Sonoma Water

Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

CF/49-4.1-11 Coyote Valley Dam & Lake Mendocino Operations (ID 1414)

July 31, 2019

Lieutenant Colonel John D. Cunningham
Commander, San Francisco District
U.S. Army Corps of Engineers
450 Golden Gate Ave, 4th Floor
San Francisco, CA 94102

Re: Water Year (WY) 2020 Deviation Request, Lake Mendocino

Members of the Lake Mendocino Forecast Informed Reservoir Operations (FIRO) Steering Committee[1] submit this request for a major planned deviation to the Coyote Valley Dam – Lake Mendocino Water Control Manual (WCM). The purpose of this request is to improve water supply reliability, flood management, and environmental conditions of Lake Mendocino and the upper Russian River while adhering to the implementation of the Russian River Biological Opinion.

This major deviation request represents the culmination of a multi-year effort, led by the FIRO Steering Committee and follows the successful implementation of a major deviation authorized by the U.S. Army Corps of Engineers (USACE) for WY 2019. Since 2014, the Steering Committee has collaborated to produce a significant body of technical and scientific work including watershed and atmospheric observations, atmospheric and hydrologic forecast analyses, and parallel modeling applications. This work has been conducted in cooperation with USACE San Francisco District, Sacramento District, Engineer Research and Development Center (ERDC), and the South Pacific Division (SPD). The Lake Mendocino FIRO Preliminary Viability Assessment (http://cw3e.ucsd.edu/firo-preliminary-viability-assessment-for-lake-mendocino/#TOP), published August 2017, provides the details of this work, and serves as the technical underpinning of this request.

The requested deviation is essentially the same as approved by USACE for WY 2019. The only difference between the deviations is that the request for WY2020 would allow USACE to pre-release in advance of a storm event into the water conservation pool if: (1) such a release is recommended by the FIRO decision support tools, and (2) Sonoma Water is consulted about the pre-release and approves of the action in coordination with National Marine Fisheries. The attached document describes the basis for the requested deviation; the details of the requested deviation; and a description of the FIRO Steering Committee evaluation process. In it, we respectfully request USACE approval of a planned major deviation, which would make the following adjustments to the rule curve:

[1] The Lake Mendocino FIRO Steering Committee consists of representatives from the Sonoma Water, Scripps Institute of Oceanography (Scripps), U.S. Army Corps of Engineers (USACE), National Oceanic and Atmospheric Administration (NOAA), U.S. Geologic Survey (USGS), U.S. Bureau of Reclamation and the California Department of Water Resources. This deviation request is being submitted on behalf of steering committee members representing the following organizations: SCWA, Scripps Institution of Oceanography, USACE, NOAA, and California Department of Water Resources.

- November 1 – February 28: Increase conservation pool storage by 11,650 acre-feet
- October 1 – October 31: Maximum conservation pool based on storage values summarized in Table 1, Appendix A of WY 2020 deviation request (attached). Decrease the conservation pool by 1,030 acre-feet per day if storage is above 80,050 acre-feet (starting October 1)
- Beginning March 1: Increase the maximum conservation pool by 436 acre-feet per day

The environmental effects of the proposed deviation and the proposal's compliance with pertinent environmental requirements has been evaluated in compliance with the National Environmental Protection Act (NEPA). This evaluation is provided in the attached Environmental Assessment which was prepared as part of the WY 2019 request. The EA concludes with a Finding of No Significant Impact (FONSI). In addition, Sonoma Water and USACE consulted with the National Marine Fisheries Service to ensure that the requirements of the Endangered Species Act (ESA) were met.

Thank you for considering this request. Given the success of the major deviation for WY 2019, we seek your consideration and decision by September 30, 2019 in order to retain a higher level of carryover storage into WY 2020. We welcome the opportunity to answer any questions you may have, or provide any additional information if needed.

Sincerely,

James Jasperse, P.E., Chief Engineer & Director of Groundwater Management
Sonoma County Water Agency

Dr. F. Marty Ralph, Director, Center for Western Weather and Water Extremes
Scripps Institution of Oceanography, U.C. San Diego

Attachments: Deviation Request Package, Coyote Valley Dam – Lake Mendocino
Major Planned Deviation to the Coyote Valley Dam – Lake Mendocino Water Control Manual Environmental Assessment

cc: Nick Malasavage, Operations Chief, San Francisco District
Janice Lera-Chan, Chief, Water Resources Section, San Francisco District
Patrick Sing, Lake Mendocino Water Manager, San Francisco District
Cuong Ly, Senior Hydraulics Engineer, South Pacific Division

Water Year (WY) 2020 Deviation Request Package
Coyote Valley Dam - Lake Mendocino
July 23, 2019

Introduction

Members of the Lake Mendocino Forecast Informed Reservoir Operations (FIRO) Steering Committee[1] submit this request for a second consecutive major planned deviation to the Coyote Valley Dam – Lake Mendocino Water Control Manual (WCM) which follows the major deviation implemented for WY 2019. The purpose of this request is to improve water supply reliability, flood risk management, and environmental conditions of Lake Mendocino and the upper Russian River. This effort is being led by a steering committee formed in 2014 and consisting of representatives from the Sonoma County Water Agency (Sonoma Water), Scripps Institute of Oceanography (Scripps), U.S. Army Corps of Engineers (USACE), National Oceanic and Atmospheric Administration (NOAA), U.S. Geologic Survey (USGS), U.S. Bureau of Reclamation and the California Department of Water Resources.

As described below, Lake Mendocino has experienced significantly reduced water supply reliability over the past several years due to a considerable reduction of trans-basin transfers into the facility from the Eel River. The goal of FIRO is to help restore some of the diminished water supply reliability without reducing the existing flood protection capacity of Lake Mendocino. The FIRO program is a water management program that uses data from watershed monitoring programs and improved weather and hydrologic forecasting to help water managers selectively retain or release water from reservoirs in a flexible manner that more accurately reflects and leverages the natural variability and predictability of meteorology and hydrology.

A substantial amount of work has been conducted to date as part of the FIRO program. A work plan was completed by the FIRO Steering Committee in July 2015 to establish a framework to evaluate the viability of FIRO for Lake Mendocino. In July 2017, the Committee completed the Preliminary Viability Study (PVA) that demonstrated the proof of concept of FIRO. The Steering Committee meets regularly to plan and develop strategies for funding, developing and implementing FIRO. In addition, staff from the participating agencies of the FIRO program meet annually to share information on work and developments completed to date.

This request for a planned major deviation to the WCM for WY 2020 follows the successful implementation of a major deviation granted by the USACE for WY 2019 and is essentially the same as that deviation. The only difference between the two deviations is that the WY 2020 request would allow USACE to pre-release in advance of a storm event into the water conservation pool if: (1) such a release is recommended by the FIRO decision support tools and (2) Sonoma Water is consulted about the pre-release and approves of the action in coordination with National Marine Fisheries. The following information related to this request are described below: (1) the basis for the requested deviation; (2) the details of the requested deviation; (3) a summary of the WY 2019 major deviation; and

[1] The Lake Mendocino FIRO Steering Committee consists of representatives from the Sonoma Water, Scripps Institute of Oceanography (Scripps), U.S. Army Corps of Engineers (USACE), National Oceanic and Atmospheric Administration (NOAA), U.S. Geologic Survey (USGS), U.S. Bureau of Reclamation and the California Department of Water Resources. This deviation request is being submitted on behalf of steering committee members representing the following organizations: SCWA, Scripps Institution of Oceanography, USACE, NOAA, and California Department of Water Resources.

(4) a description of the FIRO Steering Committee evaluation process. The decision to repeat the WY 2019 major deviation for the upcoming year was based on a collaborative process between members of the Steering Committee and USACE reservoir operators in which the results of prior year operations were evaluated relative to options for different potential deviations. It is important to emphasize that if water levels are within the storage space allowed by this deviation, the USACE will have the discretion to utilize the additional information provided to inform (but not control) reservoir operations. USACE reservoir operators will retain full operational control and authority, with the FIRO decision support model (DSM) providing an additional tool for operators.

Basis for Requested Deviation

Coyote Valley Dam and Lake Mendocino are operated in accordance with the terms of the facility's WCM developed in 1958. The most recent revision of the manual was released in August 1986. Since the preparation of the WCM, significant changes have occurred throughout the Russian River system. These changes include the listing of endangered Central California Coast Coho salmon, threatened California Coastal Chinook salmon, and Central California Coast steelhead trout, under the state and/or federal Endangered Species Act; and most importantly, significant reductions of inflow to Lake Mendocino due to lower diversions from the Eel River through Pacific Gas & Electric's Potter Valley Project (PVP).

Recent reductions in releases from PVP are the result of an Order issued by the Federal Energy Regulatory Commission in January 2004 that amended PG&E's operating license. Since 2006, when PG&E began operating under the amended license, there has approximately been a 57 percent reduction in the annual transfer of Eel River water into the Russian River Watershed. As shown in Figure 1 below, the average annual transfer through PVP between 1922 and 2006 was approximately 150,000 acre-feet. The average annual transfer through PVP between 2007 and 2017 was approximately 65,000 acre-feet.

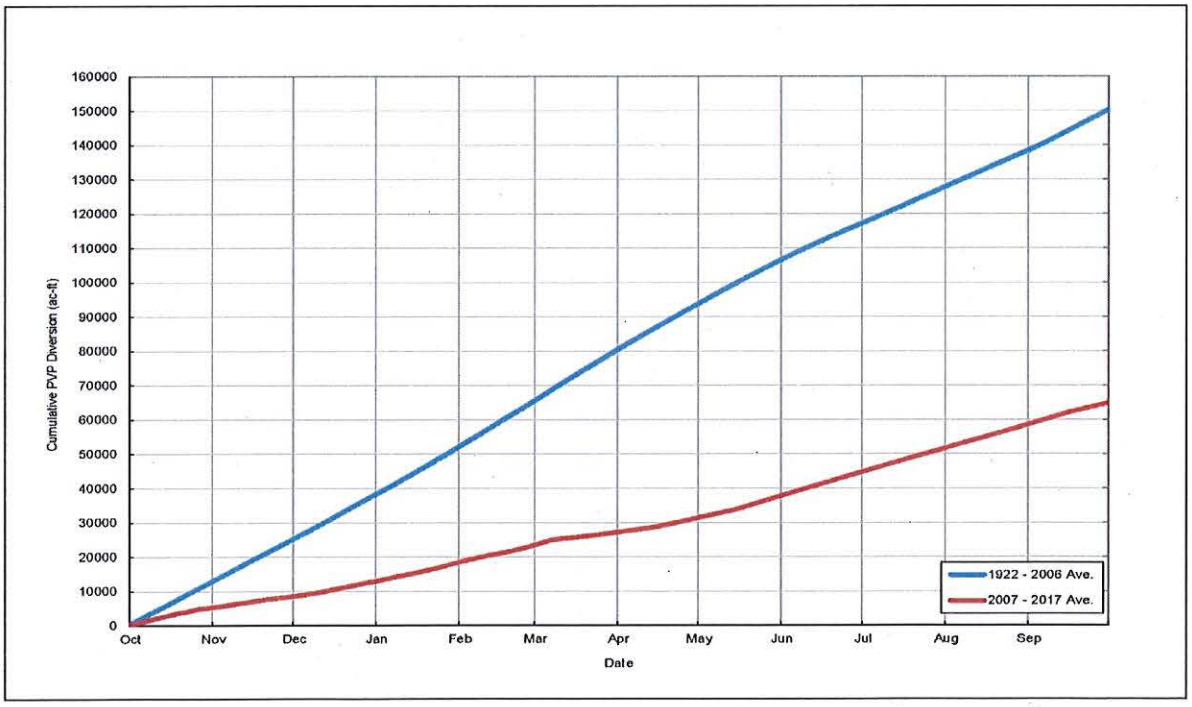


Figure 1. Cumulative Diversions of Eel River Water through the Potter Valley Project by Water Year

More importantly, a considerable portion of the reduced transfer occurs between March 1st and June 1st. As shown in Figure 2 below, the average transfer through PVP between March 1st and June 1st from 1922 through 2006 was approximately 40,000 acre-feet. From 2007 through 2017, the average transfer between March 1st and June 1st was slightly less than 15,000 acre-feet, a decrease of 63 percent.

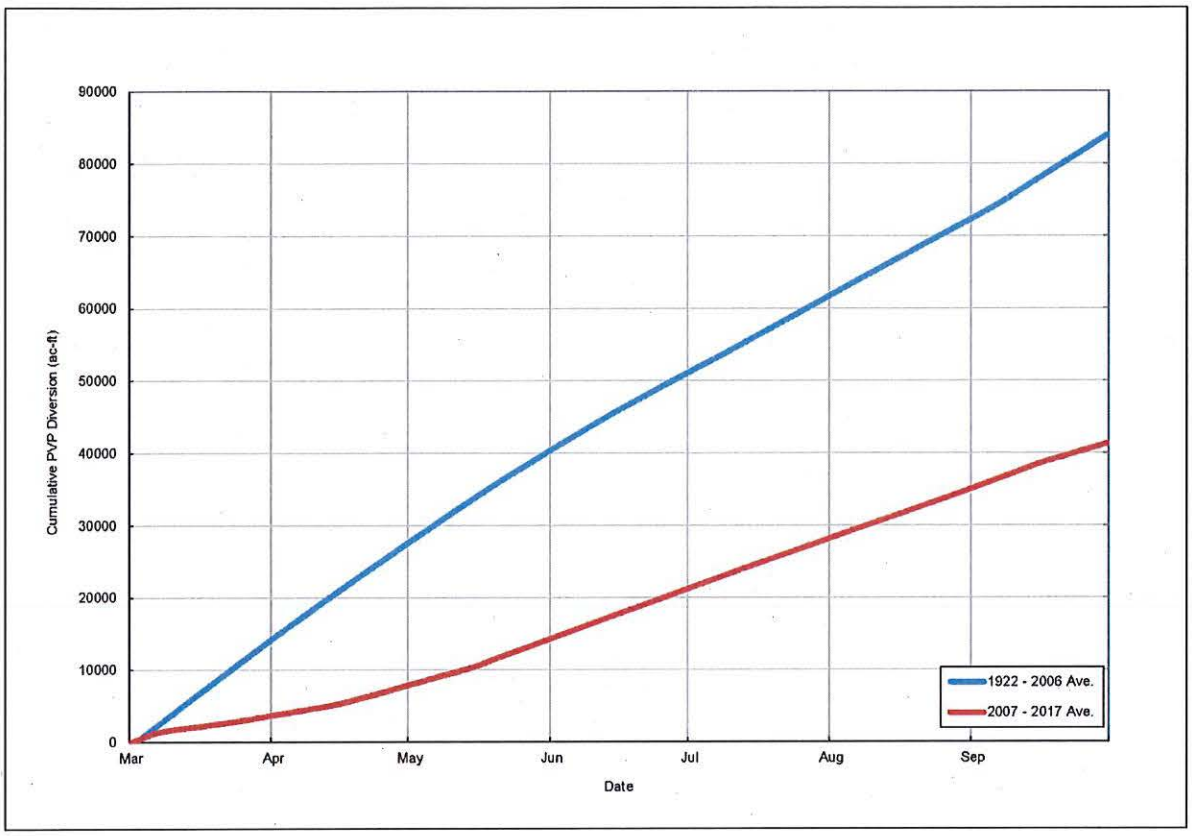


Figure 2. Cumulative Diversions of Eel River Water through the Potter Valley Project March 1 through September 30

This coincides with the time period that the water conservation pool begins increasing by 600 acre-feet per day, raising the water conservation pool from 68,400 acre-feet to 111,000 acre-feet. Consequently, Lake Mendocino has become more reliant on late spring storm events to adequately fill in order to meet minimum instream flow requirements, downstream demands and maintain a cold-water pool for summer rearing juvenile steelhead trout and fall-run adult Chinook salmon.

Because late spring storm events do not reliably occur, there have been a number of years since 2006 that Lake Mendocino has not had sufficient storage to meet water supply needs without risking draining the reservoir. As a result, Sonoma Water has needed to file Temporary Urgency Change Petitions with the State Water Resources Control Board in 2007, 2009, 2013, 2014 and 2015 to reduce minimum instream flow requirements in order to prevent draining Lake Mendocino.

PVP's FERC license expires in 2022 and PG&E has decided not to seek a new license for the project. On March 1, 2019, FERC issued a solicitation for any parties interested in filing a license application to file a Notice of Intent by July 1, 2019. On June 28, 2019 a partnership made up of Mendocino Inland Water and Power Commission, Sonoma County Water Agency, California Trout and the County of Humboldt

(Parties) filed a joint Notice of Intent with FERC to investigate the feasibility of relicensing the project. Accordingly, if the Parties are successful and FERC issues a new operating license for the project, it will likely contain terms that further reduces the transfer of Eel River water into the Russian River Watershed, resulting in even greater loss of water supply reliability of Lake Mendocino for the region. With the significant loss of water supply reliability, there is an urgent need to evaluate the operation of Lake Mendocino to determine if improvements can be implemented to offset reductions of Eel River transfers to the Russian River Watershed. This major deviation request is targeting the recovery of the compromised water supply reliability resulting from the changes to the PVP transfers from the Eel River. It is also requesting that tools developed as part of the Lake Mendocino FIRO project be included to inform USACE flood managers along with the protocols available to USACE for managing reservoir operations at Lake Mendocino.

In the summer of 2017, the FIRO Steering Committee completed the PVA which represents a major effort to develop the Lake Mendocino FIRO project, http://cw3e.ucsd.edu/firo-preliminary-viability-assessment-for-lake-mendocino/). This major body of work demonstrates that there is significant evidence that weather and water forecasts can be used to improve the operation of Lake Mendocino to recover lost water supply reliability without compromising flood management capacity. In addition, significant environmental benefits are achievable by improving fishery habitat for minimum flows and lower water temperatures. These conclusions were reached through three independent studies conducted by the USACE's Hydrologic Engineering Center, Scripps Center for Western Weather and Water Extremes (CW3E), and Sonoma Water.

Description of Deviation Request

Members of the FIRO Steering Committee are requesting USACE approval of a planned major deviation to store additional water above the existing guide curve for the Coyote Valley Dam Lake Mendocino WCM within the shaded region shown in Figure 3. As previously noted, this request is the same as the approved major deviation granted by USACE for WY 2019, with the addition that pre-releases by USACE in advance of storm events into the water conservation pool would be allowed under certain conditions. Such pre-releases would be allowed if: (1) such a release is recommended by the FIRO decision support tools; and (2) Sonoma Water is consulted about the pre-releases and approves of the action in coordination with National Marine Fisheries. If approved by USACE, this would result in a maximum additional storage of 11,650 acre-feet between November 1 and February 28. Figure 3 below shows the existing guide curve for the Coyote Valley Dam Lake Mendocino WCM and the proposed maximum deviation limit. Table 1 provided in Appendix A summarizes the daily maximum deviation limit values.

