 of this PSP, the Districts are proposing to conduct a two-year study to (1) determine the number of fall-run Chinook salmon approaching the LGDD during the 2015/2016 and 2016/2017 migration seasons, (2) compare the number of fall-run Chinook salmon approaching the LGDD to total escapement during the 2015/2016 and 2016/2017 migration seasons, and (3) document carcass condition (egg retention) of fall-run Chinook salmon that do not return to downstream habitat below the La Grange Hydroelectric Project facilities to evaluate pre-spawn mortality rates. NMFS, nor any other LP, offered any evidence that a significant proportion, or indeed any, fall-run Chinook salmon, actually become stranded at the base of the La Grange Hydroelectric Project facilities. Evidence filed with FERC as part of the Don Pedro Project relicensing shows that there is ample spawning and rearing habitat in the lower Tuolumne River to support a healthy fall-run Chinook population. If fall-run Chinook do approach the La Grange Hydroelectric Project facilities, they may be just as likely to return to available spawning habitat downstream.

The Districts are not attempting to evaluate spring-run Chinook or steelhead as part of the initial two-year study. 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, *O. mykiss* are not being investigated as part of this study. However, weir counts will extend through April or May, flows permitting, and any *O. mykiss* encountered at the weir during the study will be recorded.

NMFS (1998) concluded that the Central Valley spring-run Chinook salmon ESU was in danger of extinction because native spring-run Chinook salmon have been extirpated from all tributaries in the San Joaquin River Basin (NMFS 2009). As a result, this study will focus solely on fall-run Chinook, as there are no presently approved or funded programs to restore spring-run Chinook salmon to the Tuolumne River. Also, as stated by NMFS in its Request for Information or Study Quantifying Existing Upper Tuolumne River Habitats for Anadromous Fish as They Pertain to Fish Passage Blockage at La Grange diversion dam (addressed below), "This reach [directly upstream of La Grange diversion dam] was likely never meaningful historic holding, spawning, or rearing habitat for steelhead or spring-run Chinook, as these species historically migrated to higher elevation habitats."

- *NMFS: Effects of the Project and Related Activities on Fish Stranding and Salmonid Habitat in the Vicinity of the La Grange Project*

The Districts have not adopted this study request because fish habitat in the lower Tuolumne River, and its relationship to flow, have been studied extensively as part of the Districts' studies prior to and during the Don Pedro Project relicensing, including various IFIM-related studies (to RM 51.7), the *O. mykiss* habitat study to RM 52 (TID/MID 2013a), and the Districts' study of the rate-of-change of river stage.

The extremely low variability of stage changes in the lower Tuolumne River is documented in the La Grange Hydroelectric Project PAD. At the request of NMFS, the Districts conducted an assessment of the rate of stage change in the lower Tuolumne River (see PAD, Section 5.0). The analysis, conducted for the period January 1997 - June 2013, showed that stage change at a 15-minute interval is less than 2 inches (0.17 ft.) up or down 99.4 percent of the time, less than 4 inches (0.33 ft.) 99.9 percent of the time, and less than 8 inches (0.67 ft.) 99.99 percent of the time. One-hour stage change is less than 2 inches up or down 96.6 percent of the time, less than 4 inches 99.0 percent of the time, and less than 8 inches 99.8 percent of the time. Most of the largest stage changes that occurred during the analysis period were related to flood control operations at the Don Pedro Project, especially the 1997 flood when river flows were very high. The Districts have taken steps to ensure that stage changes in the lower river are minimized, and as a result no fish stranding study is needed, i.e., the analysis of stage changes included in the PAD provides sufficient information for evaluating the frequency and magnitude of stage changes, and as a result, potential effects on fish stranding.

- *NMFS: Quantifying Existing Upper Tuolumne River Habitats for Anadromous Fish as They Pertain to Fish Passage Blockage at La Grange diversion dam*

The Districts have not adopted any of the requested elements of this study, i.e., identification of migration barriers upstream of the Districts' Don Pedro Project, water temperature monitoring

and modeling, other monitoring actions, and development of a salmonid life-cycle model, because they all relate to obtaining information about anadromous fish habitat that is not affected by the La Grange Hydroelectric Project. Because there are no possible Project effects on habitat in the proposed location of study, this request does not satisfy the ILP's project nexus criterion.

NMFS 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)". In addition to not meeting the requirement to identify a specific project effect, this study constitutes the basic research associated with any salmon recovery effort that NMFS is obligated to undertake as part of its own proposed recovery program and the environmental effects thereof.

NMFS states that its objective is to assess the quantity and quality of suitable habitat for salmonids in the upper Tuolumne River watershed to inform its decision making regarding the establishment of fish passage at the Project. However, the Districts assert that it is the responsibility of the fisheries resource 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. In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC agreed with this position, stating 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."

In any event, there is a substantial body of information already available on the upper Tuolumne River upstream reaches and tributaries, for example, through CCSF's WSIP documents and prior USGS records.

- *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. 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* in and upstream of the Don Pedro 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 for the agencies use in making their "management decisions."

Genetics studies were also proposed during the relicensing of the Don Pedro Project. In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC concluded that 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 that such an effort, although necessary to make fisheries management decisions, would not inform licensing requirements.

- *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, it is at least in part intended 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.

Request Element #2 is not only aimed at estimating historic 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 clearly could not be used to inform decision-making in the context of the Project's licensing process.

The Districts have also chosen not to adopt this study request because it actually 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. As long as Don Pedro Dam is in place, without a fish passage program, there is no point in attempting to pass marine-derived nutrients upstream of La Grange Diversion Dam. There is limited area upstream of La Grange Diversion Dam with few, if any, resources that would benefit significantly from an influx of nutrients to this area.

In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC noted that NMFS's 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 historic mass of marine-

derived nitrogen would not produce a reliable estimate of losses, and even less so an estimate of potential Project effects.

4.2.1.2 U.S. Fish and Wildlife Service

- *USFWS: Draft Juvenile Salmonid Floodplain Rearing*

This study request 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, much of the information requested in this USFWS proposal has been developed previously or will be provided by an existing study. For example, information on floodplain rearing of juvenile salmonids on Tuolumne River floodplains will be provided by the existing 2D modeling study (W&AR-21 - Lower Tuolumne River Floodplain Hydraulic Assessment, being conducted as part of the Don Pedro Project relicensing, as required by FERC's May 21, 2013 Determination on Requests for Study Modifications and New Studies for the Don Pedro Hydroelectric Project). 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, as documented in the 2013 instream flow study report appendices (Stillwater Sciences 2013).

Beyond this, the information provided by the proposed floodplain rearing study may not be useful in addressing 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.

- *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. There is no explanation provided by the USFWS why existing information is not adequate to address this request.

As noted above, further evaluating 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 Chinook population model, and as such, the Districts consider conclusions based on the model to be accepted by the USFWS as valid.

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.

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 Project 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 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 results 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 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 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.

- *USFWS: Juvenile Chinook Salmon Survival*

The Districts have not adopted this study request because existing information is adequate to address the USFWS's objective, i.e., "characterize the limiting factors for juvenile Chinook salmon survival through the lower Tuolumne River." The Chinook Salmon Population Model (TID/MID 2013c) developed as part of the Don Pedro Project relicensing incorporates existing information on relative smolt survival in the lower Tuolumne River and provides an adequate 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, a continuation of the 2012 predation study, developed as part of the Don Pedro 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' Mark-Recapture Predation Study (W&AR-07), as proposed, 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).

- *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. 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 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 Project relicensing. In its December 22, 2011 Study Plan Determination for the Don Pedro Hydroelectric Project, FERC noted that the USFWS's 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 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 2013d and TID/MID 2013e) was adequate for addressing the USFWS's above-dam Chinook genetics study objectives.

- *USFWS: Redd Dewatering Study*

The Districts have not adopted this study request because an analysis of stage change has already been conducted by the Districts (provided in the La Grange Hydroelectric Project PAD), which, along with other information, indicates that redd dewatering is not an issue downstream of the Project. Because of FERC's 1996 requirements for steady spawning flows, redd dewatering is not considered to be a factor contributing to high rates of direct mortality of Chinook salmon, and the likelihood of *O. mykiss* spawning under flood flows in areas later subject to flow reductions is low (TID/MID 2013b).