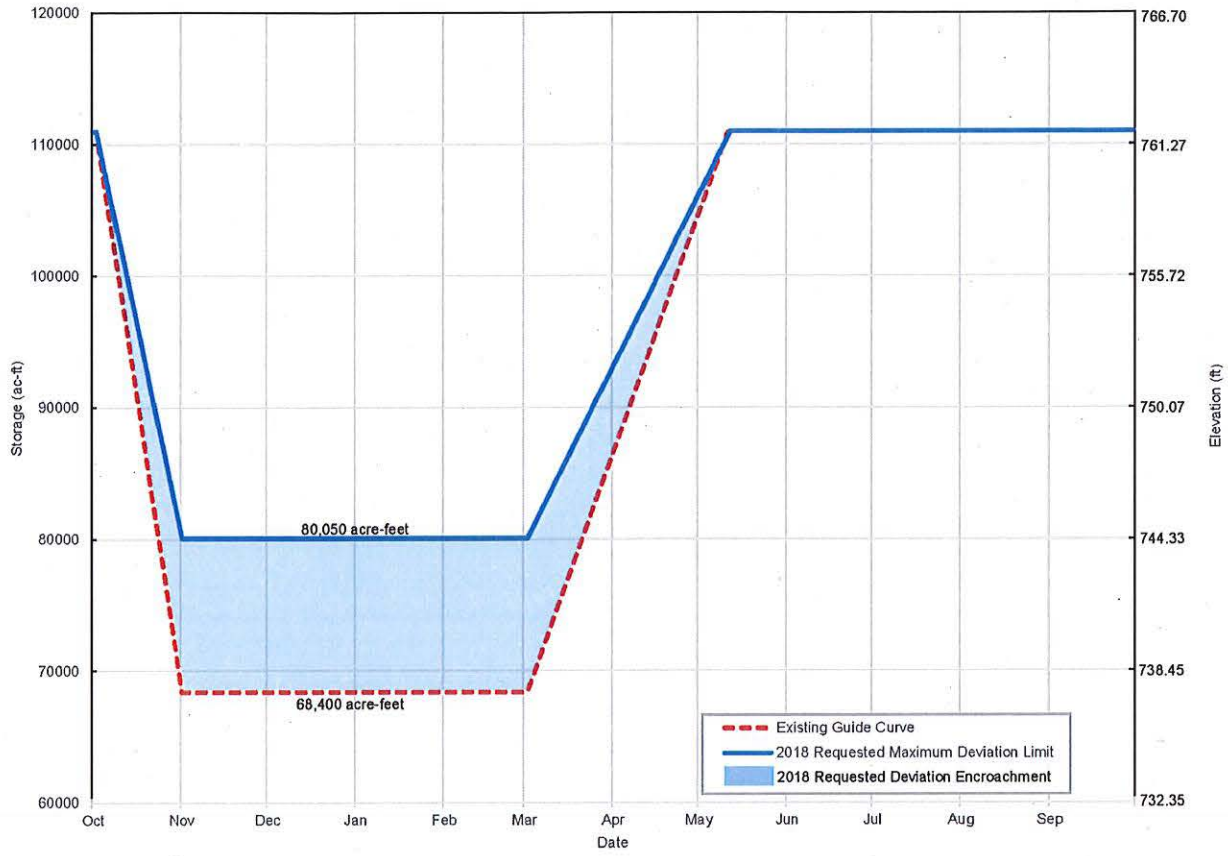


Figure 3. Existing Guide Curve and Proposed Maximum Deviation Limit

As part of the planned major deviation, members of the FIRO Steering Committee are also requesting USACE include and leverage the DSM developed by Sonoma Water as part of the tools and protocols USACE uses to manage reservoir operations at Lake Mendocino. Based on operational hydrologic ensemble of streamflow forecasts provided by the NWS California-Nevada River Forecast Center, current reservoir storage, and current and anticipated downstream conditions, the DSM provides a recommended release to help inform operational decisions. The DSM is described in detail as "Hybrid Operations" in the PVA.

To test the DSM, Sonoma Water conducted a virtual operations test on a daily-basis from December 2016 to June 2017 simulating reservoir operations at Lake Mendocino. This test demonstrated results consistent with the analysis completed for the PVA, showing improved water supply reliability over observed operations. Additionally, the results showed no increase in flood risk to downstream reaches in the Upper Russian River or increased dam safety risk. Figure 4 below shows the results of the virtual operations test using the DSM versus actual (observed) operation of Lake Mendocino during the 2017 winter season.

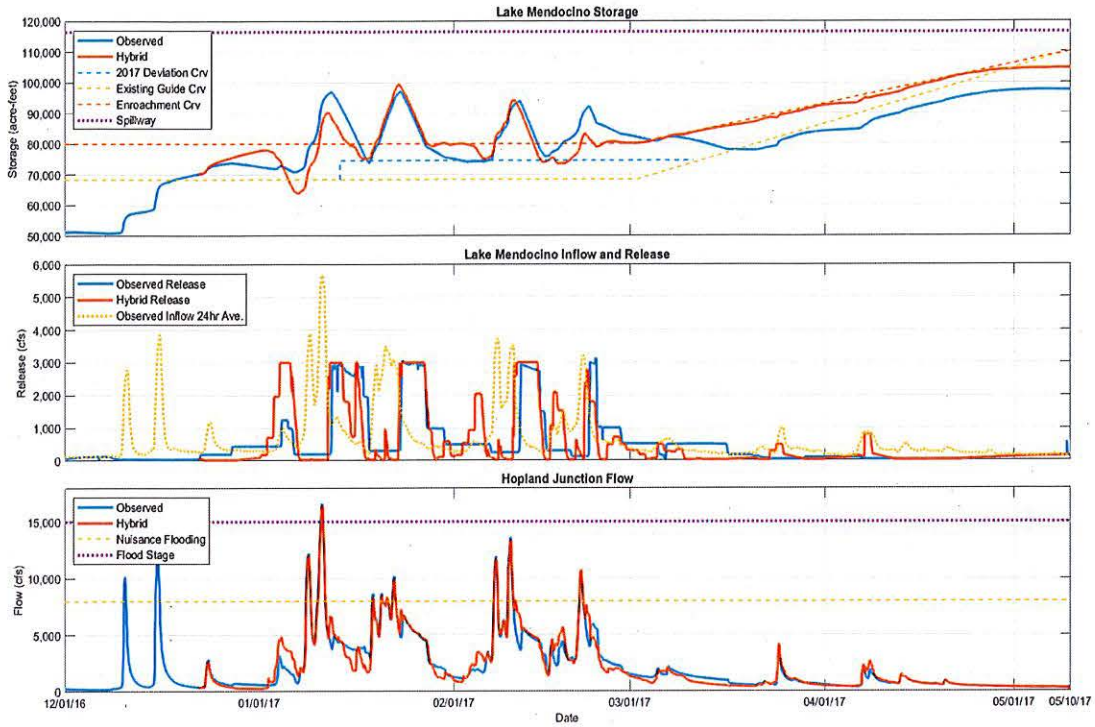


Figure 4. Comparison of Virtual Operations using the DSM with Actual Operations (observed) for December 2016 through May 2017

Although this demonstration covered only a (very wet) single season, several outcomes are noteworthy:

1. The peak reservoir storages for the virtual operations were lower than observed operations during the heart of the flood season suggesting an improved capacity to manage flood events;
2. Reservoir releases differed in timing but the magnitude of the releases were comparable for both operations;
3. Simulated flows at Hopland above the 8,000 cfs flow constraint did not exceed observed operations; and
4. At the end of the virtual operations test in May, simulated Lake Mendocino storage resulted in approximately 5,000 AF of additional stored water supply compared to observed operations.

To support the reservoir operations during WY 2019, the Russian River Decision Support System (RR-DSS) was developed as an additional tool to supplement USACE's spreadsheet and Corps Water Management System (CWMS) models. The RR-DSS provided USACE operators with real time modeling and analysis to assist managing water retained in the flood control pool as requested by this major deviation. A flowchart depicting the major components and primary process steps of the RR-DSS is provided in Figure 5 below. The RR-DSS includes an HEC-ResSim implementation as well as the Sonoma Water DSM, was modeled after the highly successful Yuba-Feather Forecast Coordinated Operations (FCO) interface that resides on California Data Exchange Center (CDEC) and is operationally supported by the California Department of Water Resources (CA DWR). The Yuba-Feather FCO program is a 10-year collaboration between Yuba County Water Agency, DWR's State Water Project, and USACE's Sacramento District with support from NOAA/NWS that provides a common operating picture of the current and forecast weather and streamflow conditions from which improved reservoir regulation decisions can be made to better meet all partners' objectives. Consistent with FIRO project goals, the

RR-DSS is available to the project team to aid in identifying opportunities for refinement and improvement. As with all Lake Mendocino FIRO components, the Russian River DSS was designed, developed and deployed by the interagency FIRO team.

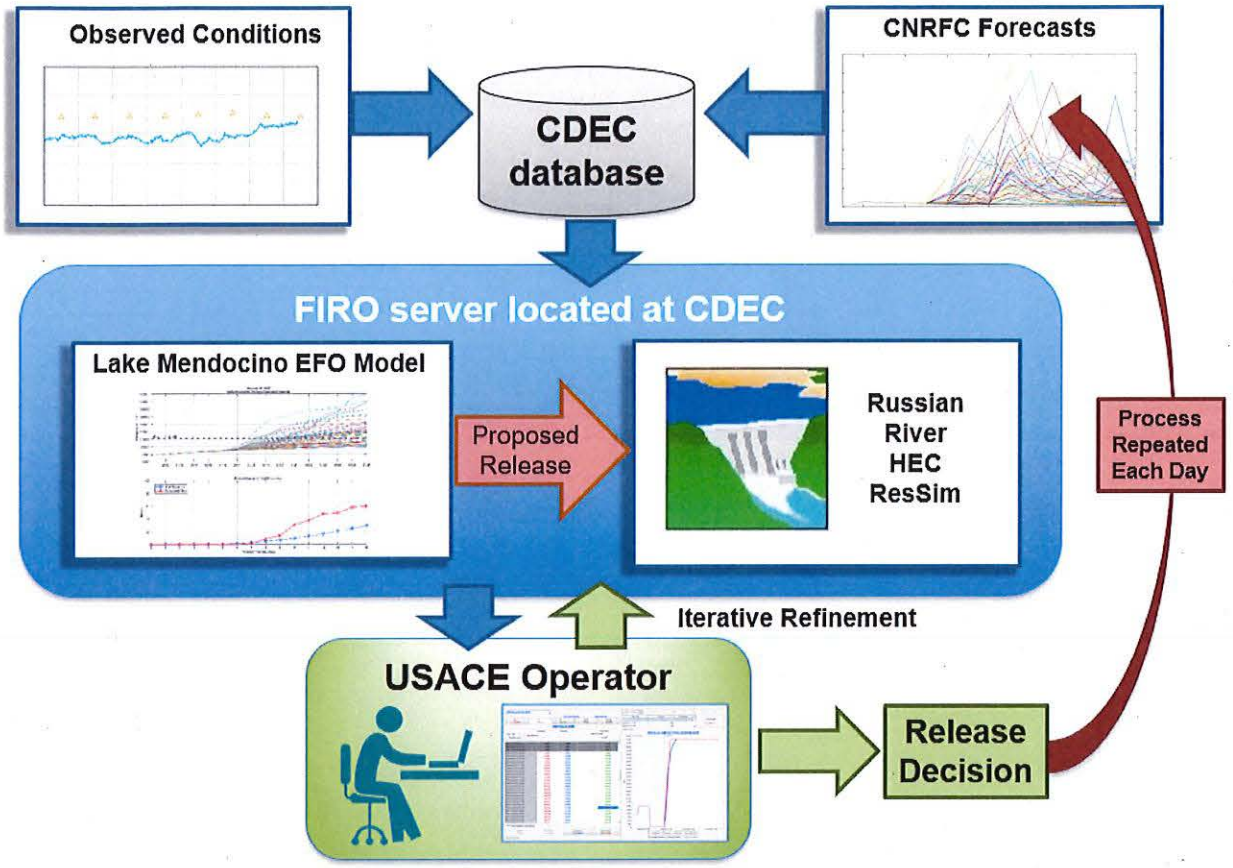


Figure 5. RR-DSS process flowchart.

USACE operators also utilize other forecast products provided by CW3E to aid in release decisions. One notable product that was utilized in WY 2019 was the U.S. West Coast Atmospheric River (AR) Landfall Tool developed by Jason Cordeira, of Plymouth State University (http://cw3e.ucsd.edu/landfall-tool-dprogdt-prob/). This tool forecasts the magnitude and probability of AR conditions at the coast and thereby provide a representation of whether or not high-impact precipitation events may be likely. The tool is also capable of providing information on the timing, landfall, intensity, coastal propagation, and uncertainty of AR conditions.

Summary of WY 2019 Major Deviation

A plot of Lake Mendocino storage and downstream flows in the Russian River at Hopland from January through April 2019 is shown in Figure 6. The figure includes results of both observed conditions and simulated (virtual) existing operations, which approximates outcomes for Lake Mendocino and the Russian River if the WY 2019 Major Deviation was not pursued and provides a useful basis of comparison. In general, WY 2019 was a very wet year and utilization of FIRO strategies was not necessary from an end-of-year water supply storage perspective. However, the experience highlighted

how forecasts and the decision tools aided reservoir operations during several storm events. The figure includes callouts of certain periods of interest that are explained below:

1. After the first significant storm of the season, storage levels are encroached into the reservoir flood pool, and virtual existing operations (solid red line) increased releases to return storage levels to the existing guide curve (dashed red line). In contrast through the use of the RR DSS and other forecast products provided by CW3E, USACE operators safely retained the storage gains within the flood pool, as shown with the solid blue observed storage line.
2. If precipitation had ceased or decreased for the remainder of the year (e.g., drought conditions), the retained early season storage would have resulted in a significant water supply benefit.
3. Due to forecasted storm events predicted with the RR-DSS and other forecast products, USACE operators increased releases to reduce storage levels in advance of the storms.
4. The pre-storm storage management actions explained in period 3 resulted in post-storm storage levels well below the emergency spillway.
5. Forecast informed operations did not result in any increases in flows above nuisance flood stage (8,000 cfs) at Hopland when compared to virtual existing operation.
6. Forecast informed operations did not result in loss of water supply storage at the end of the storm season when compared to virtual existing operations

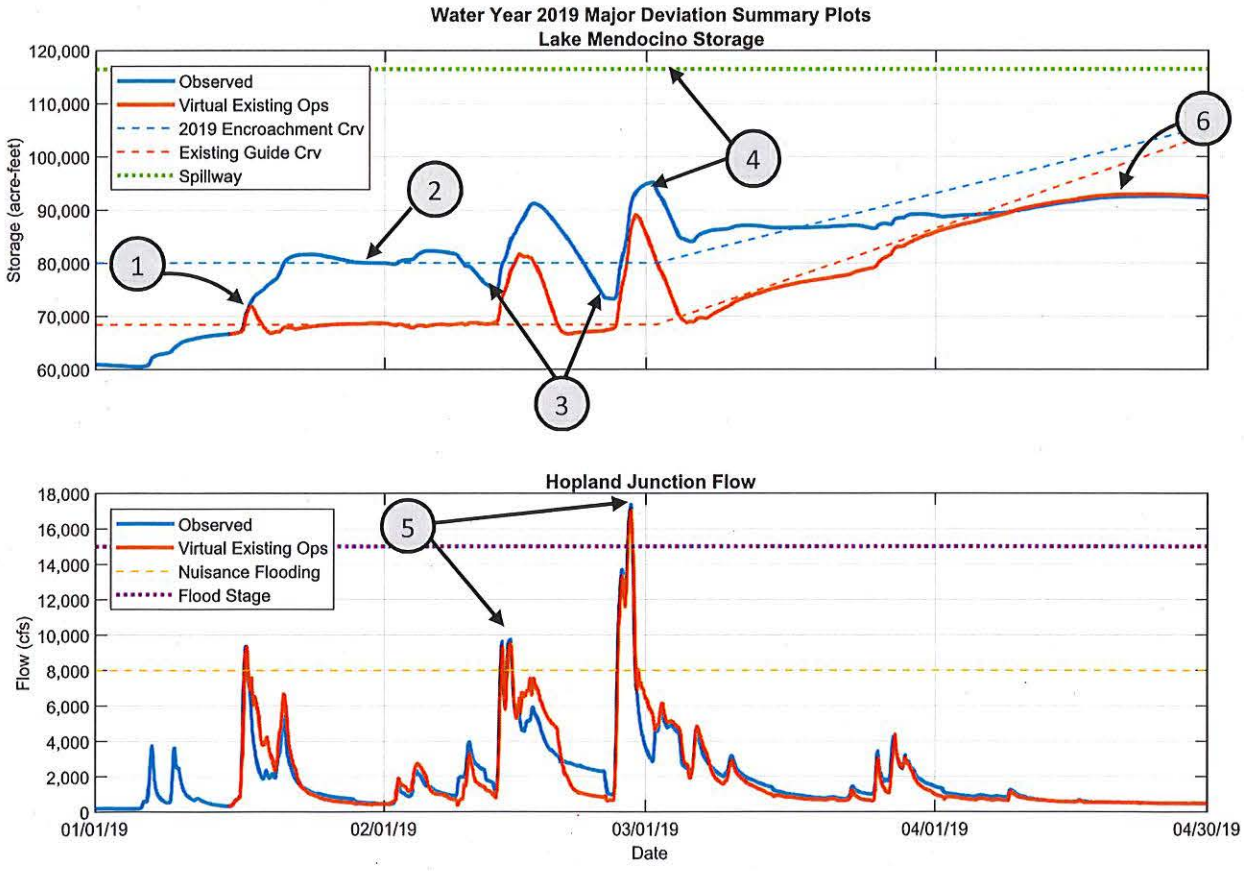


Figure 6. Plots of Lake Mendocino storage and Russian River flows at Hopland from January 1 to April 30, 2019. Callouts 1-6 depict points of interest described above.

FIRO Steering Committee Evaluation Process

This planned major deviation is part of a long-term effort leading to an anticipated WCM update. The flowchart provided in Figure 7 below describes the process that members of the FIRO Steering Committee are pursuing to further evaluate FIRO alternatives and inform changes to the Lake Mendocino WCM. In the process of developing a FIRO strategy for Lake Mendocino, the project team has learned a great deal and expects to continue learning about how to improve operations for this project using the latest technology. Members of the FIRO Steering Committee intend to continue to request major deviations of the Lake Mendocino rule curve for the next few years and likely incorporate future iterations of FIRO decision support tools which include improved: 1) watershed and atmospheric observations; 2) atmospheric and hydrologic forecasts; and 3) modeling applications. As shown in Figure 7, upon conclusion of the WY 2019 deviation, the FIRO Steering Committee and USACE reservoir operators met on multiple occasions to review the results of operations under the deviation and to discuss the nature of the WY 2019 deviation. Based on this process, it was collectively decided to essentially repeat the WY 2019 major deviation for WY 2020. It is anticipated that future deviation requests will be made in subsequent years to include improvements developed from the previous year. This process is anticipated to result in a request to update the WCM.

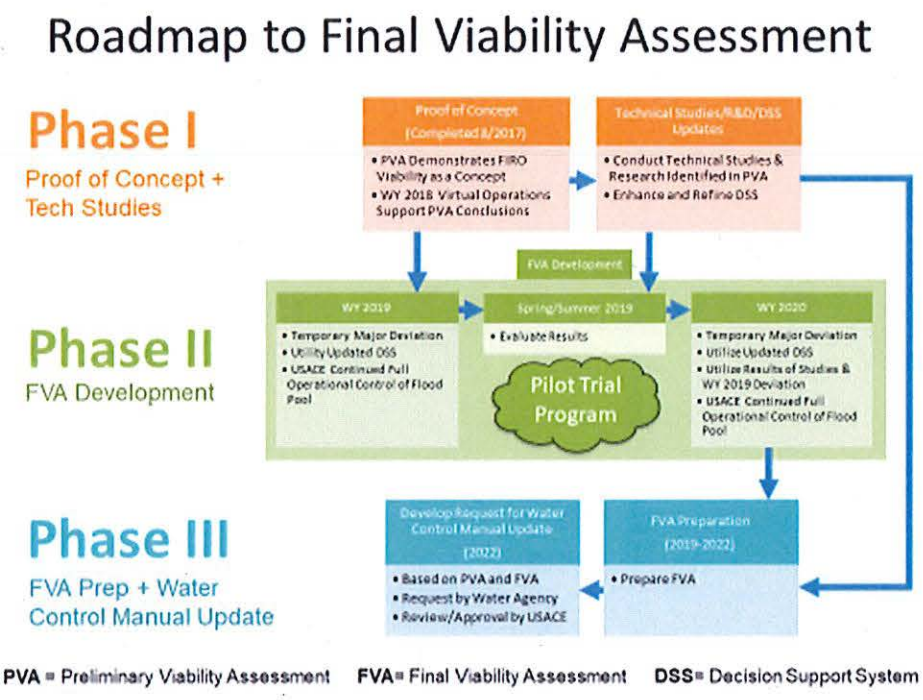


Figure 7. Process diagram for FIRO implementation at Lake Mendocino.

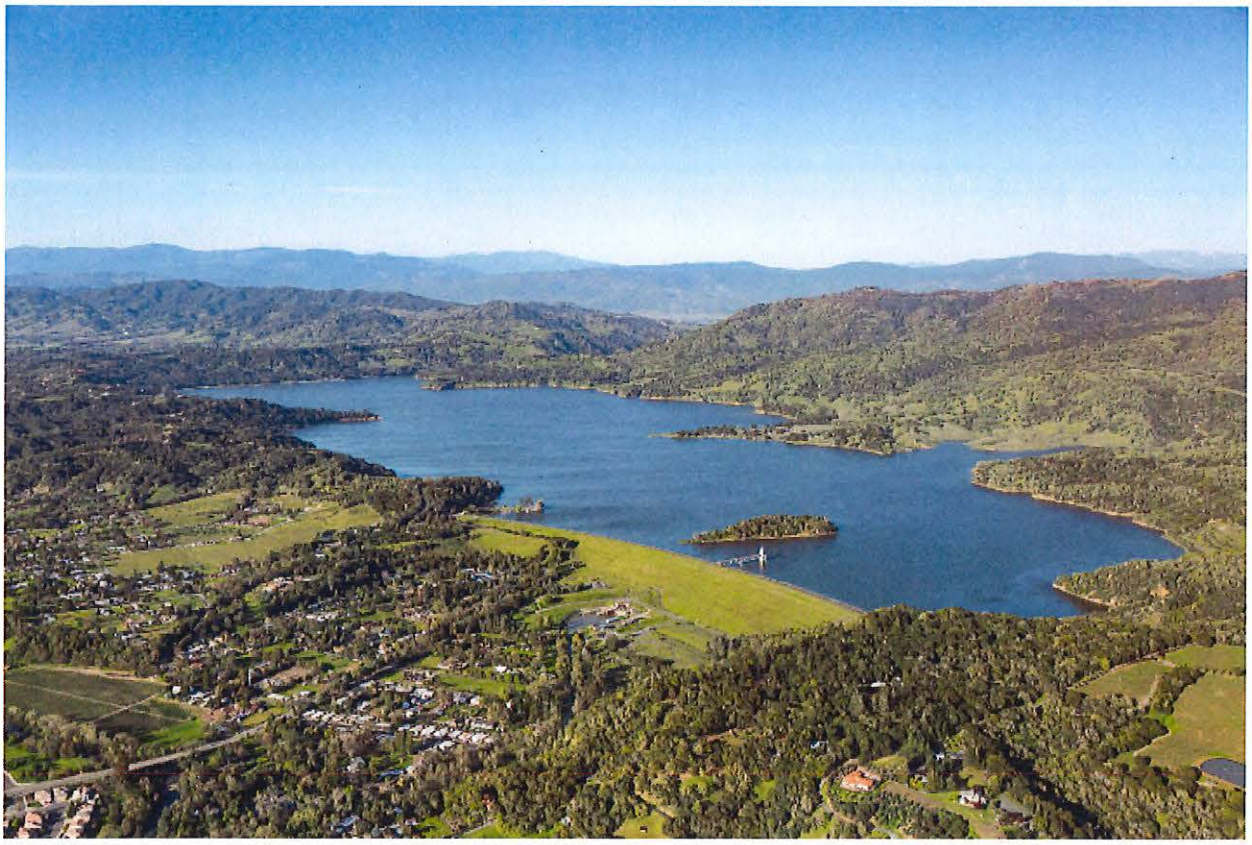
Appendix A

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	111,000	80,050	80,050	80,050	80,050	80,050	93,127	106,205	111,000	111,000	111,000	111,000
2	111,000	80,050	80,050	80,050	80,050	80,050	93,563	106,641	111,000	111,000	111,000	111,000
3	109,968	80,050	80,050	80,050	80,050	80,486	93,999	107,077	111,000	111,000	111,000	111,000
4	108,937	80,050	80,050	80,050	80,050	80,922	94,435	107,513	111,000	111,000	111,000	111,000
5	107,905	80,050	80,050	80,050	80,050	81,358	94,871	107,949	111,000	111,000	111,000	111,000
6	106,873	80,050	80,050	80,050	80,050	81,794	95,307	108,385	111,000	111,000	111,000	111,000
7	105,842	80,050	80,050	80,050	80,050	82,230	95,743	108,820	111,000	111,000	111,000	111,000
8	104,810	80,050	80,050	80,050	80,050	82,665	96,179	109,256	111,000	111,000	111,000	111,000
9	103,778	80,050	80,050	80,050	80,050	83,101	96,615	109,692	111,000	111,000	111,000	111,000
10	102,747	80,050	80,050	80,050	80,050	83,537	97,051	110,128	111,000	111,000	111,000	111,000
11	101,715	80,050	80,050	80,050	80,050	83,973	97,487	110,564	111,000	111,000	111,000	111,000
12	100,683	80,050	80,050	80,050	80,050	84,409	97,923	111,000	111,000	111,000	111,000	111,000
13	99,652	80,050	80,050	80,050	80,050	84,845	98,358	111,000	111,000	111,000	111,000	111,000
14	98,620	80,050	80,050	80,050	80,050	85,281	98,794	111,000	111,000	111,000	111,000	111,000
15	97,588	80,050	80,050	80,050	80,050	85,717	99,230	111,000	111,000	111,000	111,000	111,000
16	96,557	80,050	80,050	80,050	80,050	86,153	99,666	111,000	111,000	111,000	111,000	111,000
17	95,525	80,050	80,050	80,050	80,050	86,589	100,102	111,000	111,000	111,000	111,000	111,000
18	94,493	80,050	80,050	80,050	80,050	87,025	100,538	111,000	111,000	111,000	111,000	111,000
19	93,462	80,050	80,050	80,050	80,050	87,461	100,974	111,000	111,000	111,000	111,000	111,000
20	92,430	80,050	80,050	80,050	80,050	87,896	101,410	111,000	111,000	111,000	111,000	111,000
21	91,398	80,050	80,050	80,050	80,050	88,332	101,846	111,000	111,000	111,000	111,000	111,000
22	90,367	80,050	80,050	80,050	80,050	88,768	102,282	111,000	111,000	111,000	111,000	111,000
23	89,335	80,050	80,050	80,050	80,050	89,204	102,718	111,000	111,000	111,000	111,000	111,000
24	88,303	80,050	80,050	80,050	80,050	89,640	103,154	111,000	111,000	111,000	111,000	111,000
25	87,272	80,050	80,050	80,050	80,050	90,076	103,589	111,000	111,000	111,000	111,000	111,000
26	86,240	80,050	80,050	80,050	80,050	90,512	104,025	111,000	111,000	111,000	111,000	111,000
27	85,208	80,050	80,050	80,050	80,050	90,948	104,461	111,000	111,000	111,000	111,000	111,000
28	84,177	80,050	80,050	80,050	80,050	91,384	104,897	111,000	111,000	111,000	111,000	111,000
29	83,145	80,050	80,050	80,050		91,820	105,333	111,000	111,000	111,000	111,000	111,000
30	82,113	80,050	80,050	80,050		92,256	105,769	111,000	111,000	111,000	111,000	111,000
31	81,082		80,050	80,050		92,692		111,000		111,000	111,000	

Table 1. Coyote Valley Dam - Lake Mendocino Maximum Daily Deviation Limit Values (acre-feet)

Major Planned Deviation to the Coyote Valley Dam-Lake Mendocino Water Control Manual Environmental Assessment

AUGUST 2018



Prepared for:

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1398

By:

Sonoma County Water Agency
404 Aviation Blvd.
Santa Rosa, CA 95403
Contact: Connie Barton

FINDING OF NO SIGNIFICANT IMPACT
Major Planned Deviation to the Coyote Valley Dam-
Lake Mendocino Water Control Manual
Mendocino County

I have reviewed and evaluated the information presented in this Environmental Assessment (EA) prepared for the Major Planned Deviation to the Coyote Valley Dam - Lake Mendocino Water Control Manual at Lake Mendocino in Mendocino County, as authorized by the section 204 of the Flood Control Act of 1950, Pub. L. No. 81-516. This deviation would allow the U.S. Army Corps of Engineers (USACE) to store an additional 11,650 acre-feet of water above the existing guide curve, stipulated in the Coyote Valley Dam - Lake Mendocino Water Control Manual, between November 1 and February 28, to restore some of the diminished water supply reliability without reducing the existing flood protection capacity of Lake Mendocino.

The possible consequences of the action described in the EA have been studied with consideration to environmental, cultural, and engineering feasibility. I have considered the views of other interested agencies, organizations, and individuals.

Having reviewed the EA and and information provided by all interested parties, I find that the proposed water control manual deviation would not have a significant effect on the human environment i.e., long-term, or cumulative effect on environmental, social, or cultural resources. Based on these considerations, there is no need to prepare an Environmental Impact Statement. Therefore, an EA and Finding of No Significant Impact provide adequate environmental documentation to implement the project.

Travis J. Rayfield
Lieutenant Colonel, U.S.Army
District Commander

TABLE OF CONTENTS

ACRONYMS

AF	acre-feet
APE	area of potential effect
Basin Plan	Water Quality Control Plan for the North Coast Region
CA DWR	California Department of Water Resources
CDEC	California Data Exchange Center
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
C.F.R.	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CNRFC	California Nevada River Forecast Center
CW3E	Scripps Center for Western Weather and Water Extremes
CWA	Clean Water Act
CWMS	Corps Water Management System
DO	dissolved oxygen
DSM	decision support model
DWR	Department of Water Resources
EA	Environmental Assessment
EFH	essential fish habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESRL	NOAA Earth System Research Laboratory
FCO	Forecast Coordinated Operations
FEMA	Federal Emergency Management Administration
FERC	Federal Energy Regulatory Commission
FIRO	Forecast Informed Reservoir Operations
Fish Flow Project	Fish Habitat Flows and Water Rights Project
FONSI	finding of no significant impact
HEC	Hydrologic Engineering Center
IP	Individual Permits
IPaC	Information for Planning and Consultation
MCWFCID	Mendocino County Water Conservation and Flood Control Improvement District
msl	mean sea level
MWh	megawatt hours
NAHC	Native American Heritage Commission

NCPA	Northern California Power Association
NCRWQCB	North Coast Regional Water Quality Control Board
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NWIC	Northwest Information Center, Sonoma State University
NWS	National Weather Service
PG&E	Pacific Gas and Electric
PVA	Preliminary Viability Assessment
PVP	Potter Valley Project
RPA	Reasonable and Prudent Alternative
RPM	Reasonable and Prudent Measure
RPS	Renewable Portfolio Standard
RR-DSS	Russian River Decision Support System
Scripps	Scripps Institute of Oceanography
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
UVAP	Ukiah Valley Area Plan
Water Agency	Sonoma County Water Agency
WCM	Water Control Manual

CHAPTER 1.0 Introduction

1.1 Proposed Action

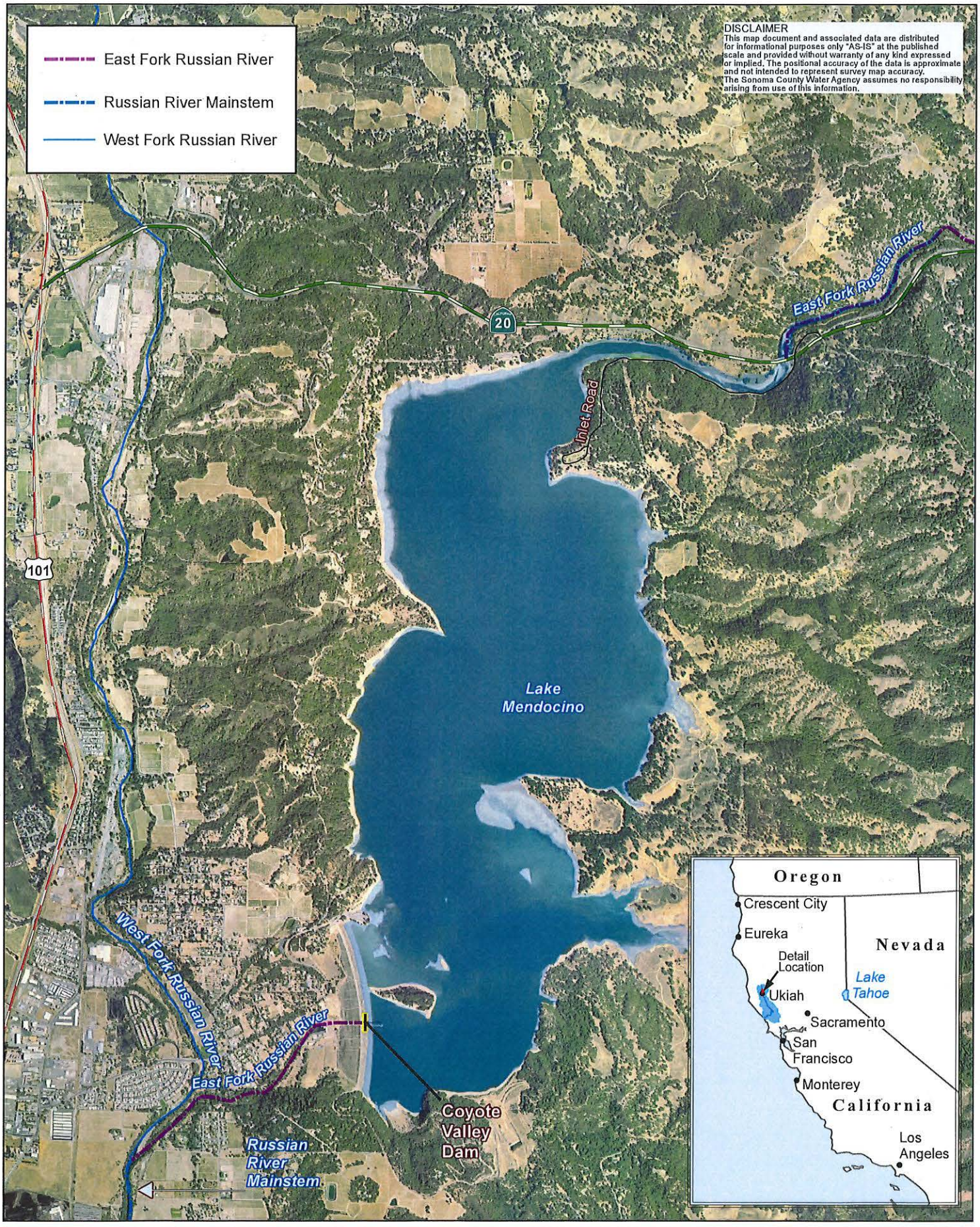
Members of the Lake Mendocino Forecast Informed Reservoir Operations (FIRO) Steering Committee have requested a major planned deviation to the Coyote Valley Dam – Lake Mendocino Water Control Manual (WCM), as amended in 2011 (USACE, 1986a). The purpose of this request is to improve water supply reliability and environmental conditions while maintaining flood management capacity of Lake Mendocino. Lake Mendocino has experienced significantly reduced water supply reliability over the past several years due to a significant reduction of trans-basin transfers into the facility from the Eel River. The goal of FIRO is to help restore some of the diminished water supply reliability without reducing the existing flood protection capacity of Lake Mendocino.

The FIRO effort is being led by a steering committee formed in 2014 and consisting of representatives from the Sonoma County Water Agency (Water Agency), Scripps Institute of Oceanography (Scripps), U.S. Army Corps of Engineers (USACE), National Oceanic and Atmospheric Administration (NOAA), U.S. Geologic Survey (USGS), U.S. Bureau of Reclamation and the California Department of Water Resources (DWR). This deviation request is being submitted on behalf of steering committee members representing the following organizations: Water Agency, Scripps, USACE, NOAA, and California Department of Water Resources.

Members of the FIRO Steering Committee are requesting USACE approval of a planned major deviation to store additional water above the existing guide curve for the Coyote Valley Dam Lake Mendocino WCM. If approved, this would result in a maximum additional storage of 11,650 acre-feet between November 1 and February 28. The requested major deviation to the WCM represents the next phase of the FIRO viability assessment. It is important to emphasize that if water levels are within the storage space allowed by this deviation, the USACE will have the discretion to utilize the additional information provided to inform (but not control) reservoir operations. USACE reservoir operators will retain full operational control and authority, with the FIRO decision support model (DSM) providing an additional tool for operators.

1.2 Location of the Project

Lake Mendocino is located approximately 4 miles northeast of the City of Ukiah on the East Fork Russian River in Mendocino County and is created by Coyote Valley Dam (Figure 1). The watershed contributing to Lake Mendocino encompasses an area of 105 square miles, which is approximately 7 percent of the Russian River watershed. The Russian River watershed drains an area of 1,485 square miles that includes substantial portions of Sonoma and Mendocino counties. The headwaters of the West Fork Russian River are located in central Mendocino



US Army Corps of Engineers
San Francisco District

Major Planned Deviation to the Coyote Valley Dam - Lake Mendocino Dam Water Control Manual

N

0 0.25 0.5 Miles

Figure 1

County, approximately 15 miles north of Ukiah. The Russian River is approximately 110 miles long and runs generally southward to Forestville, where the channel's direction changes westward to the Pacific Ocean near Jenner, approximately 20 miles west of Santa Rosa.

1.3 Background and Need for Action

The USACE's construction of Coyote Valley Dam and Lake Mendocino was completed in 1959. Coyote Valley Dam is an earth embankment dam, approximately 160 feet high with a crest 3,500 feet long. The invert of the controlled outlet at the dam is at an elevation of 637 feet above mean sea level (MSL); the dam crest elevation is at 784 feet above MSL (USACE, 1986a). Lake Mendocino's total current storage capacity is 116,500 acre-feet, with a water supply pool between 68,400 acre-feet and 111,000 acre-feet, depending on time of year (Figure 2).

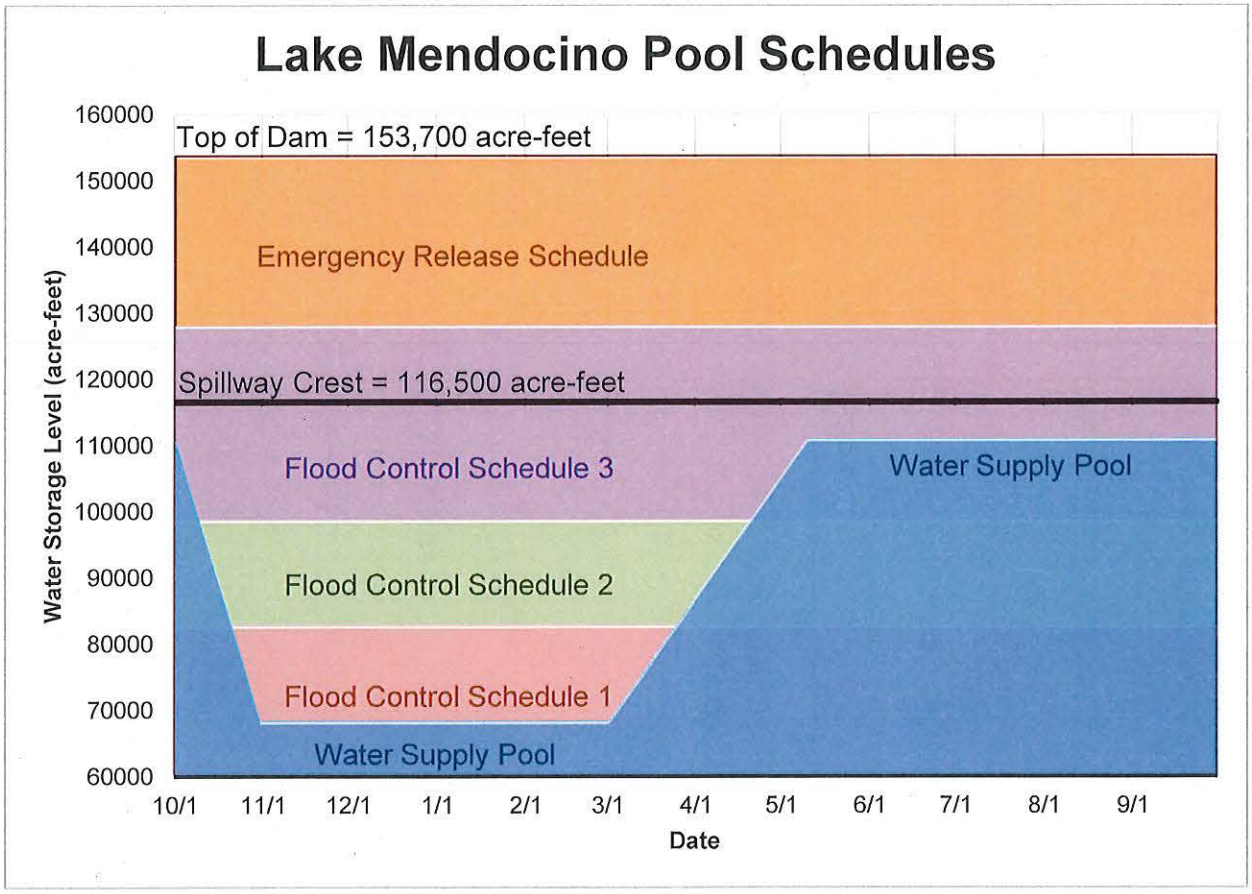


Figure 2. Lake Mendocino Flood Control and Water Supply Pool Schedules Defined in the 2004 U.S. Army Corps of Engineers Coyote Valley Dam and Lake Mendocino, Russian River, California, Exhibit A, Chart A-10 to Master Water Control Manual, Water Control Diagram.