As noted above, at the request of NMFS, the Districts conducted an assessment of the rate of stage change in the lower Tuolumne River (see PAD, Section 5.0). The analysis, conducted for the period January 1997 - June 2013, showed that stage change in 15-minute intervals is less than 2 inches (0.17 ft.) up or down 99.4 percent of the time, less than 4 inches (0.33 ft.) 99.9 percent of the time, and less than 8 inches (0.67 ft.) 99.99 percent of the time. One-hour stage change is less than 2 inches up or down 96.6 percent of the time, less than 4 inches 99.0 percent of the time, and less than 8 inches 99.8 percent of the time. Most of the largest stage changes were related to flood control operations at the Don Pedro Project, especially the 1997 flood event when river flows were very high. The Districts' maintain that no redd dewatering study is needed, because the analysis reported in the PAD provides sufficient information for evaluating the frequency and magnitude of stage changes, and as a result, potential effects on spawning salmonids.

4.2.2 State Resource Agencies

4.2.2.1 California State Water Resources Control Board

- *SWRCB: Fish Passage Feasibility Study at Project Facilities*

The Districts have not adopted this study request for the reasons stated in Section 4.2.1.1 of this PSP, i.e., the Districts' response to *NMFS: Effects of the Project and Related Activities on Fish Passage for Anadromous Fishes*.

- *SWRCB: Upper Tuolumne River Habitat Assessment*

The Districts have not adopted this study request for the reasons stated in Section 4.2.1.1 of this PSP, i.e., the Districts' response to *NMFS: Quantifying Existing Upper Tuolumne River Habitats for Anadromous Fish as They Pertain to Fish Passage Blockage at La Grange diversion dam.*

- *SWRCB: Tailrace Habitat Assessment*

This objectives of this request relate to potential salmonid "redd dewatering, redd scouring, and stranding" in the lower Tuolumne River. The Districts have not adopted this study request for the reasons stated in sections 4.2.1.1 and 4.2.1.2 of this PSP, i.e., the Districts' response to *NMFS: Effects of the Project and Related Activities on Fish Stranding and Salmonid Habitat in the Vicinity of the La Grange Project* and *USFWS: Redd Dewatering Study*, respectively.

4.2.3 Non-Governmental Organizations

A number of non-governmental organizations (referred to as the Conservation Groups [CG]) submitted comments on the PAD and requested that the Districts undertake certain investigations. Study requests of the CG that discussed the seven FERC study criteria, but which are not being adopted by the Districts, are presented below.

- *CG: Fish Passage Engineering Assessment*

The Districts have not adopted this study request for the reasons stated in Section 4.2.1.1 of this PSP, i.e., the Districts' response to *NMFS: Effects of the Project and Related Activities on Fish Passage for Anadromous Fishes*.

- *CG: Upper Tuolumne River Anadromous Fish Habitat Assessment*

The Districts have not adopted this study request for the reasons stated in Section 4.2.1.1 of this PSP, i.e., the Districts' response to *NMFS: Quantifying Existing Upper Tuolumne River Habitats for Anadromous Fish as They Pertain to Fish Passage Blockage at La Grange diversion dam.*

- *CG: Recreational Access and Facilities Feasibility Study Request*

The Districts have incorporated several elements of this study (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 draft Recreation Access and Safety Assessment Study Plan (Appendix C). 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 (page 2), provide a description of agency recommendations for enhancing recreation (page 3), and develop and evaluate alternatives for fishing and hiking (page 2) 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 (page 2), were not adopted because they have no relevancy to the Project. 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.

The CG's 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 whether it is safe for the public to utilize recreation resources at the Project. Regarding the CG's requests to estimate regional recreation needs and recreation potential, the Districts note that this 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 2013f).

5.0 MEETINGS AND REPORTS

The Districts will hold a study plan meeting during the 90-day review period for the PSP and will file the Initial Study Report (ISR) no later than February 2016 and will file the Updated Study Report (USR) no later than February 2017.

5.1 Proposed Study Plan Meeting

In accordance with 18 CFR Section 5.11(6)(e), the Districts will hold a study plan meeting within 30 days of filing the PSP to clarify the intent and content of the Districts' PSP, explain any initial information gathering that needs to take place, and attempt to resolve any outstanding issues with respect to the study plans. The meeting is scheduled as follows:

Date: Monday, October 6, 2014
Time: 10 am – 4 pm, Pacific Time
Location: Modesto Irrigation District, 1231 11th Street, Modesto, CA

The Districts will post a meeting notice, including meeting location, start time, and agenda, on its licensing website (http://www.lagrange-licensing.com/). All meetings will be held in conformance with the communication guidelines included in Section 2.3 of the Districts' PAD.

5.2 Study Determination

In accordance with 18 CFR Section 5.12, comments on the PSP, including any revised information or study requests, must be filed within 90 days after the PSP is filed. Therefore, comments on this PSP are due by December 4, 2014. The Districts will review all comments and file a Revised Study Plan (RSP) by January 3, 2015. LPs must file any comments on the RSP by January 19, 2015. Assuming that no studies are disputed by a mandatory conditioning agency, FERC will issue a Study Plan Determination by February 2, 2015.

5.3 Initial and Updated Study Reports

As required by 18 CFR Section 5.15(c), the Districts will file with FERC an Initial Study Report (ISR) within one year of the Study Plan Determination. The ISR will include the Districts' progress in implementing the studies, a summary of data collected, and a description of any variances to FERC-approved study plans. The Districts will hold a meeting with LPs to discuss the ISR within 15 days of filing the ISR and will file a meeting summary within 15 days of the meeting. In accordance with the SD1 *Process Plan and Schedule*, the Districts will file the ISR and USR by February 2, 2016 and February 1, 2017, respectively.

6.0 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.

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. 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.

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

_____. 2013f. 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.

_____. 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.

PROPOSED STUDY PLAN DOCUMENT

APPENDIX A

DISTRICTS' RESPONSE TO CONSERVATION GROUP COMMENTS

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Districts' Response to Conservation Group Comments

Comment Number	Comment	Districts' Response
1	In its Order on Rehearing finding La Grange jurisdictional, the Commission deferred decision on whether the La Grange Project required licensing as part of a complete unit of development with the Don Pedro Project. The Commission rejected the Conservation Groups' argument that La Grange reregulated flows from Don Pedro and declined to decide whether the Districts' use of La Grange to make minimum flow releases required by the Don Pedro license made La Grange a part of the complete unit of development with Don Pedro. However, the Commission has previously referred to La Grange as a "diversion and reregulating facility," and there have been no substantial changes to the La Grange facility since 1996 that would alter its reregulating function. We request that OEP Staff consider whether La Grange should be licensed as a part of a complete unit of development with Don Pedro. [Page 3 of the main body of the letter]	The Conservation Group's (CG) reliance on the reference in FERC's 1996 order to La Grange being a "diversion and reregulating facility" is misplaced. The issue of whether La Grange was a "reregulating" reservoir was not at issue, and FERC made no decision regarding "reregulation," in the 1996 order. The first time FERC examined the issue of whether La Grange was a reregulating reservoir was in its December 19, 2012 order in Docket No. UL11-1-000 where FERC staff found that La Grange did *not* act as a reregulating facility for Don Pedro, a determination the FERC Commissioners affirmed in their July 19, 2013 Order on Rehearing. Further, in an order issued in 2009 -- 13 years after the 1996 order relied upon by the CG -- FERC referred to the La Grange Dam as simply a "diversion dam." *See* 128 FERC ¶ 61,035 at ¶ 4. Even more misplaced is the CG's plea for FERC Staff to consider whether La Grange should be licensed as part of a "complete unit of development" with Don Pedro. FERC Staff has no authority to act inconsistent with the FERC Commissioners' determinations in their July 19, 2013 Order on Rehearing (1) that La Grange does not act as a reregulating facility for Don Pedro and (2) to defer a decision on whether La Grange's passing of Don Pedro minimum flows makes it part of a Don Pedro "complete unit."
2	Although the Districts initiated the La Grange licensing several years after the relicensing of Don Pedro, OEP Staff is scheduled to issue the Notices of Readiness for Environmental Analysis for the Don Pedro Project in May 2016, just one month before it issues the NREA for the La Grange Project. Given that the schedules are already closely aligned, we believe it would be more efficient to have a single EIS, in addition to contributing to a more complete environmental analysis of the proposed licensing decisions. [Pages 10 and 11 of the main body of the letter]	The CG's plea for a single EIS must be rejected. As explained in the Districts' August 21, 2014 letter to FERC, the processing schedule for La Grange set forth in SD1 is clearly erroneous and must be revised. As explained therein, the REA Notice for La Grange will not be issued in June 2016; rather, it likely will not be issued until mid- to late-2017. Thus, a single NEPA document as requested by the CG's cannot be accommodated.