The watershed contributing to Lake Mendocino encompasses an area of 105 square miles, which is approximately 7 percent of the Russian River watershed. The average annual inflow into Lake Mendocino is approximately 235,000 acre-feet per year, with a peak annual inflow of 443,000 acre-feet in 1983 and a minimum annual inflow of 60,000 acre-feet in 1977. Inflow into

the reservoir consists of unimpaired flows[1] from the contributing watershed and water imported from the Eel River by Pacific Gas and Electric's (PG&E) Potter Valley Project (PVP). Unimpaired stream flows create most of the Russian River flows downstream of Coyote Valley Dam to the Russian River's confluence with Dry Creek during the rainy season (November through April). During the drier months of May through October, water released from Lake Mendocino storage creates most of the flows in the Russian River upstream of Dry Creek.

The USACE operates Lake Mendocino recreational facilities, which include hiking trails, picnic areas, campgrounds, boat launches, and a disc golf course. These facilities also provide opportunities for boating, swimming, and hunting.

1.3.1 Basis for Requested Deviation

Coyote Valley Dam and Lake Mendocino are operated in accordance with the terms of the facility's WCM developed in 1958. The most recent revision of the manual was released in August 1986, with periodic additions and updates in 1993 (Exhibit D), 2003 (Exhibit A), and 2011 (Exhibit E). Since the preparation of the WCM, significant changes have occurred throughout the Russian River system. These changes include the listing of Central California coast steelhead (*Oncorhynchus mykiss*), Central California Coast coho salmon (*O. kisutch*), and California Coastal Chinook salmon (*O. tshawytscha*) as threatened or endangered under the state and federal Endangered Species Act (ESA); and most importantly, significant reductions of inflow to Lake Mendocino due to lower diversions from the Eel River through PVP.

Recent reductions in releases from PVP are the result of an Order issued by the Federal Energy Regulatory Commission in January 2004 that amended PG&E's operating license. Since 2006, when PG&E began operating under the amended license, there has been approximately a 57 percent reduction in the annual transfer of Eel River water into the Russian River Watershed. As shown in Figure 3 below, the average annual transfer through PVP between 1922 and 2006 was approximately 150,000 acre-feet. The average annual transfer through PVP between 2007 and 2017 was approximately 65,000 acre-feet.

More importantly, a considerable portion of the reduced transfer occurs between March 1st and June 1st. As shown in Figure 4 below, the average transfer through PVP between March 1st and June 1st from 1922 through 2006 was approximately 40,000 acre-feet. From 2007 through 2017, the average transfer between March 1st and June 1st was slightly less than 15,000 acre-feet, a decrease of 63 percent.

This coincides with the time period that the water conservation pool begins increasing by 600 acre-feet per day, raising the water conservation pool from 68,400 acre-feet to 111,000 acre-feet. Consequently, Lake Mendocino has become reliant on late spring storm events to adequately fill in order to meet minimum instream flow requirements, downstream demands and maintain a cold-water pool for the fall Chinook salmon migration.

[1] Unimpaired flows are the "natural" flows, unaffected by man-made influences like water diversions and reservoir operations.

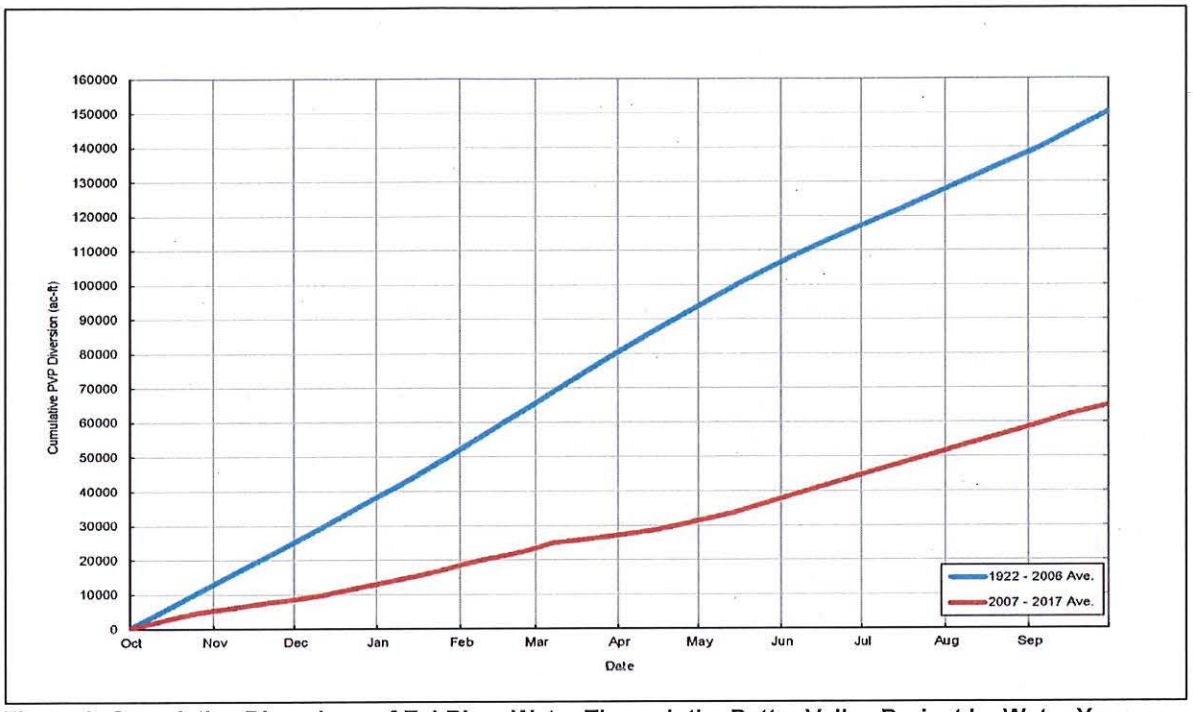


Figure 3. Cumulative Diversions of Eel River Water Through the Potter Valley Project by Water Year.

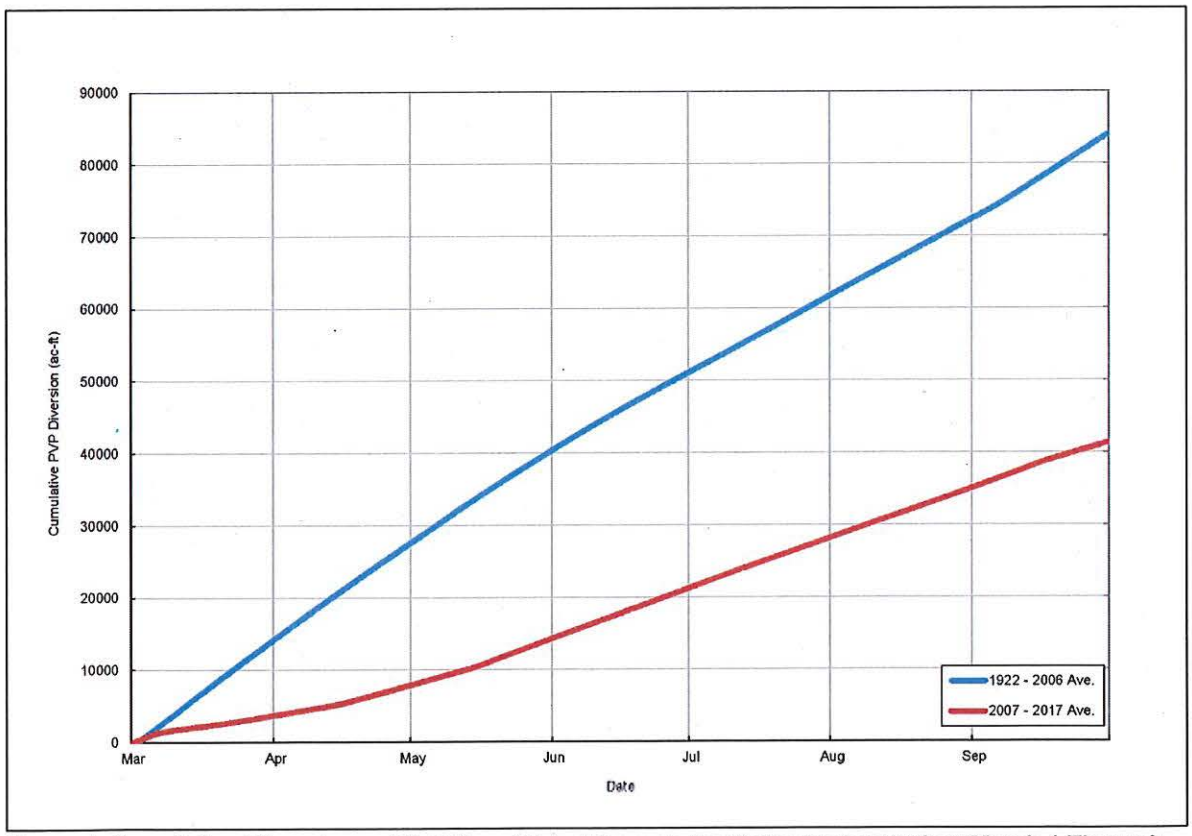


Figure 4. Cumulative Diversions of Eel River Water Through the Potter Valley Project March 1 Through September 30.

Because late spring storm events do not reliably occur, there have been a number of years since 2006 that Lake Mendocino has not had sufficient storage to meet water supply needs without risking draining the reservoir. As a result, the Water Agency has needed to file Temporary Urgency Change Petitions with the State Water Resources Control Board in 2007, 2009, 2013, 2014 and 2015 to reduce minimum instream flow requirements in order to prevent draining Lake Mendocino.

PVP's Federal Energy Regulatory Commission (FERC) license expires in 2022 and PG&E has recently initiated the relicensing of PVP. Accordingly, if FERC issues a new operating license for the project, it could contain terms that further reduces the transfer of Eel River water in to the Russian River Watershed, resulting in even greater loss of water supply reliability of Lake Mendocino for the region. With the significant loss of water supply reliability, there is an urgent need to evaluate the operation of Lake Mendocino to determine if improvements can be implemented to offset reductions of Eel River transfers to the Russian River Watershed. This major deviation request is targeting the recovery of the compromised water supply reliability resulting from the changes to the PVP transfers from the Eel River. It is also requesting that tools developed as part of the Lake Mendocino FIRO project be included to inform USACE flood managers along with the protocols available to USACE for managing reservoir operations at Lake Mendocino.

In the summer of 2017, the FIRO Steering Committee completed the *Preliminary Viability Assessment of Lake Mendocino Forecast Informed Reservoir Operations* (Jasperse, et al., 2017) (PVA), which represents a major effort to develop the Lake Mendocino FIRO project.[2] This major body of work demonstrates that there is significant evidence that weather and water forecasts can be used to improve the operation of Lake Mendocino to recover water supply reliability without compromising flood management capacity. In addition, significant environmental benefits are achievable by improving fishery habitat for flows and water temperatures. These conclusions were reached through three independent studies conducted by the USACE's Hydrologic Engineering Center (HEC), Scripps Center for Western Weather and Water Extremes (CW3E), and the Water Agency.

1.4 Authority

The USACE's construction of Coyote Valley Dam and Lake Mendocino was authorized by section 204 of the the Flood Control Act of 1950, Publ L. No. 81-516, in accordance with the Chief of Engineers' Report dated November 15, 1949, Hosue Doc. Number 518 (Oct. 10, 1966), for the purposes of flood control, water supply, recreation, and streamflow regulation.

1.5 Purpose of the Environmental Assessment

This Environmental Assessment (EA) assesses the effects of the proposed water control manual deviation on the environment to determine whether an Environmental Impact Statement (EIS) or a Finding Of No Significant Impact (FONSI) should be prepared. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) (42 USC § 4321 *et*

[2] Available at http://cw3e.ucsd.edu/firo-preliminary-viability-assessment-for-lake-mendocino/

seq), as amended, and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 C.F.R. pts. 1500-1508), which requires full disclosure of the environmental effects, alternatives, potential mitigation, and environmental compliance procedures of the proposed action through an EA.

1.6 Decision Needed

The District Engineer, commander of the San Francisco District of the USACE, will decide whether or not the proposed water control manual deviation qualifies for a finding of no significant impact (FONSI) or whether an EIS must be prepared. The decision on whether to allow the deviation to proceed will be made by USACE's South Pacific Division in San Francisco, California.

CHAPTER 2.0 Alternatives

2.1 Alternatives Eliminated from Further Consideration

The FIRO subcommittee has not identified additional alternatives beyond the No Action and Proposed Action.

2.2 No Action

The USACE would not approve the requested major water control manual deviation. As a result, the flood control releases from Lake Mendocino would continue to be made in accordance with the existing tools and protocols available to inform USACE flood managers for managing reservoir operations at Lake Mendocino. FIRO's goal to help restore some of the diminished water supply reliability without reducing the existing flood protection capacity of Lake Mendocino would not be met and a maximum additional storage of 11,650 acre-feet between November 1 and February 28 would not be achieved.

2.3 Proposed Action

Members of the FIRO Steering Committee are requesting USACE approval of a planned major deviation to store additional water above the existing guide curve for the Coyote Valley Dam - Lake Mendocino WCM within the shaded region shown in Figure 5. If approved, this would result in a maximum additional storage of 11,650 acre-feet between November 1 and February 28. Figure 5 below shows the existing guide curve for the Coyote Valley Dam - Lake Mendocino WCM and the proposed guide curve with the requested changes. Table A-1 provided in Appendix A summarizes the daily maximum deviation limit values.

As part of the planned major deviation, members of the FIRO Steering Committee are also requesting USACE include and leverage the DSM developed by the Water Agency as part of the tools and protocols USACE uses to manage reservoir operations at Lake Mendocino. Based on operational hydrologic ensemble of streamflow forecasts provided by the California-Nevada River Forecast Center, current reservoir storage, and current and anticipated downstream conditions, the DSM provides a recommended release to help inform operational decisions. The DSM is described in detail as "Hybrid Operations" in the PVA (Jasperse, et al., 2017).

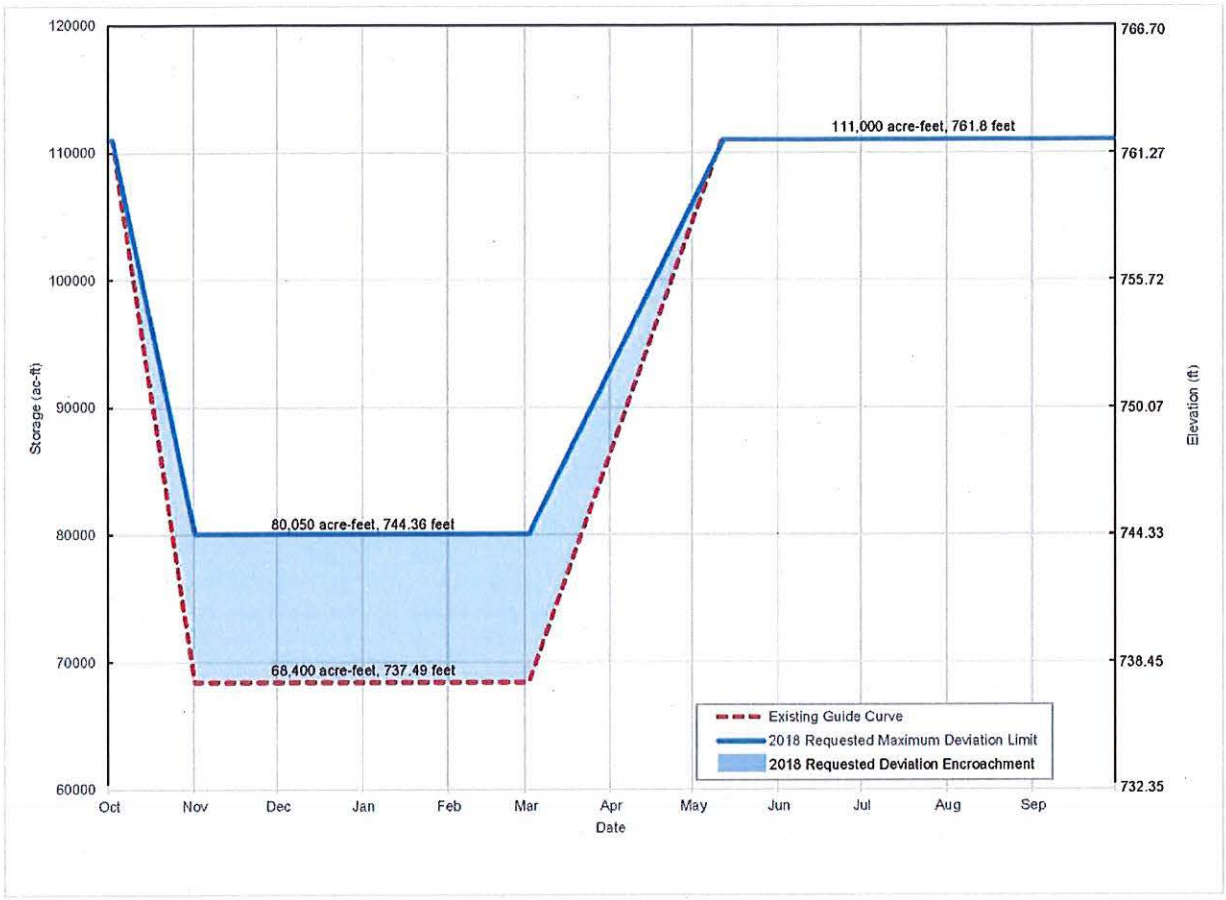


Figure 5. Guide Curve with Requested Maximum Deviation Limit.

To test the DSM, the Water Agency conducted a virtual operations test on a daily-basis from December 2016 to June 2017 simulating reservoir operations Lake Mendocino. This test demonstrated results consistent with the analysis completed for the PVA, showing improved water supply reliability over observed operations. Additionally, the results showed no increase in flood risk to downstream reaches in the Upper Russian River or increased dam safety risk. Figure 6 below shows the results of the virtual operations test using the DSM versus actual (observed) operation of Lake Mendocino during the 2017 winter season.