Comment Number	Comment	Districts' Response
3	SDI does not describe the District's operation of the La Grange Project to benefit the Don Pedro Project. OEP Staff should describe and analyze the extent to which the Districts operate La Grange to provide benefits at the Don Pedro Project in the environmental document. The Commission has stated that La Grange is a "reregulating facility" in relation to the Don Pedro Project: > Flows from 100 cfs to 550 cfs can be regulated through releases from the powerhouse at La Grange Dam, which is *a diversion and reregulating facility* located downstream of the New Don Pedro Dam. *Turlock & Modesto Irrigation Dists*., 76 FERC ¶ 61,117, ¶ 61,610 n.28 (July 31, 1996) (Emphasis added). The Commission recently departed from this precedent, finding that La Grange Reservoir did not have sufficient capacity to re-regulate releases from Don Pedro. We have appealed this finding to the D.C. Circuit; the appeal is pending. The Commission has also acknowledged that the La Grange Project is used to make fish flow releases required by the existing Don Pedro License. 144 FERC ¶ 61,051, ¶ 115. .. [Pages 11 and 12 of the main body of the letter]	The CG's request that FERC Staff analyze an alternative where Don Pedro and La Grange are licensed as a "complete unit of development" also must be rejected. As discussed in the Districts' response to Comment 1, the CG's contention that "precedent" supports its position is false, while their request that FERC Staff act inconsistent with the determinations made by the FERC Commissioners is patently inappropriate.
4	Reopener at Don Pedro has previously been proposed as a means to coordinate fish passage between the Projects. Reopener would be insufficient to protect fish resources. The Commission takes the position that, even with a reopener provision, it cannot reopen and amend a license "absent agreement among the parties." *Turlock Irrigation Dist. & Modesto Irrigation Dist.*, 140 FERC ¶ 61,207, ¶ 17 (2012). [Page 14 of the main body of the letter]	The CG's contention that FERC has taken the position that, even with a reopener provision, it cannot reopen and amend a license without the agreement of the licensees is incorrect. The entire sentence of 140 FERC ¶ 61,207 at ¶ 17 (2012) from which the CG lifted their abbreviated quotation reads as follows: "Thus, absent an agreement among the parties, we could not act unilaterally to amend the license to require interim measures without first determining that the license should be reopened, and providing notice and an opportunity for a hearing."

Comment Number	Comment	Districts' Response
5	Both projects will be ready for environmental analysis within a month of each other in 2016 -- Don Pedro in May and La Grange in June. [Page 14 of the main body of the letter]	The CG's contention that Don Pedro and La Grange will be ready for environmental analysis within one month of each other in 2016 is incorrect. See the Districts' response to Comment 2, above.
6	Turlock Irrigation District ("TID") operates the La Grange Project powerhouse. Modesto and Turlock Irrigation Districts (collectively, "Districts") operate La Grange Dam for water and power supply purposes and to make fish flow releases required under the Don Pedro License. [Page 2 of the Fish Passage Engineering Assessment Study Request]	The CG's assertion that the Districts "operate" La Grange "to make fish flow releases" required by the Don Pedro license is misleading. Since water flows downhill, water released from Don Pedro for fishery purposes pursuant to Article 37 of the Don Pedro license must flow downhill and thus pass La Grange to reach the Article 37 measuring point at the La Grange Bridge located downstream of La Grange. The Districts do not "operate" La Grange to make the fish flow releases. Rather, they simply make prudent, real-time decisions at La Grange as to how to pass Don Pedro releases downstream (*i.e.*, via the spillway on the dam, various gates, and/or La Grange powerhouse releases) based on all relevant factors (*e.g.*, time of year, flow amount, hydraulic capacity of the various potential outlet devices, and the condition and operability of those devices).
7	There is no dispute that the Districts coordinate operation of the La Grange and Don Pedro Projects for water supply and power purposes. [Page 2 of the Fish Passage Engineering Assessment Study Request]	Contrary to the assertion of the CG, the Districts do not "coordinate" operation of La Grange and Don Pedro for "power purposes." As FERC clearly held in its December 19, 2012 and July 19, 2013 orders in the Docket No. UL11-1-000 proceeding, La Grange does not act as a reregulating facility for Don Pedro, and its operation does not in any way enhance generation at Don Pedro. Thus, the operation of La Grange is not coordinated with the operation of Don Pedro for "power purposes."
8	There is little riverine habitat between La Grange Dam and Don Pedro Dam. La Grange Diversion Pool is not significantly fluctuated in its stage height, and its backwater extends effectively to Don Pedro Dam. [Page 2 of the Fish Passage Engineering Assessment Study Request]	The CG's assertion that the backwater of the La Grange pool "extends effectively to Don Pedro Dam" ignores the fact that the Districts (1) believe that FERC's determination in the Docket No. UL11-1-000 proceeding that the La Grange pool extends more than one mile upstream is incorrect and (2) are challenging that determination in *Turlock Irrigation District and Modesto Irrigation District vs. FERC*, No. 13-1250 (D.C. Cir. filed September 13, 2013).

Comment Number	Comment	Districts' Response
9	If the La Grange Project were licensed as part of a complete unit of development with the Don Pedro Project, fish passage past both dams and reservoirs would be subject to the Section 18 authority of NMFS and thus squarely on the table for study in relicensing. [Page 9 of the Fish Passage Engineering Assessment Study Request]	The CG's explicit and implied references to the "complete unit of development" theory to support their study requests are highly inappropriate. FERC determined in its December 19, 2012 and July 19, 2013 orders in the Docket No. UL11-1-000 proceeding that La Grange does not act as a reregulating reservoir for Don Pedro and thus is not part of a Don Pedro "complete unit of development" on this basis. Further, and although FERC did not make a final determination on the issue of whether the passing of Don Pedro fish flow releases downstream past La Grange made La Grange part of a Don Pedro "complete unit of development," it indicated serious reservations as to such a theory.
10	If the La Grange Project were licensed as part of the Don Pedro Project, fish passage past both dams and reservoirs would be subject to the Section 18 authority of NMFS, and thus squarely on the table for study in relicensing. [Page 10 of the Upper Tuolumne River Anadromous Fish Habitat Assessment Study Request]	See the Districts' response to Comment 9 above.

PROPOSED STUDY PLAN DOCUMENT

APPENDIX B

DRAFT CULTURAL RESOURCES STUDY PLAN

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STUDY PLAN

TURLOCK IRRIGATION DISTRICT
AND
MODESTO IRRIGATION DISTRICT

LA GRANGE HYDROELECTRIC PROJECT
FERC NO. 14581

Cultural Resources Study

September 2014

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 south (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.