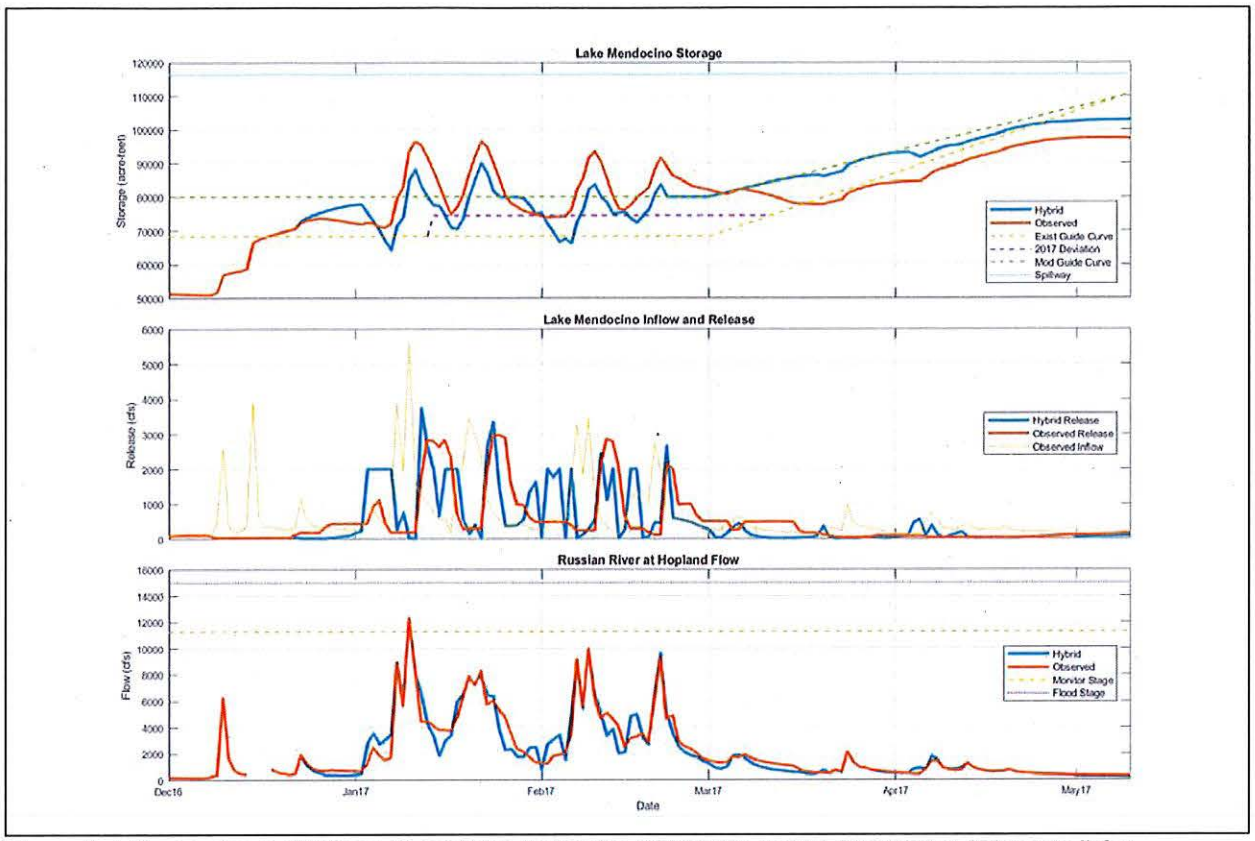


Figure 6. A Comparison of Virtual Operations Using the DSM With Actual Operations (Observed) for December 2016 Through May 2017.

Although this demonstration covered only a (very wet) single season, several outcomes are noteworthy:

1. The peak reservoir storages for the virtual operations were lower than observed operations during the heart of the flood season suggesting an improved capacity to manage flood events;
2. Reservoir releases differed in timing, but the magnitude of the releases were comparable for both operations;
3. Simulated flows at Hopland above the 8,000 cfs flow constraint did not exceed observed operations; and
4. At the end of the mock operations test in May, simulated Lake Mendocino storage resulted in approximately 5,000 AF of additional stored water supply compared to observed operations.

Efforts are currently underway to develop a Russian River Decision Support System (RR-DSS), an additional tool to supplement USACE's spreadsheet and Corps Water Management System (CWMS) models, which will provide USACE operators with real time modeling and analysis to assist managing water retained in the flood control pool as requested by this major deviation. The RR-DSS will include an HEC-ResSim implementation as well as the Water Agency DSM and is being modeled after the highly successful Yuba-Feather Forecast Coordinated Operations (FCO) interface that resides on California Data Exchange Center (CDEC) and is

supported by the California Department of Water Resources (CA DWR). The Yuba-Feather FCO program is a 10-year collaboration between Yuba County Water Agency, DWR's State Water Project, and USACE's Sacramento District with support from NOAA that provides a common operating picture of the current and forecast weather and streamflow conditions from which improved reservoir regulation decisions can be made to better meet all partners' objectives. Consistent with FIRO project goals, the RR-DSS will be available to the project team to aid in identifying opportunities for refinement and improvement. As with all Lake Mendocino FIRO components, the RR-DSS is being designed, developed and deployed by the interagency FIRO team.

2.3.1 FIRO Steering Committee Evaluation Process

This planned major deviation is part of a long-term effort leading to an anticipated WCM update. The flowchart provided in Figure 7 describes the process that members of the FIRO Steering Committee will pursue to further evaluate FIRO alternatives and pursue changes to the Lake Mendocino WCM. In the process of developing a FIRO strategy for Lake Mendocino, the project team has learned a great deal and expects to continue learning about how to improve operations for this project using the latest technology. Members of the FIRO Steering Committee intend to continue to request major deviations of the Lake Mendocino rule curve for the next few years and likely incorporate future iterations of FIRO decision support tools which include improved: 1) watershed and atmospheric observations; 2) atmospheric and hydrologic forecasts; and 3) modeling applications. As shown in Figure 7, upon conclusion of the deviation in the spring/summer season, the FIRO Steering Committee and USACE reservoir operators will consult and evaluate whether any modifications to the prior year deviation should be made to further optimize operations. A new deviation request will be made the subsequent year to include improvements developed from the previous year. This process is anticipated to result in a future request to update the WCM.

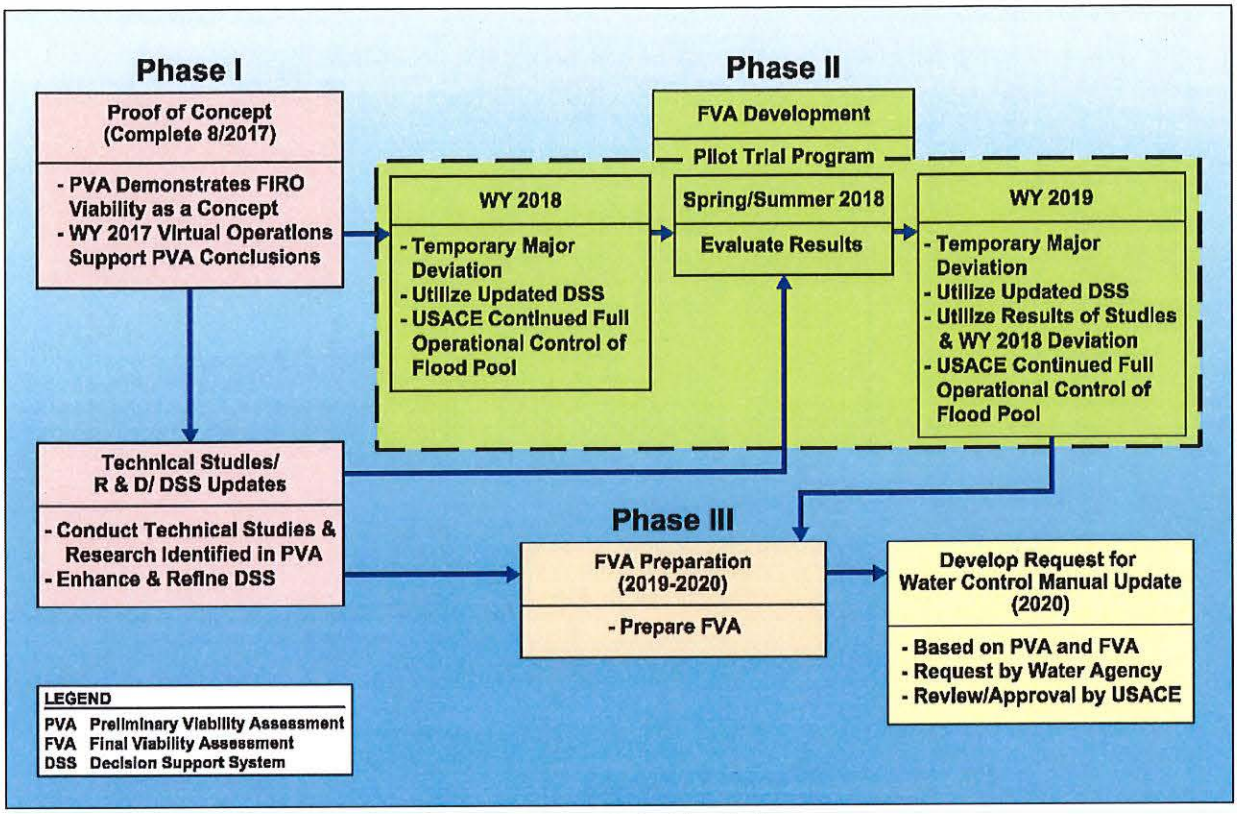


Figure 7. Process Diagram for FIRO Implementation at Lake Mendocino.

CHAPTER 3.0 Affected Environment and Environmental Consequences

This section describes the environmental resources in the project area as well as any effects of the alternatives on those resources. When necessary, mitigation measures are also proposed to avoid, reduce, minimize, or compensate for any significant effects.

3.1 Environmental Resources Not Considered in Detail

Initial evaluation of the effects of the project indicated that there would likely be little to no effect on several resources. These resources are discussed below to add to the overall understanding of the project area.

3.1.1 Air Quality and Climate Change

Mendocino County is located within the North Coast Air Basin. The North Coast Air Basin is comprised of the counties of Del Norte, Trinity, Humboldt, Mendocino, and that region of Sonoma County designated as the Northern Sonoma County Air Pollution Control District. For the purposes of regulating and monitoring air quality, Lake Mendocino and Mendocino County are under the jurisdiction of the Mendocino County Air Quality Management District, whose boundaries are coterminous with the existing boundaries of Mendocino County.

The proposed major deviation would not result in direct emissions of criteria pollutants or greenhouse gases from equipment, processes, or vehicles either on- or off-site. Therefore, no Federal air quality standards would be violated and the project would not hinder the attainment of air quality objectives in the North Coast Air Basin.

The Lake Mendocino Hydroelectric Plant at Coyote Valley Dam is operated and maintained by the City of Ukiah Electric Utility Department. The facility has a capacity of 3.5 MW (City of Ukiah, 2014) and an annual production of 3,000 to 10,000 megawatt hours (MWh) per year, depending on the water year (Grandi, 2016). These estimates translate to approximately 2.8 to 9.5 percent of the City's electrical energy needs, which totaled 106,731 MWh in 2016 (California Energy Commission, n.d.). The remaining electricity demand is met through the Northern California Power Association (NCPA). During the most recent three years for which data is available, 2014 through 2016, from 37 to 62 percent of the City's electricity came from "carbon-free green renewable resources" (City of Ukiah, n.d.).

While the timing of power production could shift as a result of the Proposed Action, the total amount of power produced annually is not anticipated to change. Improved forecasting would allow dam operators to make moderate, sustained releases for longer time periods ahead of incoming storms rather than large releases immediately ahead of incoming storms. This may increase the length of time that the releases produce power and reduce the peak power production rate but would not significantly change the total amount of power produced by those releases. When no precipitation is forecasted, releases may be reduced during the winter but

water held in the reservoir would be released the following summer and fall, thus shifting the timing of power production but maintaining the same overall amount of power produced.

These changes in timing would not impact the City of Ukiah's ability to meet the 33 percent Renewable Portfolio Standard (RPS) for 2020. Therefore, no affect to climate change is anticipated and the Proposed Action would not hinder the attainment of climate change objectives in the North Coast Air Basin.

The Proposed Action could enable operators to adapt dam operations to an increasingly variable climate. By making improved forecasting data available to dam operators, the FIRO effort would allow operators to prepare for large precipitation events by releasing water to prevent downstream flooding or, conversely, to retain water longer when no precipitation is forecasted. The Proposed Action, therefore, would be beneficial with regard to climate change adaptation.

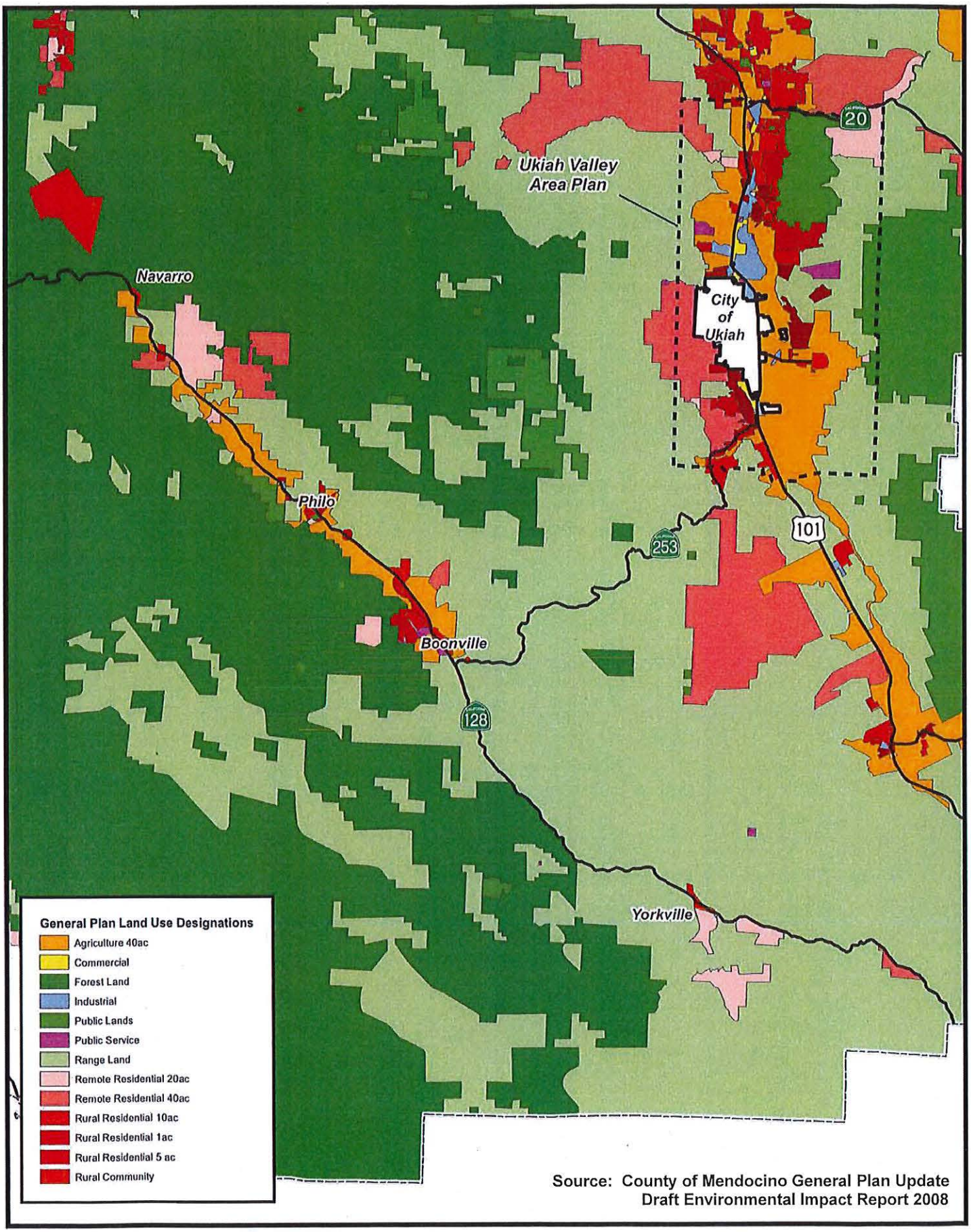
3.1.2 Land Use and Socioeconomics

Lake Mendocino falls within the *Ukiah Valley Area Plan (2011)* (UVAP) for Mendocino County, California. The UVAP is an element in the Mendocino County General Plan governing land use and development on the unincorporated lands in the Ukiah Valley. However, this portion of the county is not subject to Mendocino County's government land use planning authority. Figure 8 identifies the non-jurisdictional landholders in the county.

The UVAP focuses on issues and elements of importance to the growth and development of the Ukiah Valley. Figure 9 identifies Lake Mendocino as Public Lands in the Ukiah Valley planning area. A large portion of land surrounding Lake Mendocino is designated as Remote Residential and Range Lands. Other areas include Agricultural, Rural Residential with 1, 2, 5, and 10 acre minimums and very limited areas of Suburban Residential (Figure 9).

The UVAP goals and policies guide development of higher density residential uses generally be located within the City of Ukiah's sphere of influence and the City itself in order to concentrate development in areas with adequate services and access and limit impacts to resource lands. These policies maintain a well-balanced land use pattern, ensuring compatibility among adjacent uses and satisfying the economic, social, and environmental requirements of the community. The project is located on Federally-owned land. The Proposed Action would have no effects on or changes to land use plans.

Ukiah is the largest city in the UVAP and encompasses an area of 4.7 square miles and has an estimated 2016 population of 15,882 people (U.S. Census, 2016). Mendocino County has a population of 86.4 percent white, 25 percent Hispanic or Latino, 1 percent African American, 6.3 percent American Indian and Alaska Native, 2.1 percent Asian and 0.2 percent Native Hawaiian and other Pacific Islander and 4.0 percent of two or more races with 19 percent of the population below the poverty level (U.S. Census, 2016). No relocations would occur as a result of the water control manual deviation, and no populations would be displaced as a result of approving the temporary change in operation.



Source: County of Mendocino General Plan Update
Draft Environmental Impact Report 2008

T:\water transmission\Water Supply\W0045C018-MendocinoRes-FIROI\Fig_3.2_2-1.mxd 1/10/2018

US Army Corps of Engineers
San Francisco District

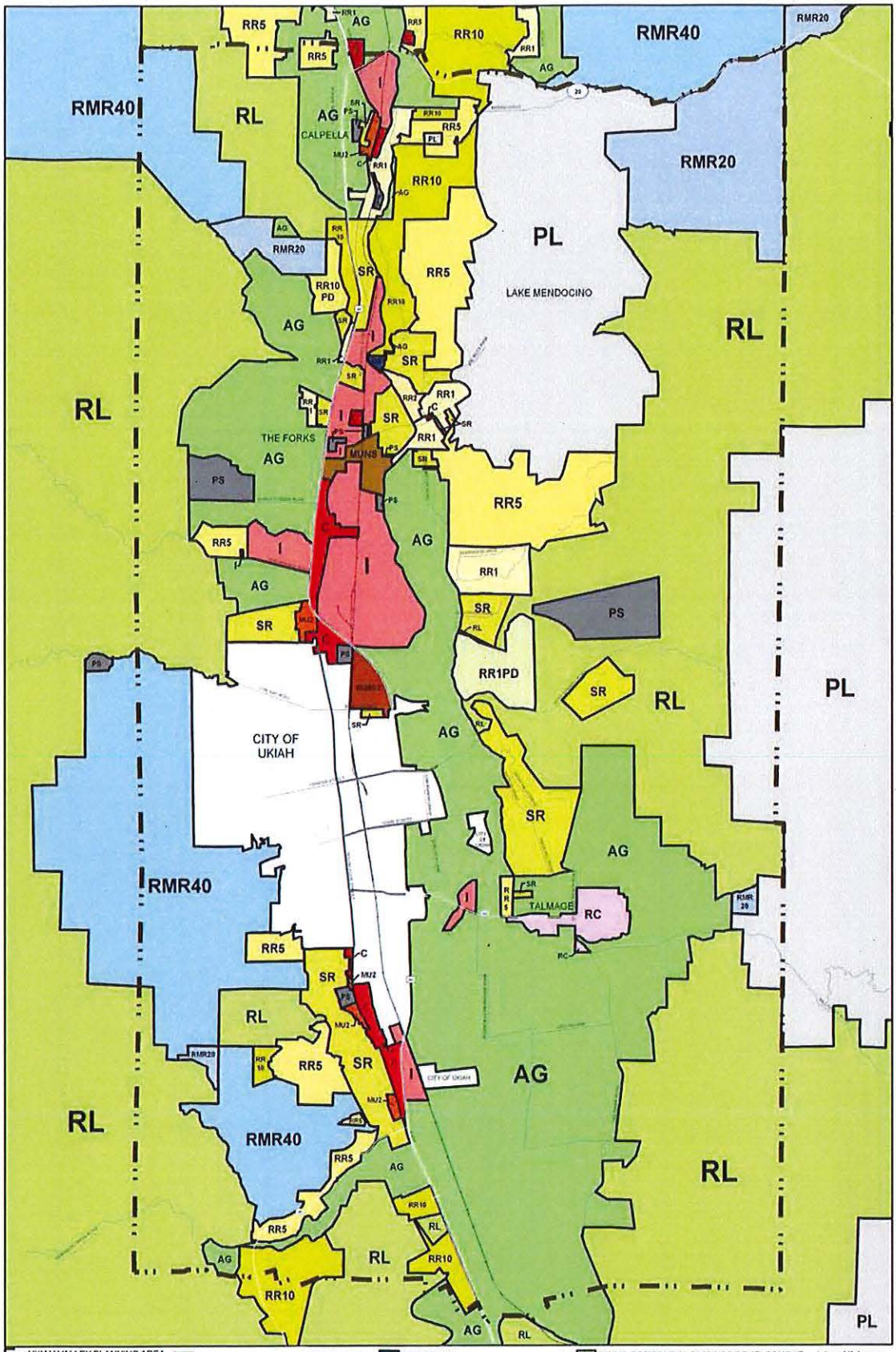
Major Planned Deviation to the Coyote Valley Dam - Lake Mendocino Dam Water Control Manual

Mendocino County General Plan Land Use Designations

N

2 0 2 Miles

Figure 8



Source: Mendocino County Planning & Building Services

This map is provided as a visual display of county information.