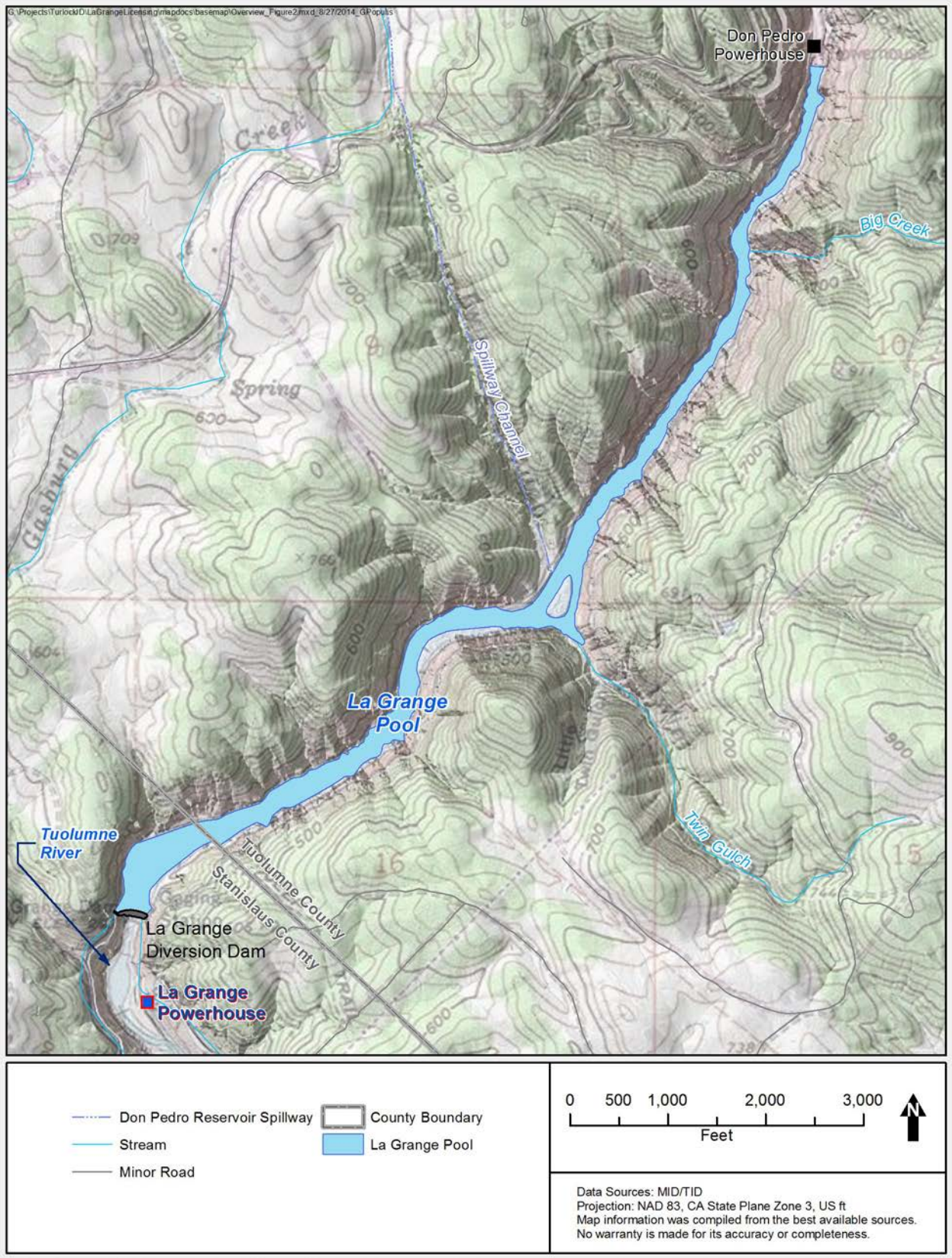

Figure 1.0. La Grange Hydroelectric Project location map.

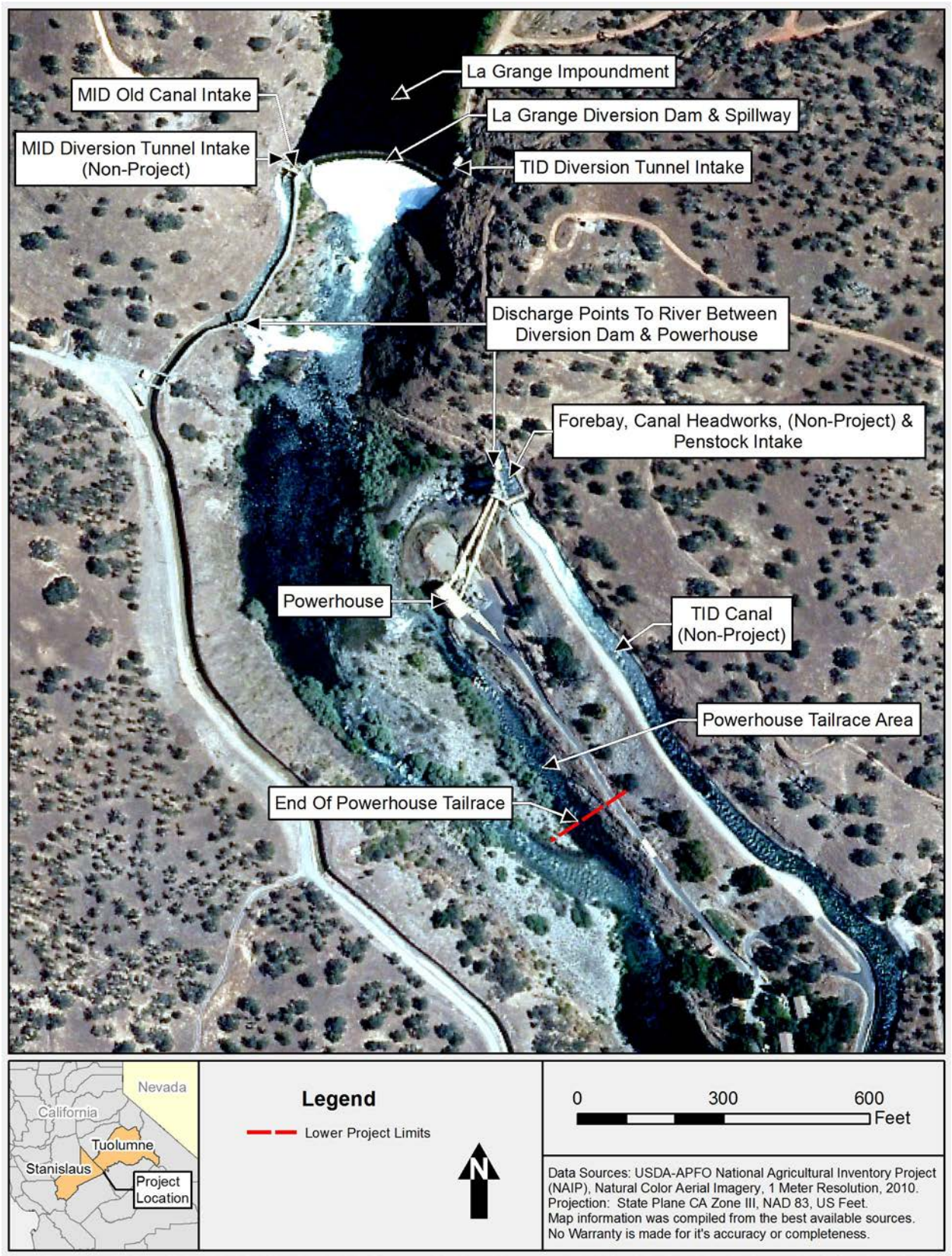

Figure 2.0. La Grange Hydroelectric Project site plan.

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

[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.

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. The APE is defined as lands incorporating the La Grange Hydroelectric Project facilities, and La Grange Hydroelectric Project access roads. 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 (ARPA) of 1974 (16 USC 469), the American Indian Religious Freedom Act (AIRFA) of 1978 (42 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, form 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 us 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. Today, the Districts serve electric customers in a 1,200 square mile area.

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 (CSU), 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 (ADOE) (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 line, 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 area to be studied; 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, as described above, has been initially defined as lands incorporating the La Grange Hydroelectric Project facilities, 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.

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

[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.

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 (CPC), California Health and Safety Code (CH&SC), and California Public Resources Code (CPRC), 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 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 CH&SC Section 7050.5, and contact the Native American Heritage Commission (NAHC), 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 CPRC 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.

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

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 NAHC 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 cost will be provided in the Revised Study Plan.