Reasonable effort has been made to ensure the accuracy of the map and data provided, nevertheless som information may not be accurate.

August 2011

T:\water transmission\Water_Supply\W0045C018-MendocinoRes-FIRO\Fig_3.2_2-2.mxd 1/10/2018

US Army Corps of Engineers
San Francisco District

Major Planned Deviation to the Coyote Valley Dam - Lake Mendocino Dam Water Control Manual

Land Use and Public Land

0.5 0 0.5 Miles

Figure 9

In compliance with Executive Order (EO) 12898, Environmental Justice, the USACE evaluated the potential effects of the Proposed Action on low-income and minority population. The Proposed Action does not have the potential to cause disproportionately high and adverse impacts on low-income and minority populations. No relocations would occur as a result of the water control manual deviation, and no populations would be displaced as a result of approving the temporary change in operation.

3.1.3 Noise

The proposed major deviation request would not expose persons to or generate noise levels in excess of standards established in county or city plans, ordinances, or applicable standards of other agencies. In addition, it would not expose persons to or generate ground-borne vibration or ground noise levels, or substantially increase ambient noise levels. Modifying the reservoir storage curve and using the DSM would not impact noise levels in the Lake Mendocino area. The proposed water control manual deviation would have little to no effect on noise.

3.1.4 Traffic

Highway access to Lake Mendocino is provided by State Highway 101 to the west and State Highway 20 to the north. The major deviation request would not involve any new construction and would not result in an increase in traffic that is substantial in relation to existing traffic load or capacity of the street system. Thus, there would be no changes to traffic or transportation associated with modifying the reservoir storage curve and using the DSM. The proposed water control manual deviation would have little to no effect on traffic.

3.1.5 Fisheries

The fish community in Lake Mendocino is dominated by non-native warm water species such as largemouth bass (*Micropterus salmoides*) and redear sunfish (*Lepomis microlophus*), with lesser numbers of smallmouth bass (*Morone saxatilis*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and channel catfish (*Ictalurus punctatus*) being caught. A few native species inhabit the lake, including Sacramento sucker (*Catostomus occidentalis*) and Sacramento pikeminnow (*Ptychocheilus grandis*). Lake Mendocino supports recreational fishing. Implementation of the Proposed Action could increase the size of the reservoir pool on a temporary basis and would not impact the fisheries resources in Lake Mendocino.

There are no anadromous fish species in Lake Mendocino. The Russian River downstream of the Lake Mendocino supports special-status anadromous salmon that rely on releases from the reservoir. These species are discussed further under Section 3.5, Special-status Species.

The Proposed Action is not associated with river flows on the West Fork of the Russian River, therefore no impacts to fisheries resources would occur.

Coyote Valley Dam impounds the East Fork of the Russian River (Figure 1). There are no anadromous fish species in the reaches of the East Fork Russian River upstream of Lake Mendocino; however, there are warm water species present. The Proposed Action would not alter flows from the East Fork to Lake Mendocino and would not impound additional reaches of

the East Fork, therefore, no impacts to fisheries resources would occur upstream of Lake Mendocino.

3.1.6 Visual Resources

Lake Mendocino is located on the East Fork Russian River near the City of Ukiah. Water-based boating, swimming, fishing, and camping are popular at Lake Mendocino. The reservoir is surrounded by views of oak woodland hills. A 15-mile network of trails can be used to hike, bike, or horse ride, and provides access to a 689-acre Wildlife Management Area. Fishing is popular at Lake Mendocino (U.S. Army Corps of Engineers, 2015). The public can view the reservoir from multiple view points from the trail network near the reservoir, as well as from boats on the reservoir.

Currently, the conservation space elevation fluctuates seasonally, with corresponding change in the viewshed at the lake. The proposed water control manual deviation and increased reservoir pool size would have a temporary effect on visual resources from the increased reservoir level. However, this temporary effect would be minor and conditions would return to normal following the deviation. The proposed water control manual deviation would have little to no effect on visual resources.

3.2 Cultural Resources

3.2.1 Existing Conditions

Prehistoric Context

Archaeological evidence indicates that human occupation of California began at least 11,000 years ago. Early occupants appear to have had an economy based largely on hunting, with limited exchange, and social structures based on the extended family unit. Later, milling technology and an inferred acorn economy were introduced. This diversification of economy appears to have arisen along with the development of sedentism and population growth and expansion. Sociopolitical complexity and status distinctions based on wealth are also observable in the archaeological record, as evidenced by an increased range and distribution of trade goods (e.g., shell beads, obsidian tool stone), which are possible indicators of both status and increasingly complex exchange systems (Barrow & Caskey, 2015).

In the regions north of the San Francisco Bay that became Sonoma, Marin, and Mendocino counties, Pomo, Wappo, and Coast Miwok (California Indian Library Collections, 2015) settled in village communities. Members of these nations lived in tribal groups made up of numerous autonomous village communities or tribelets. Within these tribelets were one or two central villages that were surrounded by up to a dozen smaller outlying villages. The tribelet occupied a specific tract of land and often spoke a distinct dialect. North San Francisco Bay tribelets followed a hunting and gathering subsistence pattern, with acorns providing a year-round food staple. They maintained permanent winter villages and set up temporary outlying camps during the summer to gather seasonal resources.

Pomo

The Pomo are one of the best-known aboriginal groups in California. Pomo settlements were distributed throughout nearly the entire Russian River watershed, but were most concentrated in the Russian River valley.

Northern Pomos inhabited present-day Mendocino County, extending from Cleone on the coast, east across the Coast Range to the Laytonville area, and south to Ukiah and the valley in which Lake Mendocino is now located. Their territory included the upper reaches of the Russian River watershed. The valleys and foothills they inhabited contained abundant resources and had a mild climate.

The Central Pomo occupied the area from the mouth of the Navarro River, south to Gualala, west to Cloverdale and north to Ukiah.

The Kashaya Pomo (Southwestern Pomo) occupied most of Sonoma County. The Kashaya territory consisted primarily of rocky coastline and redwood forest from Stewarts Point south to Jenner. Their territory included the mouth of the Russian River and the Austin Creek drainage area. Shellfish, sea mammals, and salmon were major resources. Village sites were situated along the coast and on inland ridges.

The Southern Pomo occupied the Russian River drainage south of the Mendocino-Sonoma county line near Cloverdale south to Santa Rosa and Cotati (Kroeber, 1970).

Records and Literature Search

The record search area includes Lake Mendocino and extends out 0.5 mile around the lake. This entire area was subject to a record search at the Northwest Information Center, Sonoma State University (NWIC File No. 17-1620), and a Sacred Lands File Search was also completed through the Native American Heritage Commission (NAHC). Previously identified sites were evaluated for their eligibility for listing in the National Register of Historic Places (NRHP). NRHP recommendations were also completed for newly documented sites. As a result of the records search, it was determined that 31 cultural resources have been recorded within the record search area. Of these resources recorded within the record search area, 29 are either inundated or have been recommended ineligible for National Register listing (Cox *et al.* 1977a; Fredrickson and Origer 1977; Minor 2010a, 2010b, 2010c, 2010d, 2010e, 2010f, 2010g, 2010h, 2010i, 2010j, 2010k, 2010l, 2010m, 2010n; Newland 1997). There are two resources that are both potentially eligible for inclusion on the National Register. However, these two resources are found at elevations higher than the area of potential effect (APE) and would not be affected by the Proposed Action.

3.2.2 Environmental Effects

Basis of Significance

Any adverse effects on cultural resources that are listed or eligible for listing in the NRHP (i.e., historic properties) are considered to be significant. Effects are considered to be adverse if they:

- Alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the NRHP so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.

No Action

Under the No Action alternative, the USACE would not approve the requested major water control manual deviation. As a result, the flood control releases from Lake Mendocino would continue to be made in accordance with the existing tools and protocols available to inform USACE flood managers for managing reservoir operations at Lake Mendocino. There would be no effect on cultural resources existing in the area of potential effect because current conditions would remain unaltered.

Proposed Action

Effects to cultural resources would be from water inundation through the raising of the water level along the project APE, which is a narrow strip of Lake Mendocino's shoreline between the reservoir's gross pool level of 734 feet and the proposed increased level of 744.36 feet mean sea level (msl). No sites are potentially eligible for listing in the NRHP within the APE. Therefore, pursuant to 36 C.F.R. § 800.4(d)(1), the USACE determined that the Proposed Action will not affect historic properties.

Cultural resources would be vulnerable to damage by inundation of areas not previously subject to inundation; however, because the range of water surface elevations in Lake Mendocino would remain within reservoir's existing operational levels, no new areas would be inundated as a result of the Proposed Action and no impact is anticipated.

Vegetation along the shore of Lake Mendocino has been determined by seasonal fluctuations in reservoir elevation that occur under existing operations. The maximum water surface elevation at the reservoir would remain the same as existing operations under the Proposed Action. The maximum water surface elevation determines the transition location from upper shoreline to upland vegetation. Annual plant species may seasonally colonize exposed shoreline areas. Because there would be no change in maximum water surface elevation, upland vegetation beyond the shoreline is not anticipated to change and there would be no impact to culturally significant plants. The proposed water control manual deviation would have little to no effect on cultural resources.

3.2.3 Mitigation

No impact to cultural resources would result from implementation of the Proposed Action and no mitigation is needed or proposed.

3.3 Recreation

3.3.1 Existing Conditions

The Lake Mendocino Recreation Area offers a variety of recreational activities, including boating, water skiing, swimming, camping, fishing, hunting, picnicking, mountain biking,

horseback riding, and sightseeing. Lake Mendocino recreation facilities are open year round; however, the summer months of June through August are the most popular months for boating activities on the reservoir. Lake Mendocino offers four large day-use areas with covered picnic shelters and barbeques (Figure 10). Lake Mendocino provides boating, swimming, water skiing, and fishing opportunities. Fishing for large and small mouth bass, striped bass, crappie, blue gill and catfish are popular sport fish at Lake Mendocino. There is a 700-acre wilderness area where native wildlife can be viewed on the east side of the reservoir, which is accessible by boat or by driving or walking down Inlet Road. Camping at Lake Mendocino is available at Kyen Campground, Bushay Recreation Area, and Chekaka Recreation Area. Kyen Campground offers 102 campsites, Bushay Recreation Area offers over 100 campsites, and Chekaka Recreation Area offers 17 campsites. There are approximately 15 miles of trails around Lake Mendocino that are accessible to mountain bikers and hikers. Horseback riders are allowed on designated trails. Lake Mendocino provides 1,750 surface acres of water that are accessible by canoe, sailboat, motorboats, or other water vessels. Boat launching is provided at public boat ramps located at the northern end of Lake Mendocino off of Marina Drive (North Boat Ramp) and at the southern end of Lake Mendocino near Coyote Valley Dam (South Boat Ramp). Many of the recreation facilities are built at or slightly above 748 feet mean sea level (msl).

3.3.2 Environmental Effects

Basis of Significance

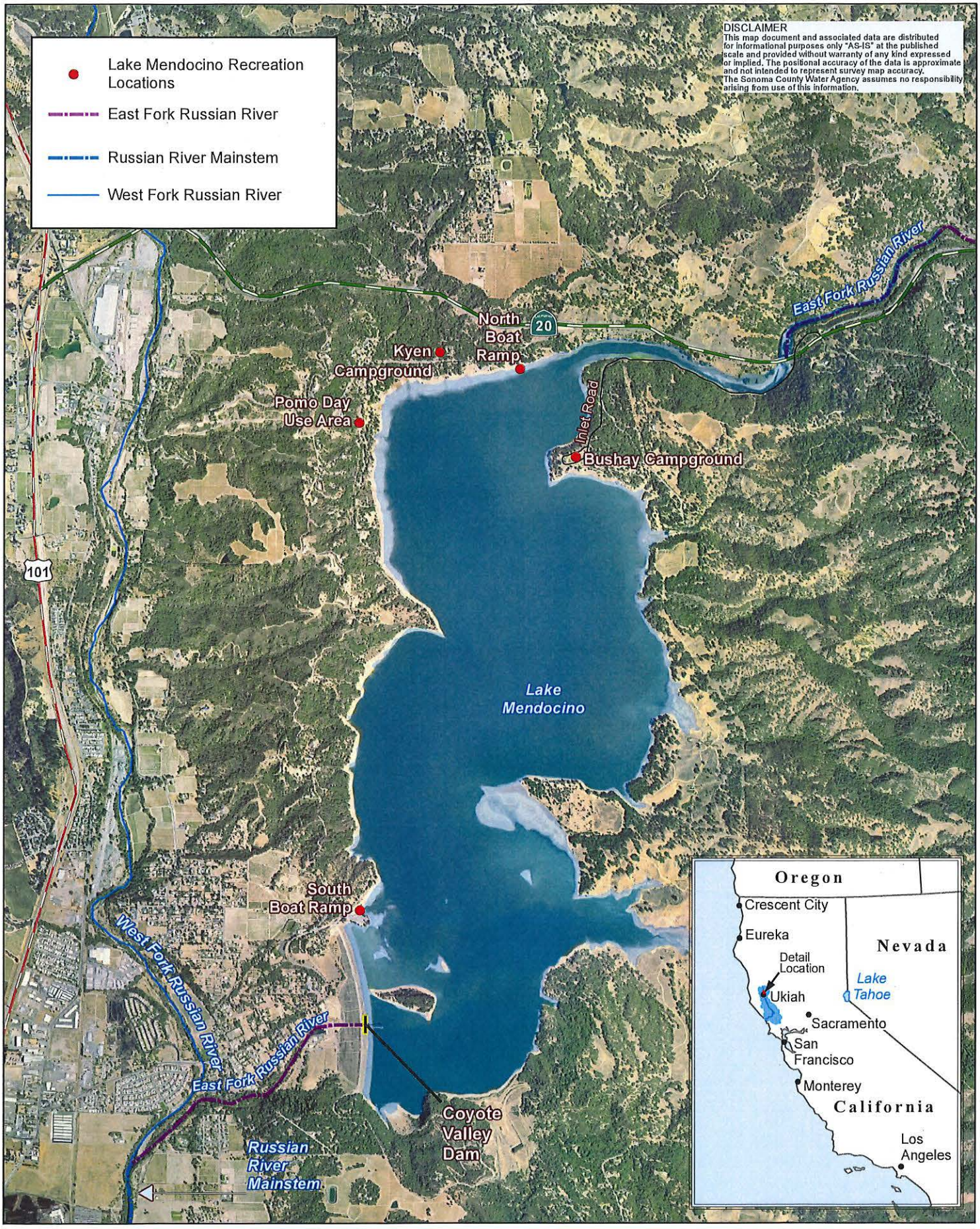
An alternative would be considered to have a significant effect on recreation if it would result in loss of recreational facilities, cause a substantial disruption in a recreational activity or opportunity, or substantially diminish the quality of the recreational experience. Since recreation occurs primarily from June through September, a seasonal component to potential impacts to recreation is considered. However, since recreation facilities are open year round, impacts to recreation during the year as a whole (October through September) are often presented as well.

No Action

Under the No Action alternative, the USACE would not approve the requested major water control manual deviation. As a result, the flood control releases from Lake Mendocino would continue to be made in accordance with the existing tools and protocols available to inform USACE flood managers for managing reservoir operations at Lake Mendocino. There would be no effect on recreational resources existing in the project area because current conditions would remain unaltered.

Proposed Action

Modifying the reservoir storage curve and utilizing the DSM would not negatively impact Lake Mendocino's recreational facilities. Recreational resources at Lake Mendocino are built at or slightly above 748 feet msl. The modified storage curve included in the Proposed Action would be at 744.36 msl. The range of water surface elevations in at Lake Mendocino would remain within reservoir's existing operational levels and no impact is anticipated. The proposed water control manual deviation would have no negative effect on recreational resources.



US Army Corps of Engineers
San Francisco District

Major Planned Deviation to the Coyote Valley Dam - Lake Mendocino Dam Water Control Manual
Lake Mendocino Recreation Locations

N

0 0.25 0.5 Miles

Figure 10

3.3.3 Mitigation

No impact to recreational resources would result from implementation of the Proposed Action and no mitigation is needed or proposed.

3.4 Special-status Species

For the purpose of this section, special-status species are wildlife species that meet one or more of the following definitions: species listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (ESA) (50 C.F.R. § 17.11); or species that are candidates for possible future listing as threatened or endangered under the federal ESA (61 FR 7591).

3.4.1 Existing Conditions

The federal Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531 – 1599) provides legal protection for plant and animal species in danger of extinction (50 C.F.R. pt. 17). This act is administered by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).

A list of Federally listed, proposed, and candidate species that may occur in the project area was obtained on April 18, 2018, via the USFWS Information for Planning and Consultation (IPaC) website (United States Fish and Wildlife Service, 2018), the species by county reports for Sonoma and Mendocino counties (Service, 2018), and the NMFS lists of protected species and essential fish habitat (EFH) in the West Coast Region (NOAA, 2014). Anadromous species and their critical habitats are under the responsibility of NMFS. These information sources were used to generate a master list of species and habitats potentially present in the project area. The lists are provided in Appendix B.

In Mendocino and Sonoma counties, there are designated critical habitats for three protected salmonids (Chinook salmon, coho salmon, and steelhead) that inhabit the Russian River. Although these species do not occur in Lake Mendocino, a brief discussion of their life history is included since their critical habitats are near the project area. Additionally, a search of the California Natural Diversity Database (CNDDB) conducted on December 27, 2017, indicated that there are reported occurrences of Federally listed species near the project area. Species' known ranges and habitat constraints were evaluated and those determined to have the potential to occur in the project area at Lake Mendocino are discussed below.

The area of potential effect consists of Lake Mendocino and its shoreline. For the purposes of describing biological resources that may be affected by the Proposed Action, the lateral extent of the project area consists of the shoreline and adjacent vegetation that is dependent on the river or lake for water. The Lake Mendocino project area boundary extends along the upper shoreline. Regulated water levels in these reservoirs create an abrupt change between barren shoreline and upland vegetation with no extensive riparian zone present.

Special-status Plants

Based on review of the databases and other information sources, 29 special-status plant species have been identified as occurring in Sonoma and Mendocino counties (Appendix B-1 of Appendix B). For project-level evaluation, an official species list was requested via the IPaC website. The list identified three occurring or potentially occurring federally protected flowering plants in the vicinity of the project area (Appendix B-2 of Appendix B). However, two of these plants are considered unlikely to occur within the project area for reasons such as absence of essential habitat requirements for the species, or the distance to known occurrences and/or the species distributional range. These species are listed in Appendix B-3 of Appendix B and not discussed further in this section. The remaining plant is considered to have moderate potential to occur within the project area, based on known occurrences and availability of suitable habitat.

Burke's Goldfields

Burke's goldfields *(Lasthenia burkei)* is state- and federally-listed as endangered. It is an annual herb in the Aster family (Asteraceae) with a blooming period that extends from April to June. This plant grows in meadows, seeps vernal pools, and swales and occurs in Mendocino, Sonoma, Lake, and Napa counties.

The margins of the Russian River may contain seasonal wetlands, which may provide suitable habitat for Burke's goldfields. The project area contains sparse patches of marsh and grassland, which are potential habitat for the Burke's goldfields but likely experience inundation and flow velocities that would preclude its presence. The closest known occurrence was reported in 2010 near Coyote Valley Dam. Given the potential presence of suitable habitat and proximity to an occurrence record near Coyote Valley Dam, this species has a moderate likelihood of occurring in the project area.

Special-status Wildlife

Based on review of databases and other information sources, 28 special-status animal species have been identified as occurring in Sonoma and Mendocino counties (Appendix B-1 of Appendix B). For project-level evaluation, an official species list was requested via the IPaC website. The list identified five wildlife species occurring or potentially occurring in the vicinity of the project area (Appendix B-2 of Appendix B). However, two of these species are considered unlikely to occur and two have a low potential to visit in the project area for reasons such as absence of essential habitat required for the species or the distance to known occurrences and/or the species distributional range. These species are listed on Appendix B-3 of Appendix B and are not discussed further in this section. The remaining special-status animal species, tricolored blackbird, is considered to have moderate to high potential to occur within the project area based on occurrences, known range, or availability of suitable habitat. While the tricolored blackbird is not listed on the IPaC species list, as a candidate species, it has moderate potential to occur within the project area. Therefore, a discussion of its nesting and foraging habitats and behavior are included. All species identified as occurring or potentially occurring in the vicinity of the project area are summarized in Appendix B-3 of Appendix B.

Amphibians

California Red-legged Frog

The California red-legged frog (*Rana draytonii*) is federally listed as threatened and is a California species of special concern (CDFW, 2016b). The USFWS released a recovery plan in 2002 (USFWS, 2002), and critical habitat for the California red-legged frog was designated in 2010 after several legal and regulatory actions (USFWS, 2010). There is no critical habitat for the California red-legged frog within the Russian River watershed.

The California red-legged frog ranges from coastal mountains from southern Mendocino County southward to northern Baja California, and inland to the Sierra Nevada foothills (Jennings & Hayes, 1994) (Shaffer, Fellers, Voss, Olivers, & Pauly, 2004). The frog has been apparently extirpated from approximately 70 percent of its historic range (USFWS, 2002). California red-legged frogs are usually confined to aquatic habitats such as creeks, streams, and ponds, and occur primarily in areas that have pools about 2 to 3 feet deep, with adjacent dense emergent or riparian vegetation (Jennings & Hayes, 1988) (Cook & Jennings, 2007). Adult frogs move seasonally between their egg-laying sites and foraging habitat, but they rarely move long distances from their aquatic habitat. Long-distance movement of more than two miles between aquatic sites has been reported (Bulger, Scott, & Seymour, 2003), but is likely a relatively rare event. California red-legged frogs breed from November to March. Egg masses are attached to emergent vegetation (Jennings & Hayes, 1994) and hatch within about two weeks. Metamorphosis generally occurs between July and September. This frog prefers freshwater and avoids brackish water greater than 4-9 parts per thousand (Jennings & Hayes, 1990).

California red-legged frog is known from several locations within the vicinity of the Russian River project area, including two tributaries of the Russian River. Aquatic habitats along Russian River and Lake Mendocino are not characteristic for this species and are likely unsuitable habitat due to an abundance predatory fish, crayfish, and bullfrogs.

Birds

Tricolored Blackbird

On September 18, 2015, the USFWS determined that a petition to protect the tricolored blackbird (*Agelaius tricolor*) may be warranted and initiated a status review of the species (USFWS, 2015b). The tricolored blackbird is a California Species of Special Concern that is largely endemic to California. Tricolored blackbird is found mostly throughout the Central Valley and San Francisco Bay-Delta regions (Riparian Habitat Joint Venture, 2004) and is highly gregarious, foraging and nesting in flocks. Tricolored blackbirds forage in annual grasslands; wet and dry vernal pools and other seasonal wetlands; and croplands. They also forage occasionally in riparian scrub habitats and along marsh borders. Tricolored blackbirds nest near freshwater marshes. The three basic requirements for nesting sites include open accessible water; a protected nesting substrate, including both flooded or thorny or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few miles of the nesting site (Beedy & Hamilton, 1999). The breeding season generally extends from mid-March into mid-July (Riparian Habitat Joint Venture, 2004). Nests built of mud and plant material are usually

located a few feet over, or near, freshwater, but may be hidden on the ground among low vegetation.

Although the tricolored blackbird is known to occur in the Russian River watershed, there are no occurrence records in the project area (USGS, 2016) (CDFW, 2016a). There is one CNDDB occurrence record from the project vicinity located southeast of Hopland at a reservoir in 1990. This site is approximately one mile from the Russian River. Marsh vegetation that blackbirds typically nest in is very limited in the project area. Lake Mendocino is reservoir with regulated water levels that preclude the establishment of most marsh vegetation. Also, the Russian River has very limited marsh vegetation due to winter scouring flows that prevent the establishment of marsh plants in most areas. However, potentially suitable foraging habitat for this species may be present in the project area. This species has a moderate potential to occur within the project area mainly as a seasonal non-breeding resident or as a transient.

Special-status Fish

There are three fish species in the Russian River watershed listed under the federal Endangered Species Act (ESA): Central California Coast steelhead (*Oncorhynchus mykiss*); Central California Coast coho salmon (*O. kisutch*); and California Coastal Chinook salmon (*O. tshawytscha*). Coho salmon are also listed under the California Endangered Species Act (CESA). These species do not occur in Lake Mendocino. Critical habitats for these species occurs in the mainstem Russian River downstream of Lake Mendocino, but are not found in the reservoir or upstream in the East Fork Russian River.

Generalized Salmonid Life History

All three salmonids (Chinook salmon, coho salmon, and steelhead) inhabiting the Russian River exhibit a similar life history strategy known as anadromy. With an anadromous life style, juveniles rear in freshwater before migrating to the ocean where they grow and mature; finally returning as adults to freshwater to lay their eggs and begin the lifecycle anew. Although there are specific differences between salmonids, they all share several life history traits. After growing and maturing in the ocean, the adults of all three species return (generally) to the stream where they were born. The eggs are laid in a nest, called a redd. The freshwater residency is highly variable between the three species, but is marked by rapid growth followed by a physiological change known as smoltification. A salmonid undergoing this change is called a smolt. The smoltification process is necessary for salmon to convert from a physiology adapted to living in freshwater to one adapted to living in salt water.

Chinook salmon

Based on run timing, Chinook salmon inhabiting the Russian River are considered "fall-run." Chinook salmon occupy the Upper and Lower Russian River seasonally from the estuary upstream into the West Fork Russian River. Chinook salmon have been documented to spawn in some tributaries to the Russian River, but usage of tributaries appears to be limited. Chinook salmon primarily spawn in the Russian River, upstream of Healdsburg.

Adult Chinook salmon have been observed at the Mirabel fish counting station as early as the last week in August through at least early February; however, the adult upstream migration

consistently peaks in October and November (Chase et al. 2007; Martini-Lamb and Manning 2014). Chinook salmon are limited naturally in the basin to waters with sufficient flow to allow upstream migration and spawning during the fall/early winter timeframe. Spawning typically begins in November (Cook 2008), and often continues through at least early February. Juvenile Chinook emigrate through the Russian River from approximately late-February through July, with peak emigration from mid-April through mid-May.

Coho Salmon

Coho salmon primarily occupy streams in the lower Russian River watershed, primarily from the Maacama Creek sub watershed downstream. Coho salmon do not spawn or rear in the mainstem Russian River, but use it seasonally as a migration corridor.

Coho salmon have the most restricted habitat requirements of the three salmonid species inhabiting the Russian River. Coho salmon prefer cold (≤61° F); low gradient stream reaches that typically include dense riparian canopy.

Coho salmon have a fairly rigid life history, where they spend approximately one year in freshwater and two years in the ocean, although juveniles occasionally spend two years in freshwater, and a few adults return after one year in the ocean (mostly male fish). In other streams in California, coho migrate upstream in November and December, and spawning occurs primarily between December and January (Shapovalov and Taft 1954), (UCCE, n.d.). Since coho spawn in relatively small tributaries, they are dependent on rain to provide sufficient streamflow to allow for passage and spawning. Smolts emigrate March through May, with the peak occurring during the first two weeks of May.

Steelhead

Based on run timing, steelhead in the Russian River are considered "winter run." Steelhead are the most widely distributed salmonid in the Russian River watershed, inhabiting most permanent tributary streams. Steelhead also utilize the mainstem Russian River as spawning and rearing habitat. Spawning habitat overlaps with Chinook salmon (mainly above Cloverdale). Limited steelhead rearing occurs in the mainstem Russian River with peak abundances recorded in the Canyon Reach located between Cloverdale and Hopland and near Ukiah (Cook 2003). Although steelhead are widely distributed in the basin, the overall population is likely depressed compared to historical levels.

Steelhead are flexible in their life history strategies and habitat requirements. Adult steelhead migrate primarily during the winter (December through March). Adult steelhead enter the Russian River from at least November through May, although based on hatchery returns peak migration occurs in January through March. Steelhead spawn in the upper mainstem river as well as most tributaries throughout the basin. Steelhead smolt primarily as two year old fish (Chase et al. 2005) although one-year-old smolts are observed in Dry Creek (Water Agency unpublished data). Steelhead smolts emigrate primarily during the spring (March through early June), as well as post-spawn adult steelhead (kelts).

3.4.2 Environmental Effects

Basis of Significance

Adverse effects on Federally listed, proposed, and candidate species were considered significant if an alternative would result in any of the following:

- Direct or indirect reduction in the growth, survival, or reproductive success of species listed or proposed for listing as threatened or endangered under the ESA.
- Direct mortality, long-term habitat loss, survival, or reproductive success of Federally-listed threatened or endangered animal or plant species.
- Have an adverse effect on a species' designated critical habitat.

No significant effects to Federally listed, proposed, or candidate species or critical habitat are anticipated from the Proposed Action. No potential for significant effects to Federally listed, proposed, or candidate species or critical habitat under the jurisdiction of the USFWS is anticipated. Given the presence of critical habitat and potential for presence of listed salmonid species downstream of Lake Mendocino, coordination with NMFS was conducted. In preparation of the Steering Committee's request, staff from USACE, NMFS, and the Water Agency met to coordinate preparation of the request and ensure avoidance of potential effects to listed salmonid species downstream of Lake Mendocino in the Russian River. A summary of the coordination is provided in Appendix C.

No Action

Under the No Action alternative, the USACE would not approve the requested major water control manual deviation. As a result, the flood control releases from Lake Mendocino would continue to be made in accordance with the existing tools and protocols available to inform USACE flood managers for managing reservoir operations at Lake Mendocino. There would be no effect on special-status plant, wildlife, and fish species existing in the area of potential effect because current conditions would remain unaltered.

Proposed Action

The plant communities along the Lake Mendocino shoreline have been exposed to historically large changes in water surface elevation that occur as part of reservoir operations. The Lake Mendocino maximum water level would remain unchanged. This maximum water level determines the edge of the upper shoreline and upland vegetation. Because this maximum water level would remain the same under the Proposed Action, no direct or indirect impacts to the growth, survival, or reproductive success of special-status species is anticipated. Similarly, no direct mortality, long-term habitat loss, or impacts to survival or reproductive success of Federally-listed wildlife, fish, or plant species are anticipated. No critical wildlife or fish habitat has been designated in the Lake Mendocino area.

Downstream of Lake Mendocino, flows in the East Fork Russian River and mainstem Russian River would remain within the range of existing baseline levels with extreme high winter flows and low summer flows potentially slightly moderated. Because the range of flows downstream of the reservoir would remain the same as under baseline conditions, the Proposed Action would

have no direct or indirect impacts to the growth, survival, or reproductive success of special-status species; no direct mortality, long-term habitat loss, or impacts to survival or reproductive success of Federally-listed wildlife, fish, or plant species; and no impact to critical habitat downstream of Lake Mendocino.

National Marine Fisheries Service issued its *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River Watershed* (Russian River Biological Opinion) on September 24, 2008 (NMFS 2008). The Russian River Biological Opinion is a culmination of more than a decade of consultation among the USACE, the Water Agency, the Mendocino County Water Conservation and Flood Control Improvement District (MCWFCID), and NMFS regarding the impacts of the USACE and Water Agency flood control and water supply activities on three fish species listed under the federal Endangered Species Act: Central California Coast steelhead; Central California Coast coho salmon; and California Coastal Chinook salmon.

The ESA prohibits the "take" (which include killing, harassing or harming) of threatened and endangered species. Agencies may be authorized to take actions that cause incidental take liability by the regulating agency (in this case NMFS) if species will be harmed only incidentally as unintentional results of lawful operations. The Russian River Biological Opinion includes an Incidental Take Statement with a term of 15 years that authorizes the USACE and the Water Agency to conduct specified lawful operations and make specified changes in operations as a result of the Russian River Biological Opinion so long as the terms and conditions of the Incidental Take Statement are met, even if incidental take may result from such operations. The Incidental Take Statement includes Reasonable and Prudent Measures (RPMs) that the USACE and Water Agency must implement to minimize and monitor the impacts of the incidental take of listed species due to implementation of the Water Agency and USACE's water supply and flood control activities and Reasonable and Prudent Alternatives (RPAs) (NMFS 2008).

Appendix C provides a summary of coordination with NMFS regarding the major deviation request (Proposed Action). The Proposed Action does not include operations beyond the scope of conditions evaluated and considered under the Russian River Biological Opinion. The DSM is configured to comply with existing operations, including Decision 1610 minimum instream flow requirements and the Russian River Biological Opinion, flood release requirements including that there would be no flood releases when Russian River flows at Hopland are greater than 8,000 cubic feet per second and in compliance with ramping rates recommended by the NMFS (NMFS, 2016). As discussed in Appendix C, one issue raised by NMFS staff was related to model results for 1996 (Figure C-8) when the DSM shows a fall flood release to maintain storage levels below the modified storage curve. NMFS will require an advanced opportunity to discuss with the USACE the timing of such fall releases in order to determine the appropriate release strategy for spawning and migrating salmonids.

3.4.3 Mitigation

No adverse impact to Federally-listed special-status species would result from implementation of the Proposed Action and no mitigation is needed or proposed.

3.5 Vegetation and Wildlife

3.5.1 Existing Conditions

For the purposes of describing vegetation and wildlife, the project area includes one large reservoir on the East Fork Russian River, Lake Mendocino, as well as the mainstem Russian River downstream of its confluence with the East Fork.

Lake Mendocino

The project area includes Lake Mendocino, located 32 miles inland where summer temperatures are much higher than along the coast. Riparian and marsh habitat is generally absent from the shoreline of the lake due to managed, fluctuating water levels. The shoreline is typically barren with an upland plant community at the high water line. The USACE owns Lake Mendocino, including the surrounding uplands at a total of approximately 3,500 acres. Mountainous north-facing slopes contain hardwood and coniferous forests, and on foothills oak woodlands and grasslands are common. Chaparral and grassland exists on shallow soils of south-facing slopes.

Russian River

The Russian River below the confluence of the East and West Forks flows from Ukiah Valley to the Pacific Ocean. Cool coastal conditions moderate temperatures year-round in the lower river. In contrast, the inland Russian River mainstem has hot, dry summers. Bank vegetation ranges from sparse to dense riparian forest. Some river banks are armored with rock riprap, and in a few places even automobile bodies. Adjacent to the river, habitats vary from urban, ruderal, agricultural, woodland, to forest. Largely, scouring during winter high flows provides the dominant force that dictates where vegetation can establish and persist. In the Ukiah, Hopland, and Alexander valleys most lands are agricultural, typically vineyard. The Lower Russian River is primarily forested lands, with interspersed vineyards, and development associated with communities in the Healdsburg, Forestville, Guerneville and Monte Rio areas.

The lower portion of the Russian River is a tidal estuary (Estuary) that extends from the Pacific Ocean upstream approximately seven miles to the Duncans Mills area. The Estuary can be characterized as a submerged or "drowned" river at the ocean with an open or closed sandbar barrier beach at the river mouth. The terrain adjacent to the Estuary is mountainous forest, woodland, and grassland habitats. Estuary bank vegetation consists of riparian forest, grazed grassland, sparse marshlands, and exposed gravel bars.

The following section describes the biological resources in the vicinity of the Proposed Action. Please refer to the Special-status Species section above for additional information.

Plant Community and Wildlife Habitat

North Coastal Forest

North coastal forest occurs over much of the North Coast Ranges in Sonoma and Mendocino counties. North coastal forest generally occurs on north and west facing slopes and in steeper canyons and ravines. In the wetter regions and along the coastline, north coastal forest is typically dominated by one or more coniferous trees including coast redwood and Douglas fir, and may include hardwoods such as big-leaf maple and tan oak. On the dryer, inland slopes of the North Coast Ranges, conifers can be found with hardwoods such as California black oak (*Quercus kelloggii*), coast live oak (*Quercus agrifolia*), California bay laurel, and Pacific madrone (*Arbutus menziesii*). The north coast forest habitat provides important foraging and nesting habitat for several wildlife species. Berries, forbs, conifer seeds, and oak acorns provide important food sources for species including western gray squirrel (*Sciurus griseus*), dusky-footed woodrat (*Neotoma fuscipes*), mule deer (*Odocoileus hemionus columbianus*), various species of woodpecker, and Stellar's jay (*Cyanocitta stelleri*). Avian predators such as Cooper's hawk (*Accipiter cooperii*) and great horned owl (*Bubo virginianus*) prey upon rodents and small birds in this habitat. In addition, north coastal forest provides shelter and breeding habitat for wildlife species such as nesting raptors; cavity nesters such as woodpeckers, western screech-owl (*Otus kennicottii*), and pygmy nuthatch (*Sitta pygmaea*); mammals including ringtail (*Bassariscus astutus*) and long-tailed weasel (*Mustela frenata*); and reptile and amphibians such as northern alligator lizard (*Elgaria coerulea*), ring-necked snake (*Diadophis punctatus*), and California giant salamander (*Dicamptodon ensatus*).

Within the project vicinity, valley and foothill woodland is dominated by oak species with varying degrees of canopy cover, and with grasses and scattered low shrubs between trees. Oak woodlands, while common in California, are considered in decline due to seedling predation and loss due to development. This habitat provides important foraging for numerous wildlife species. Oak acorns provide an important food source for species including western gray squirrel, California ground squirrel, mule deer, various species of woodpecker, and western scrub jay (*Aphelocoma californica*). Avian predators such as golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), and Cooper's hawk, prey upon rodents and small birds in this habitat. In addition, oak woodlands and savannahs provide shelter and breeding habitat for wildlife species such as nesting raptors; cavity nesters such as woodpeckers, house wrens (*Troglodytes aedon*), and western bluebirds (*Sialia mexicana*); mammals including mule deer, raccoon (*Procyon lotor*), brush rabbit (*Sylvilagus bachmani)*, and feral pig (*Sus scrofa)*; and reptile and amphibians such as western fence lizard (*Sceloporus occidentalis*), common gopher snake (*Pituophis melanoleucus*), arboreal salamander (*Aneides lugubris*) and Pacific treefrog/chorus frog *Pseudacris regilla* (*seirrae*).

Valley and Foothill Woodland (Oak Savannah)

Within the project vicinity, valley and foothill woodland is dominated by oak species with varying degrees of canopy cover, and with grasses and scattered low shrubs between trees. Oak savannah typically occurs on dry and/or fine-textured soils. Savannahs are dominated by valley oak and coast live oak where they occur in open stands. Valley grassland is found between

trees and herbaceous species grow in shaded areas within tree driplines. Oak woodlands, while common in California, are considered in decline due to seedling predation and loss due to development.

This habitat provides important foraging for numerous wildlife species. Oak acorns provide an important food source for species including western gray squirrel, California ground squirrel, mule deer, various species of woodpecker, and western scrub jay (*Aphelocoma californica*). Avian predators such as golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), and Cooper's hawk, prey upon rodents and small birds in this habitat. In addition, oak woodlands and savannahs provide shelter and breeding habitat for wildlife species such as nesting raptors; cavity nesters such as woodpeckers, house wrens (*Troglodytes aedon*), and western bluebirds (*Sialia mexicana*); mammals including mule deer, raccoon (*Procyon lotor*), brush rabbit (*Sylvilagus bachmani)*, and feral pig (*Sus scrofa)*; and reptile and amphibians such as western fence lizard (*Sceloporus occidentalis*), common gopher snake (*Pituophis melanoleucus*), arboreal salamander (*Aneides lugubris*) and Pacific treefrog/chorus frog *Pseudacris regilla* (*seirrae*).