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

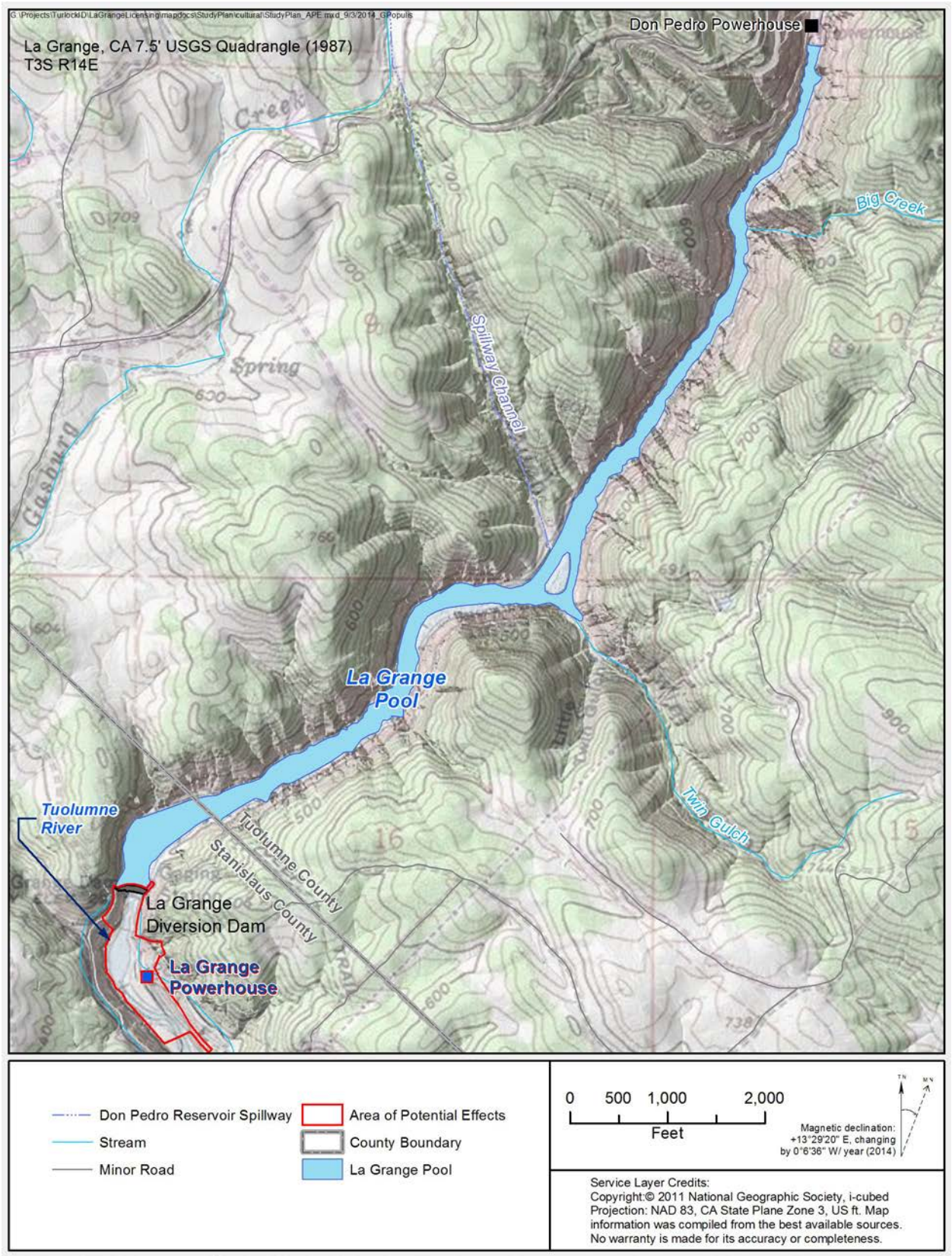

Figure A-1. Area of Potential Effects Map.

PROPOSED STUDY PLAN DOCUMENT

APPENDIX C

DRAFT RECREATION ACCESS AND SAFETY ASSESSMENT STUDY PLAN

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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

September 2014

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 south (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.

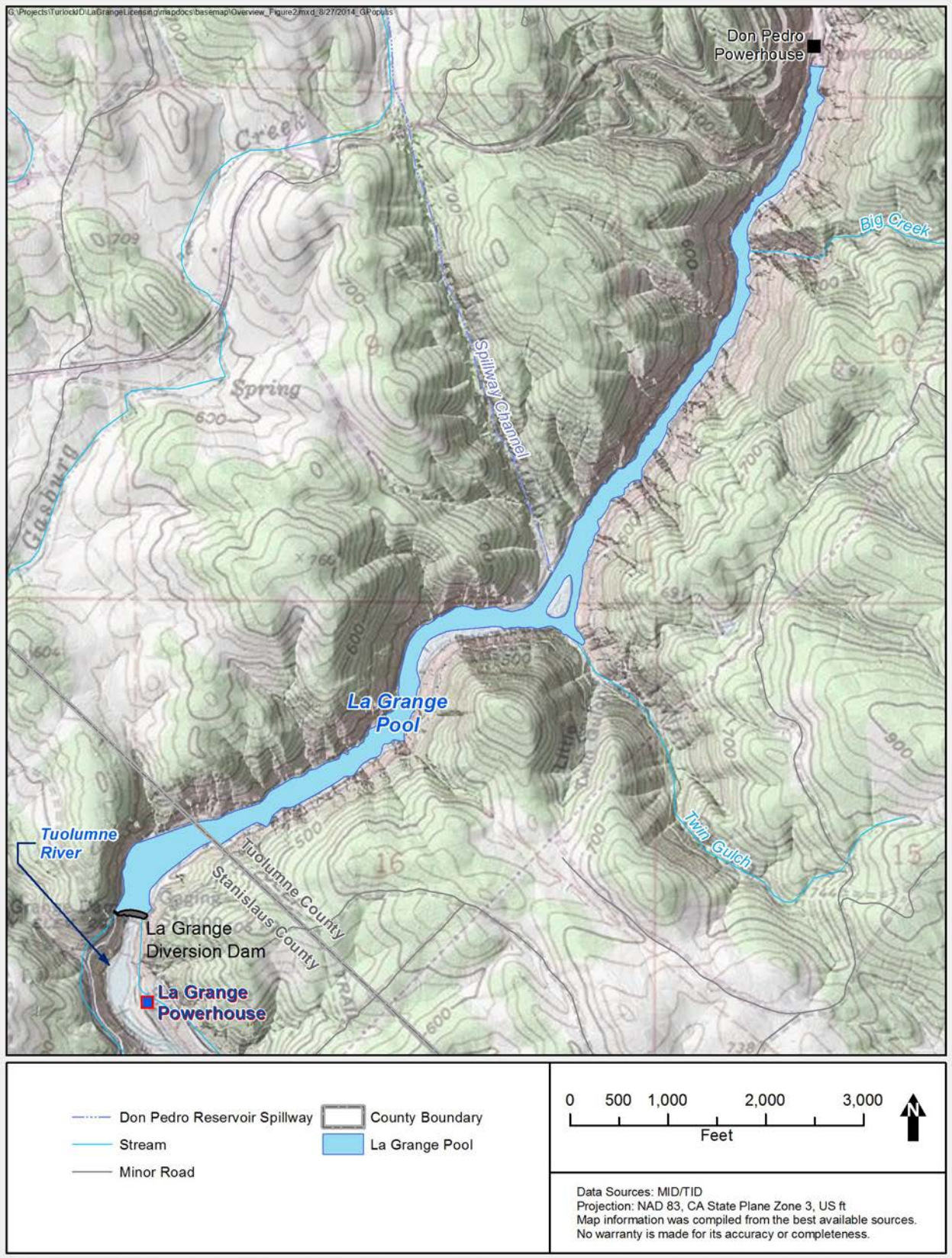

Figure 1.0. La Grange Hydroelectric Project location map.

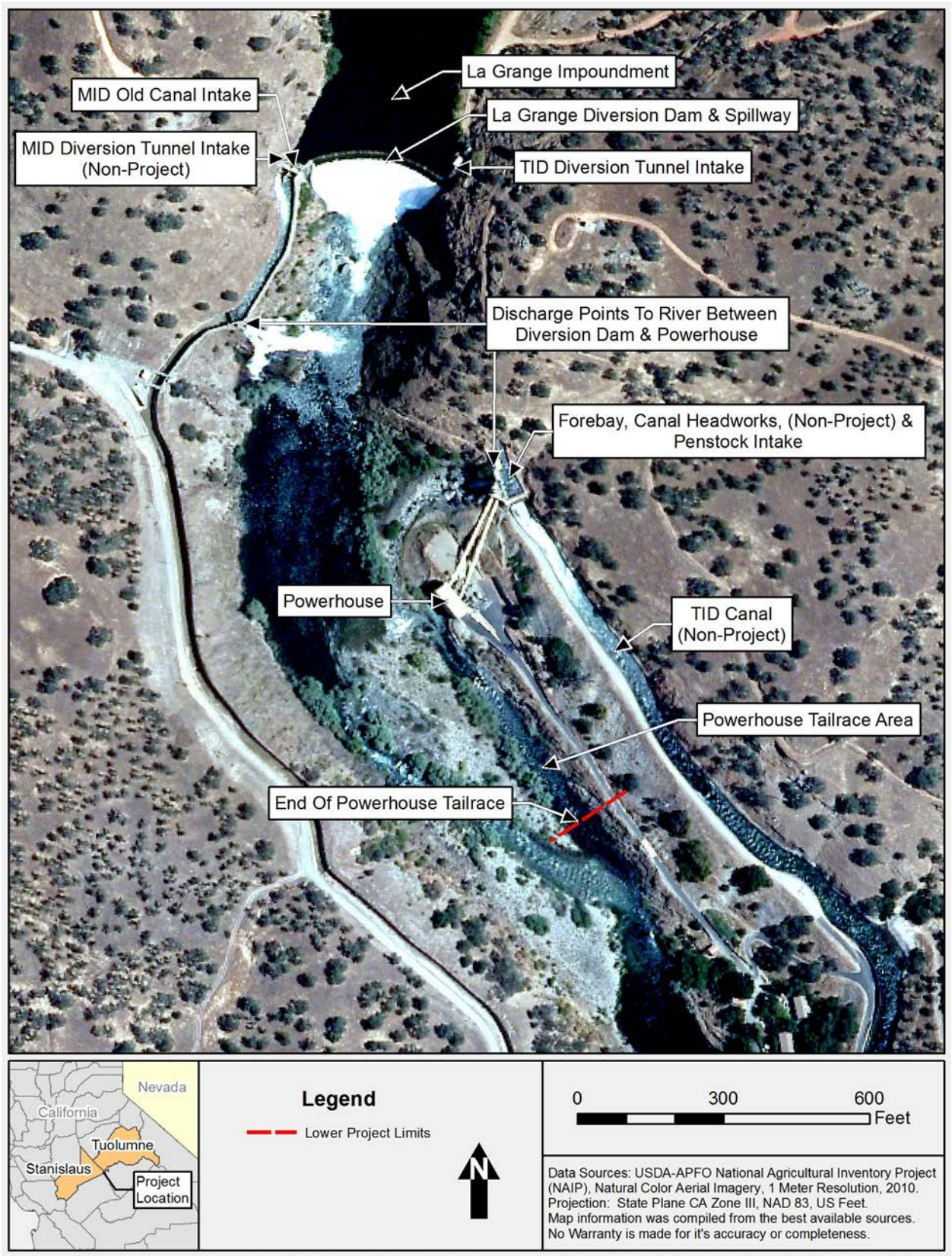

Figure 2.0. La Grange Hydroelectric Project site plan.

2.0 Project Nexus

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.

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, among other things, 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

Rank	Activity	Rank	Activity
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), an element of the CORP, identify the following as the top five recreational activities in California with the highest latent demand (Table 3.1-1). These are activities that Californians would participate in, from a statewide perspective, if more facilities and opportunities were provided. The summary provides an overview of the results from the adult and youth surveys and also includes a section on Hispanic and regional differences and overall recommendations.

In addition, the 2009 POAOR 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. Implementation of the Recreation Element revolves around the following seven key goals:

- 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.

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.

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. Above the La Grange Diversion Dam, the study area will extend to elevation 300 feet.

7.0 Study Methods

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

Public Access Review

Using 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 the site visit will be used to produce descriptions of each public access route, including route length, terrain, and barriers to use. Photographs will be taken to augment the written descriptions.

Recreation Opportunity Identification

Site characteristics in the study area will be assessed for recreation potential. Site characteristics to be assessed at the La Grange pool will include proximity to improved roads, site topography and bank slope, existing access, and property ownership. Site conditions will be detailed quantitatively, described narratively, and photographed.

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 (i.e., La Grange pool and tailwaters) that may be used for recreation.

2. **Identify Potential Recreation Activities within Each Component** – Information will be obtained regarding the types and level of public activities currently associated with each component, where applicable.

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 study.

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 ..... March – April 2015
- Step 2 ..... May – 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

Study plan implementation cost will be provided in the Revised Study Plan.

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).

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.

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DRAFT RECREATION ACCESS AND SAFETY ASSESSMENT STUDY PLAN

ATTACHMENT A

SAMPLE RISK ASSESSMENT FORM

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CDA Public Safety Around Dams Risk Assessment Tool

Date	Name	Signature

DOWNSTREAM 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																																										

CDA ACB

CDA Public Safety Around Dams Risk Assessment Tool

DOWNSTREAM 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	

PROPOSED STUDY PLAN DOCUMENT

APPENDIX D

DRAFT FALL-RUN CHINOOK SALMON MIGRATION BARRIER STUDY PLAN

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STUDY PLAN

TURLOCK IRRIGATION DISTRICT
AND
MODESTO IRRIGATION DISTRICT

LA GRANGE HYDROELECTRIC PROJECT
FERC NO. 14581

Fall-Run Chinook Salmon Migration Barrier Study

September 2014

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 south (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.

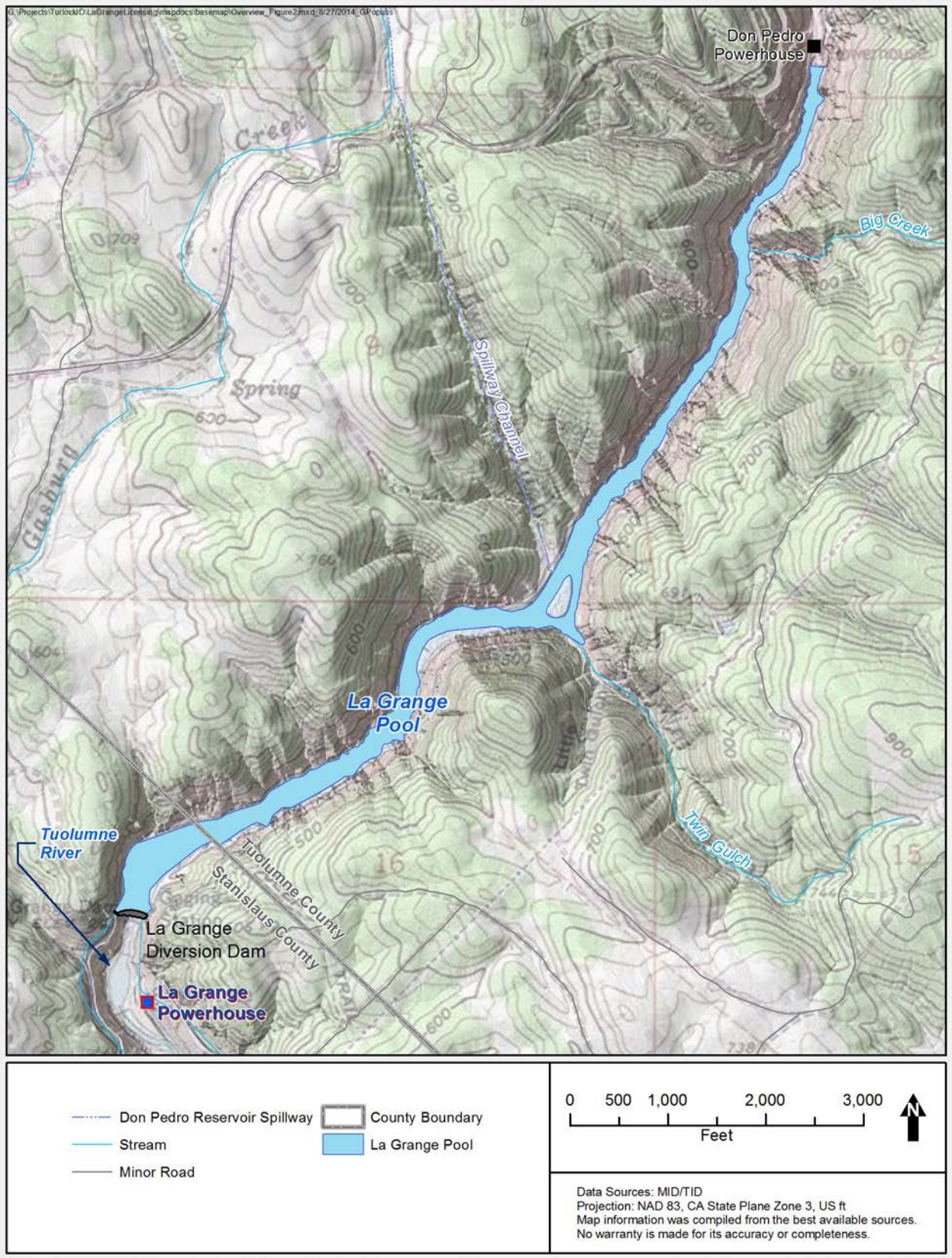

Figure 1.0. La Grange Hydroelectric Project location map.

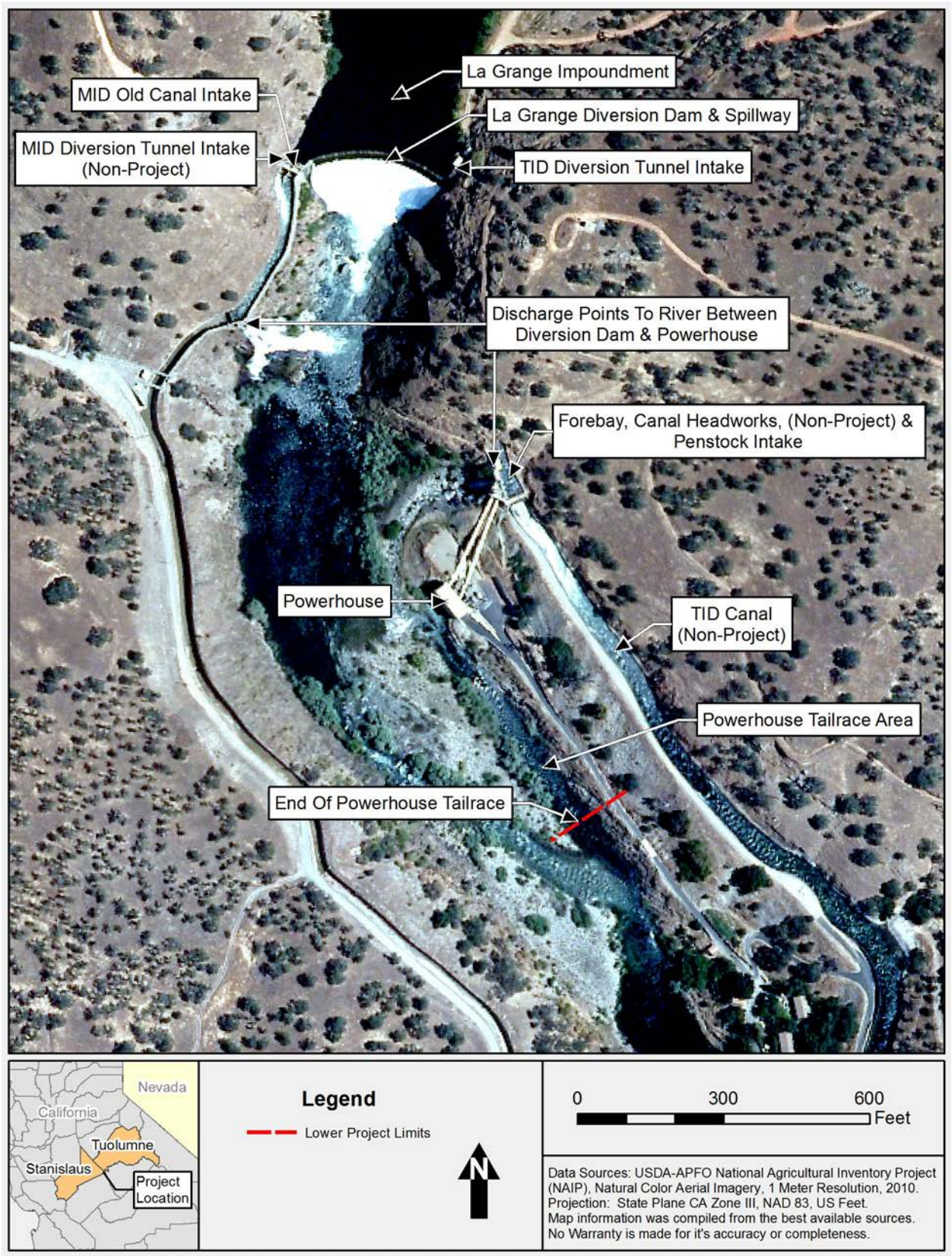

Figure 2.0. La Grange Hydroelectric Project site plan.

2.0 Study Requests, Project Nexus and Information Needed

Resource agencies and Conservation Groups (CG) requested that the Districts undertake extensive and costly anadromous fish passage studies at the LGDD as part of the licensing process for the La Grange Hydroelectric Project. More specifically, these groups requested that the Districts undertake investigations of upstream and downstream fish passage at both LGDD and the Districts' Don Pedro Dam located upstream, with the CG acknowledging that "there would likely be little benefit to providing fish passage at La Grange dam alone". The National Marine Fisheries Service's (NMFS) study request for fish passage states erroneously that "[c]urrently, the La Grange Project continues to completely block access of anadromous fish to the upper Tuolumne River watershed." It is self-evident that LGDD can only be a barrier to habitat that may exist in the approximately two miles of the Tuolumne River between LGDD and the base of Don Pedro Dam.

The Don Pedro Hydroelectric Project is undergoing relicensing under a process completely independent of the licensing of the La Grange Hydroelectric Project. In the Don Pedro Hydroelectric Project relicensing proceeding, FERC has previously rejected NMFS' request to have the Districts investigate anadromous fish passage at Don Pedro Dam finding that "there is no nexus between the Don Pedro Hydroelectric Project and direct effects on fish passage of anadromous fish" (see FERC's Study Plan Determination for the Don Pedro Hydroelectric Project; December 21, 2011, page 74). FERC's December 2011 Determination went on to say that NMFS' study request in the Don Pedro Hydroelectric Project proceeding did not show "that fish passage above La Grange dam would be reasonably certain to occur in the near future." This continues to be the case. The La Grange Hydroelectric Project is not a FERC-licensed facility, and it remains uncertain whether FERC will issue a license, or if issued, the Districts will accept the license. NMFS has the option to reserve its authority to prescribe fish passage at Don Pedro Dam if the La Grange Hydroelectric Project is licensed by FERC, the license includes fish passage at LGDD, and the Districts accept the license.

Given the above considerations and considerations of cost, the federal agencies and CG requests for fish passage studies at LGDD and Don Pedro Dam do not meet the ILP criteria for studies to be conducted as part of the La Grange Hydroelectric Project licensing. Neither NMFS nor the CG actually requested a study of anadromous fish passage at LGDD. Therefore, no fish passage study request was made specifically for the La Grange Hydroelectric Project alone. In fact, the CG acknowledge that studying anadromous fish passage at just LGDD would be of little value. Therefore, by their own reasoning, study of fish passage at LGDD will not meet ILP Study Criteria 4, 5, or 6.

In any event, a study of fish passage facilities constitutes a study of a mitigation measure, the need for which has not been shown. While the mere existence of LGDD may appear to be a barrier to anadromous fish migration, there is no evidence presented in the agencies' or CG's study requests that significant numbers of anadromous fish are being prevented from migrating upstream or that any upstream migrants are prohibited from successfully 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 dam or powerhouse, and if a few reach these locations, that they are not moving back downstream to successfully spawn.

NMFS's study request does identify the tailrace, powerhouse, and diversion dam as "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 a spring Chinook (*O. tshawytscha*) run or a steelhead (*Oncorhynchus mykiss*) run. NMFS only identifies the potential for a future population of these two anadromous species; however, there currently are no approved plans or approved funding for reintroduction of spring-run Chinook, and there is no evidence of a steelhead run on the Tuolumne River. Additionally, there have been no research studies conducted by fish and wildlife agencies confirming the existence of suitable habitat for anadromous fish above Don Pedro Reservoir. Logically, significant and detailed research studies of the existence and suitability of upstream habitat and the flows needed to sustain these habitats should precede any proposal to move ESA-listed fish into these habitats. Proposing to release listed species into unknown and unproven habitats without first conducting basic research to evaluate the suitability of those habitats could significantly harm these listed species.

The Districts assert that none of the various anadromous fish passage study requests meet the ILP's seven criteria. Additionally, FERC has already determined that the investigation of anadromous fish passage studies at Don Pedro Dam are not warranted, and the reasoning employed continues to apply. By definition, there is no Don Pedro "Project nexus" to fish passage at LGDD, and the licensing participants' efforts to "back-door" their desire for fish passage studies at Don Pedro Dam into the La Grange Hydroelectric Project licensing proceeding are misplaced. Studies undertaken as part of the Don Pedro relicensing demonstrate that there is sufficient spawning and rearing habitat in the lower Tuolumne River below LGDD to meet the agencies' fall-run Chinook population goals and there is a robust *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 tantamount to a "build-it-and-they-will come" scheme.

The primary biological reason for facilitating fish passage upstream of a barrier would be to improve their chance of successfully spawning and rearing in order to maintain a healthy population. Neither NMFS nor the CG present any evidence that there is insufficient habitat in the lower Tuolumne River to maintain healthy populations of fall-run Chinook and *O.mykiss*. In fact, a substantial body of evidence is available in the Don Pedro Hydroelectric Project relicensing record to demonstrate that there is adequate habitat in the lower Tuolumne River to achieve these goals.

However, as indicated by NMFS in its study request, the degree to which the LGDD constitutes an actual barrier to upstream anadromous fish migration is unknown at this time. The Districts agree that there is no factual evidence to suggest that the LGDD is having an adverse effect on anadromous fish populations in the lower Tuolumne River by preventing upstream migration. If only a small percentage of the migrating fall-run Chinook population actually reaches the LGDD, and if those fish that do typically move back downstream to spawn, then the existence of the LGDD is not a barrier to successful migration and is not having a significant impact on the maintenance of the fall-run Chinook salmon population. Therefore, the Districts propose to conduct a two-year study, described below, to investigate whether and to what extent the LGDD and the La Grange Hydroelectric Project powerhouse is a barrier to the upstream migration of fall-run Chinook salmon and whether it adversely affects successful spawning.

3.0 Resource Agency Management Goals

The Districts contend that four agencies have resource management goals related to fall-run Chinook salmon 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. For Central Valley fall/late fall-run Chinook, the relevant goals are to enhance Essential Fish Habitat downstream of the La Grange Hydroelectric Project and achieve a viable population of Central Valley fall/late fall-run Chinook salmon in the Tuolumne River.

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 Study Goals

The proposed Fall-Run Chinook Migration Barrier Study will evaluate the potential impact of the LGDD and the La Grange Hydroelectric Project powerhouse as barriers to upstream migration of adult fall-run Chinook salmon. The study will document the proportion of the fall-run Chinook salmon population that may migrate upstream to these facilities and evaluate any

potential impacts to the reproductive success of these fish. The specific objectives of the study are as follows:

- Determine the number of fall-run Chinook salmon migrating upstream to the LGDD and the La Grange Hydroelectric Project powerhouse during the 2015/2016 and 2016/2017 migration seasons.
- Compare the number of fall-run Chinook salmon migrating upstream to the LGDD and the La Grange Hydroelectric Project powerhouse to total escapement during the 2015/2016 and 2016/2017 migration seasons.
- Document carcass condition (egg retention) to evaluate pre-spawn mortality rates of fall-run Chinook salmon migrating upstream to the LGDD and the La Grange Hydroelectric Project powerhouse, which do not move back downstream to spawn.

5.0 Existing Information and Need for Additional Information

Historically, both fall- and spring-run Chinook salmon occurred in the Tuolumne River. However, under existing conditions only fall-run Chinook salmon occur 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 (NMFS 1998) concluded that the Central Valley spring-run Chinook salmon ESU was in danger of extinction because native spring-run Chinook salmon are extirpated from all tributaries in the San Joaquin River Basin (NMFS 2009). As a result, this study will focus solely on fall-run Chinook.

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 habitat exists. Egg incubation and fry emergence occur from October through January. Juvenile fall-run Chinook have a relatively short freshwater rearing period before emigrating to the ocean.

During the period of fish counts, maximum and minimum fall-run Chinook salmon run sizes have been between 130,000 spawners in 1944 (Fry 1961) and 100 in 1963 (Fry and Petrovich 1970). Since the completion of Don Pedro Dam (1971-2009), spawner estimates have ranged from 40,300 in 1985 to 77 in 1991 (TID/MID 2010, Report 2009-2). From 1971 to 2009 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, just below 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, with progeny displaying either anadromous or resident life history traits. 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 April or May, flows permitting, and any *O. mykiss* encountered at the weir during the study will be recorded.

The extent to which the LGDD or the La Grange Hydroelectric Project powerhouse is a barrier to migrating fall-run Chinook salmon is unknown. It is also unknown whether migrating fish that may reach these facilities move back downstream of or remain immediately below and are unable to spawn successfully. Therefore, it is unclear whether the LGDD or the La Grange Hydroelectric Project powerhouse is adversely affecting fall-run Chinook salmon. Based on review of available information, Chinook salmon are capable of spawning within a wide range of water depths and velocities (Healey 1991) and gravel sizes (Kondolf and Wolman 1993). A spawning gravel assessment, conducted in 2012 as part of the Don Pedro Hydroelectric Project relicensing process documented that under the current FERC flow schedule, habitat below LGDD is available for maximum Chinook run sizes ranging from approximately 47,882-59,795, based on average redd size estimates from the Tuolumne River (TID/MID 2013a). This study also documented a total of 3,527,200 ft^2 of riffle mesohabitat mapped from RM 52.2 to RM 23, of which 2,967,500 ft^2 (84%) contained spawning gravel. Anecdotal information suggests that few spawning adults migrate upstream of the gravel-bedded reach (RM 24.1 -52.2), indicating that sufficient spawning habitat is available for the current population of adult fall-run Chinook returning to the Tuolumne River (i.e., baseline condition) since FERC-mandated flows have been in effect. The proposed study will evaluate whether the LGDD or the La Grange Hydroelectric Project powerhouse is a migration barrier to fall-run Chinook salmon, and if so, identify the proportion of the spawning population being restricted from migrating upstream and the potential impacts on the reproductive success of these fish.

6.0 Study Methods

6.1 Study Area

The study area consists of the Tuolumne River channel opposite the La Grange Hydroelectric Project powerhouse and in the La Grange Hydroelectric Project tailrace just downstream of the powerhouse.

6.2 Study Methods

The proposed study will evaluate the potential impact of the LGDD and the La Grange Hydroelectric Project powerhouse on upstream migration of adult fall-run Chinook salmon during the 2015/2016 and 2016/2017 runs by:

- Operating a fish counting weir to determine the number of fall-run Chinook salmon migrating upstream to the LGDD and the La Grange Hydroelectric Project powerhouse,
- Comparing the number of fall-run Chinook salmon migrating upstream to the LGDD and the La Grange Hydroelectric Project powerhouse (i.e., above the counting weir) and not returning to downstream habitat to total fall-run Chinook escapement; and
- Documenting carcass condition (egg retention) to evaluate pre-spawn mortality rates of fall-run Chinook salmon migrating upstream to the LGDD and the La Grange Hydroelectric Project powerhouse (i.e., those that do not return to downstream habitats below La Grange Hydroelectric Project facilities to spawn).

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

Several permits will be required to operate a fish counting weir in the vicinity of the La Grange Hydroelectric Project, including a Section 4d take authorization for Central Valley steelhead from CDFW and NMFS, a Streambed Alteration Agreement and Scientific Collector Permit amendments from CDFW, and a Section 404 permit from the U.S. Army Corps of Engineers. In some cases, existing permits may be amended to include operation of the proposed new counting weir near the La Grange Hydroelectric Project facilities, and in other cases new permits may need to be obtained. Permits are expected to take at least six months to obtain, and some permit applications will 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 permit will be requested in fall 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 fish counting device (i.e., video system or Vaki Riverwatcher).

Task 2: Field Data Collection

A fish counting weir consisting of two segments will be installed in the Tuolumne River prior to the start of the 2015/2016 fall-run Chinook salmon migration season (i.e., fall 2015). One segment will be placed immediately downstream of the first pool below LGDD in the Tuolumne River main channel, and the second segment will be placed just below the La Grange Hydroelectric Project powerhouse. The counting weir will be operated during 2015/2016 and during 2016/2017 to determine the number of fall-run Chinook salmon that migrate upstream of the weirs to the LGDD. The total number of fall-run Chinook salmon exhibiting upstream migration behavior will be defined as the net difference between upstream and downstream fish counts at the weir. Monitoring will begin each year in September and continue until April or May, with termination of sampling planned to occur approximately 5-10 days following the spring pulse flow. In addition to monitoring fall-run 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 near the downstream end of the spawning reach (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 fall-run Chinook salmon exhibiting upstream migration behavior (approaching the LGDD or the La Grange Hydroelectric Project powerhouse and not moving back downstream) to estimate the extent of the effect of these facilities on fall-run Chinook migration.

Salmon encountering barriers to migration may experience pre-spawn mortality. During carcass surveys conducted to estimate salmon escapement, CDFW has examined 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. To the Districts' knowledge, salmon egg retention (i.e., pre-spawn mortality) has never been documented on the Tuolumne River. To evaluate the potential effect of the LGDD and the La Grange Hydroelectric Project powerhouse on reproductive success of fall-run Chinook salmon exhibiting upstream migration behavior, 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 on the Stanislaus and Upper Sacramento Rivers, 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% or more), and unspent if the ovaries appear nearly full of eggs (Guignard 2005, Snider et al. 2002).

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 upstream migration behavior (upstream counts – downstream counts). The total number of fish exhibiting upstream migration behavior will be divided by total escapement determined at the lower weir to determine the percentage of the fall-run Chinook population exhibiting upstream migration behavior. Any spawning activity, live Chinook salmon, or carcasses observed between the weir and the LGDD will be reported. Egg retention rates will be reported for any female Chinook salmon carcasses examined. 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. A comprehensive report of findings from the two-year study will be submitted in July 2017.

7.0 Schedule

The Districts anticipate the following schedule to complete the study. 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.

- Planning and Permitting ..... October 2014 – August 2015
- Fieldwork .....September 2015 – April/May 2016 and September 2016 – April/May 2017
- Data Entry, QA/QC, and Analysis ..... September 2015 – June 2017
- Initial Study Report Issuance ..... February 2016
- Updated Study Report Preparation ..... February 2017 – July 2017

8.0 Consistency of Methodology with Generally Accepted Scientific Practices

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 determine the abundance of fall-run Chinook salmon escaping to the Tuolumne River.

9.0 Level of Effort and Cost

Study plan implementation costs will be provided in the Revised Study Plan.

10.0 References

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.

_____. 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.

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.