Chaparral

Chaparral is one of the most characteristic plant communities of California, and occurs only in California. It is characterized by hard-leaved low-growing shrubs, and is typically devoid of tree and herbaceous plant species. This is in part attributable to shading and competition from the dense growing brush. Characteristic plant species include manzanita, chamise (*Adenostoma fasciulatum*), toyon (*Heteromeles arbutifolia*), and California lilac (*Ceanothus* sp.). Chaparral occurs in the project vicinity on hot, dry southern slopes. Wildlife species that occur within chaparral are those that inhabit drier, more arid regions of the county and include western fence lizard, California ground squirrel, and brush rabbit. Birds such as common bushtit, California quail, and wrentit are commonly occurring species that use chaparral for foraging, cover, and nesting. Predators include coyote (*Canis latrans*) and American badger (*Taxidea taxus*) that utilize open areas in chaparral for hunting prey.

Valley Grassland

Valley grassland occurs most extensively in the Central Valley of California, but also is present in some of the low valleys or gentle slopes of the Coast Ranges, including the project vicinity. Non-native grassland habitat is commonly distributed in valley and foothills of most of California, except for the north coastal and desert regions. Valley grassland (native and non-native) occurs in the open areas adjacent to or within woodland and forest habitats. Within the project area valley grassland may fringe the riparian zone along the Russian River. This habitat typically occurs on fine-textured soils, usually clay, moist, or even waterlogged during the winter rainy season, and very dry during the summer and fall. European settlement of the area introduced non-native annual grasses, which have, for the most part, replaced the native perennial grasses that used to dominate this biotic community. Plant species characteristic of valley grassland in the project area include Harding grass (*Phalaris aquatica*), soft chess (*Bromus mollis*), slender oats (*Avena barbata*), clover (*Trifolium* spp.), lotus (*Lotus* spp.), California burclover (*Medicago polymorpha*), and vetch (*Vicia* spp.). Wildlife species typically observed foraging in valley grasslands include song sparrow (*Melospiza melodia*), red-winged blackbird (*Agelaius*

phoenicus), and American pipit (*Anthus rubescens*). Valley grasslands provide cover and foraging habitat for small mammals, reptiles, and avian species, including Botta's pocket gopher (*Thomomys bottae*), common gopher snake, common kingsnake (*Lampropeltis getulus*), and raptors such as red-tailed hawk. This habitat is also important for common ground nesting birds such as western meadowlark (*Sturnella neglecta*) and mourning dove (*Zenaida macroura*). Grasslands provide open foraging habitat for wildlife species such as white-tailed kite (*Elanus leucurus*) and mule deer that seek cover in adjacent woodland.

Riparian Woodland

Riparian vegetation, or the plants associated with a stream environment, once covered much of the Russian River floodplain and tributaries. Generally, riparian areas are associated with and/or encompass elevations adjacent to streams up to the floodplain elevation that matches the 100 to 500 year storm event. These large intense events along a river system are the primary driver for mobilizing sediments, scouring vegetation, and creating new places for vegetation to colonize. Historically, riparian vegetation along the Russian River was removed for agriculture, gravel mining, logging, flood control, and urbanization. Today, riparian vegetation along the Russian River and numerous tributaries exists in thin and in some places discontinuous strips. Riparian plant communities often show abrupt changes in species composition along stream banks due to differing preferences of seasonal water levels and tolerance to scouring during winter floods.

With close proximity to water and a multi-story canopy, riparian habitats provide important breeding, foraging, migration, dispersal, and cover habitat for numerous wildlife species. Riparian habitats benefit fish and other aquatic organisms through nutrients provided in the form of leaf litter and insects; shelter provided by scour pools, woody debris, and root masses; and cool water temperatures maintained by shading of all or parts of streams. Trees in riparian areas provide stabilization of banks and erosion control and prevent woody debris from entering agricultural lands during peak flood flows. Riparian areas also link fragmented upland habitats together. Because of its importance to terrestrial and aquatic wildlife species, riparian habitat has been afforded special regulatory protection, namely from the CDFW.

Wildlife species commonly found in riparian habitats include mule deer, dusky-footed woodrat, gray fox (*Urocyon cinereoargenteus*), raccoon, downy woodpecker (*Picoides pubescens*), belted kingfisher (*Ceryle alcyon*), northern oriole (*Icterus galbula*), brown towhee (*Pipilo fuscus*), common bushtit (*Psaltriparus minimus*), song sparrow, and common kingsnake. Neotropical migrant songbirds use these habitats as movement corridors and nesting habitat. Raptors often nest in riparian areas and forage in adjacent grasslands and agricultural fields. Characteristic riverine species that also use riparian habitats include river otter (*Lutra canadensis*), Pacific treefrog, and western pond turtle (*Actinemys marmorata*).

3.5.2 Environmental Effects

Basis of Significance

An alternative would be considered to have a significant effect on vegetation and wildlife if it would permanently remove or disturb sensitive native communities, or significantly reduce the amount of native vegetation and wildlife habitat in the project area.

No Action

Under the No Action alternative, the USACE would not approve the requested major water control manual deviation. As a result, the flood control releases from Lake Mendocino would continue to be made in accordance with the existing tools and protocols available to inform USACE flood managers for managing reservoir operations at Lake Mendocino. There would be no effect on vegetion and wildlife species existing in the area of potential effect because current conditions would remain unaltered.

Proposed Action

At Lake Mendocino, riparian and marsh habitat is generally absent from the shoreline due to managed, fluctuating water levels. The shoreline is typically barren with an upland plant community at the high water line. Changes in water releases from Coyote Valley Dam would affect water levels in Lake Mendocino, however the maximum water level would remain unchanged. This maximum water level determines the transition of the upper shoreline to upland vegetation. Because this maximum water level would remain the same as currently exists under existing conditions, the Proposed Action would not permanently remove or disturb sensitive native communities, nor would it significantly reduce the amount of native vegetation and wildlife habitat in the area.

Downstream of Lake Mendocino, flows in the East Fork Russian River and mainstem Russian River would remain within the range of existing levels with extreme high winter flows and low summer flows potentially slightly moderated. Because the range of flows downstream of the reservoir would remain the same as existing conditions, the Proposed Action would not permanently remove or disturb sensitive native communities, nor would it significantly reduce the amount of native vegetation and wildlife habitat in downstream areas.

3.5.3 Mitigation

No impact to vegetation and wildlife would result from implementation of the Proposed Action and no mitigation is needed or proposed.

3.6 Water Quality

3.6.1 Existing Conditions

Mendocino County and Lake Mendocino are located within the jurisdiction of the North Coast Regional Water Quality Control Board (Regional Board). Water quality objectives for the Russian River and its tributaries are specified in the *Water Quality Control Plan for the North*

Coast Region (Basin Plan) prepared in compliance with the federal Clean Water Act (CWA) and the State Porter-Cologne Act (NCRWQCB 2011). The Basin Plan identifies the existing and potential beneficial uses of water within the North Coast Region and the water quality objectives necessary to protect those uses. Section 401 of the Clean Water Act also gives the Regional Board the authority to review any proposed federally permitted or federally licensed activity that may impact water quality and to certify, condition, or deny the activity if it does not comply with State water quality standards.

The Regional Board listed the entire Russian River on the 2010 Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments (NCRWQCB, 2011) for sedimentation/siltation and temperature impairments. Lake Mendocino is also on the 303(d) List for mercury impairments in fish tissue. Mercury, also called quicksilver, is a heavy metal and potent neurotoxin that is harmful to humans and wildlife (NCRWQCB 2016a). Mercury builds up in the bodies of fish and also in people who eat contaminated fish. There is a statewide effort currently in development for a control program for reservoirs, including Lake Mendocino, that will address controlling sources of mercury and water quality objectives for mercury.

Reservoir stratification

Reservoirs such as Lake Mendocino can undergo "thermal stratification" within the lake, which can affect water temperature and dissolved oxygen (DO) levels in the water releases from the reservoir storage. As water cools, its density increases. This relationship continues until water cools to about 39° F at which point the density of water decreases with further cooling (this explains why ice floats). Solar radiation disproportionately warms water near the surface of a lake. As the surface water warms, it becomes less dense and "floats" on top of the colder, denser layer below. With just a few degrees of warming, the density difference can become strong enough to prevent mixing between the surface and bottom layers. In essence, lakes stratify into three layers: a warm surface layer (called the epilimnion), a narrow middle layer where the temperature rapidly declines, called the metalimnion (sometimes referred to as the thermocline); and a cold bottom layer (called the hypolimnion, which is commonly referred to in reservoirs as the "coldwater pool"). During the fall, atmospheric temperatures decline, cooling the surface waters of the reservoirs. The decrease in temperature in the surface waters reduces the density gradient between the epilimnion and hypolimnion, allowing the two layers to mix (often referred to as the lake "turning over"). During the mixing of the upper and lower layers, the bottom layer becomes re-oxygenated, and the overall temperature of the lake decreases, depending on the size of the remaining coldwater pool.

The density barrier that restricts mixing between the upper and lower layers affects water quality. The epilimnion remains in contact with the atmosphere and remains well oxygenated. However, the hypolimnion is isolated, and overtime, biological and chemical processes slowly deplete the oxygen within this layer. Thus, the reservoirs stratify into a warm, oxygenated surface layer and a cold bottom layer where the DO declines over time, potentially becoming anoxic. Depending on the depth of the release outlet in relation to the "coldwater pool," water released from a reservoir may range from warm to cold and oxygenated to anoxic.

The size of the reservoir significantly affects downstream water quality as well. Larger reservoirs, such as Lake Sonoma, support a large coldwater pool. The available cold water is substantially less in smaller reservoirs such as Lake Mendocino and can be depleted on a regular basis.

During the late fall, winter, and early spring, water stored in Lake Mendocino remains well mixed, and water released from the reservoir is well oxygenated. In addition, atmospheric conditions and tributary input help to maintain DO levels at or near saturation. However, beginning in May of most years, DO levels in the water released below the reservoir begins to decrease. This continues through the summer and early fall until the lake "turns over" and the process starts anew. The general pattern follows the development and depletion of the coldwater pool in Lake Mendocino. Lake Mendocino has one release point at the bottom of the lake where the water typically remains colder than surface temperatures until mixing of the stratified water layers occurs in late summer/early fall.

Figures 11 and 12 show Lake Mendocino water temperature data collected by the Sonoma County Water Agency in 2013, 2015, and 2016 at differing reservoir storage levels. The data demonstrates benefits of higher reservoir storages levels to maintaining cooler water temperatures into the late summer/early fall.

3.6.2 Environmental Effects

Basis of Significance

An alternative would be considered to have a significant effect on water quality if it would violate water quality standards or waste discharge requirements, result in the loss of surface or groundwater sources, or interfere with existing beneficial uses or water rights.

No Action

Under the No Action alternative, the USACE would not approve the requested major water control manual deviation. As a result, the flood control releases from Lake Mendocino would continue to be made in accordance with the existing tools and protocols available to inform USACE flood managers for managing reservoir operations at Lake Mendocino. There would be no effect on water quality in Lake Mendocino because current conditions would remain unaltered.

Proposed Action

Implementation of the Proposed Action would not would not negatively impact Lake Mendocino's water quality. The Proposed Action would include modifying the reservoir storage curve. The range of water surface elevations in Lake Mendocino would remain within reservoir's existing operational levels and no new areas would be inundated or subject to shoreline erosion as a result of the Proposed Action; therefore, no water quality impact is anticipated.

The Proposed Action would provide benefits to Lake Mendocino water quality by providing greater spring reservoir storage volumes (Jasperse, et al., 2017), improving the ability to maintain a "cold water pool" and release cooler water in late summer.

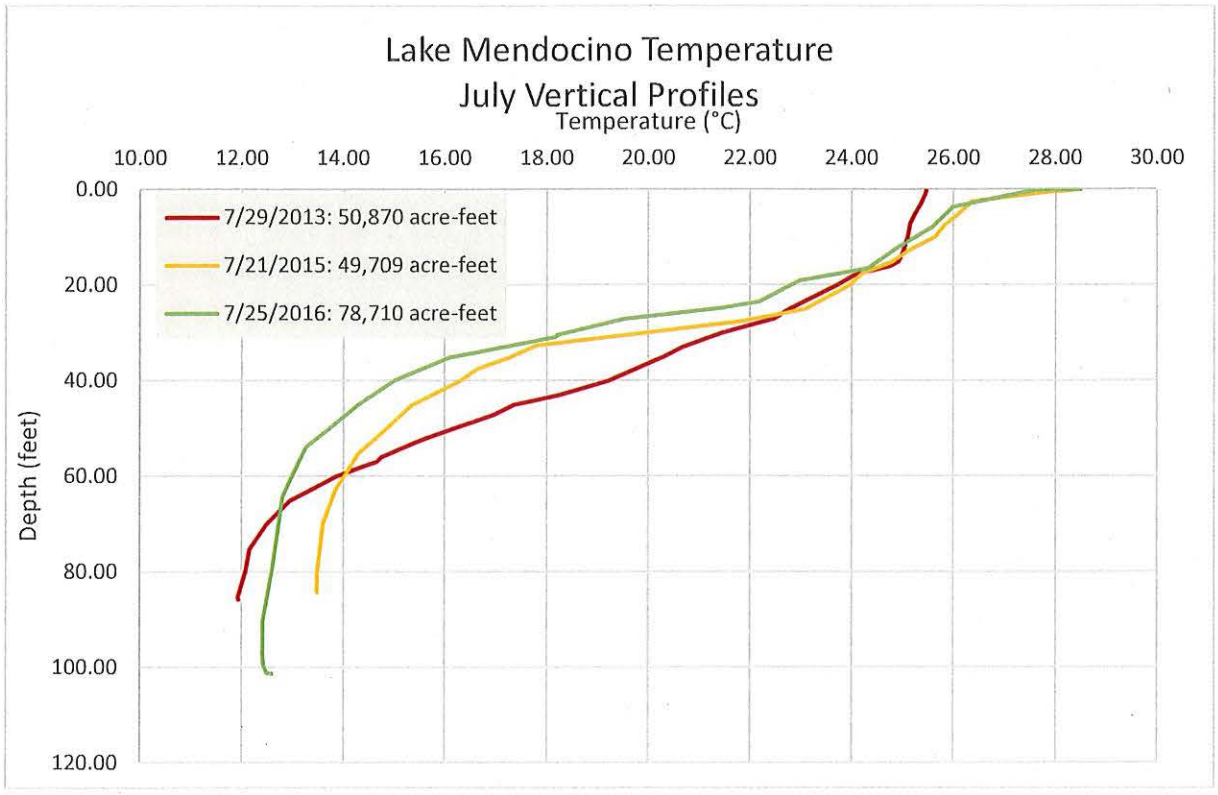


Figure 11. Lake Mendocino Water Temperatures in July 2013, 2015, and 2016.

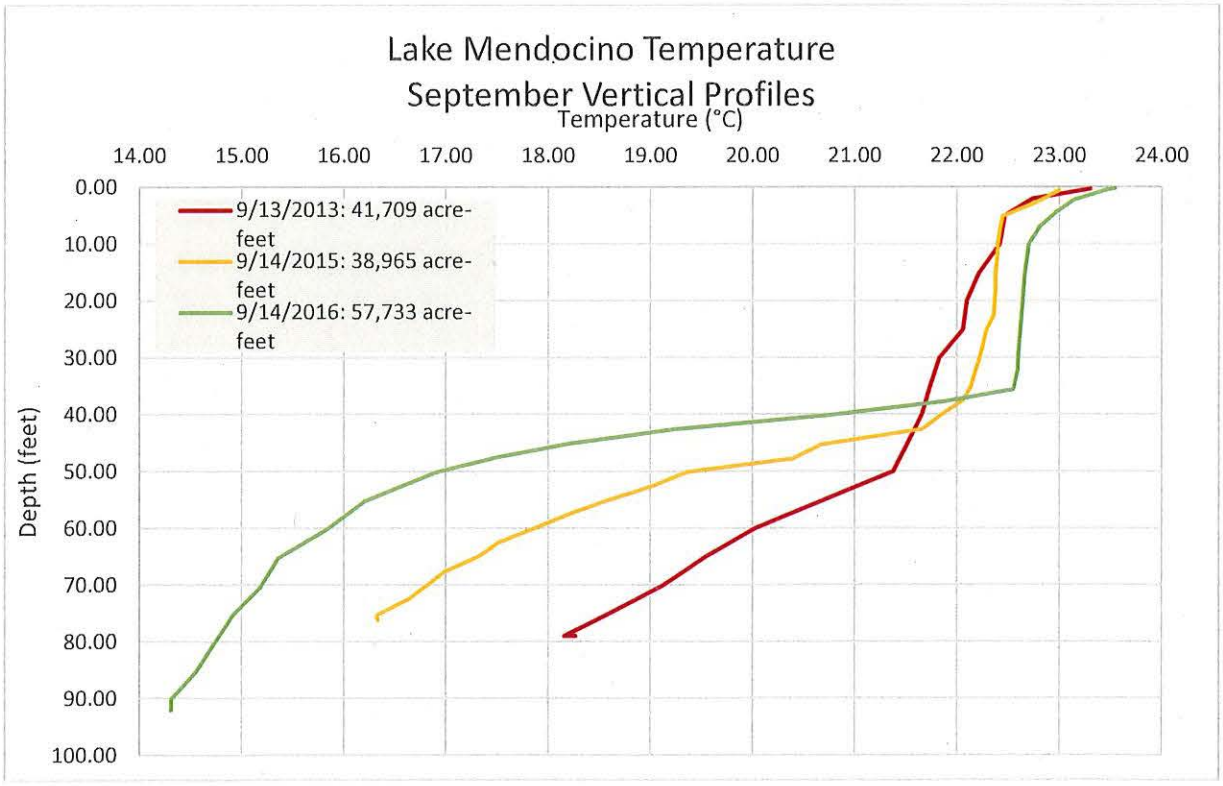


Figure 12. Lake Mendocino Water Temperatures in September 2013, 2015, and 2016.

3.6.3 Mitigation

No impact to water quality would result from implementation of the Proposed Action and no mitigation is needed or proposed.

3.7 Cumulative Effects

NEPA requires the consideration of cumulative effects of the Proposed Action combined with the effects of other projects. NEPA defines a cumulative effect as the effect on the environment that results from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (C.F.R. 40 pt. 1508.7). NEPA requires a discussion of cumulative impacts when they are significant. The discussion should reflect the severity of impacts and their likelihood of occurrence and should be guided by the standards of practicability and reasonableness. The Proposed Action would not have any significant and adverse effects on any of the discussed resources. The Proposed Action's potential to incrementally contribute to significant cumulative effects on specific resources is discussed below.

3.7.1 Past, Present, and Reasonably Foreseeable Future Projects

This section describes implemented, developed, or planned projects that may result in environmental effects similar to those of the proposed action, such that these effects, when combined, constitute cumulative impacts. Section 1.3 provides a description of the development of Coyote Valley Dam and Lake Mendocino and the USACE operation of Lake Mendocino recreational facilities. Section 3.4 describes the listing of Central California coast steelhead, Central California Coast coho salmon, and California Coastal Chinook salmon as threatened or endangered under the ESA. The Basis for Requested Deviation discussion, included in Section 1.3, describes the significant reductions of inflow to Lake Mendocino due to lower diversions from the Eel River through Pacific Gas & Electric's Potter Valley Project.

Local Projects

Fish Habitat Flows and Water Rights Project

The Water Agency is the local sponsor for Lake Mendocino (the USACE is the federal sponsor) and manages water supply releases from the conservation pool. The Water Agency is proposing the Fish Habitat Flows and Water Rights Project (Fish Flow Project). A California Environmental Quality Act (CEQA) Draft Environmental Impact Report (EIR) was released by the Water Agency for public review on August 19, 2016. The public review period concluded on March 10, 2017. The Water Agency is currently responding to comments made on the Draft EIR. The objectives of the Fish Flow Project are to manage Lake Mendocino and Lake Sonoma water supply releases to provide instream flows that will improve habitat for threatened and endangered fish species, and to update the Water Agency's existing water rights to reflect current conditions. The Fish Flow Project proposes to change minimum instream flow requirements in the Russian River downstream of Lake Mendocino and in Dry Creek (a tributary

to the Russian River and downstream of Lake Sonoma); to change the hydrologic index that determines the minimum instream flow schedules; to extend the time to 2040 to fully utilize existing water rights; and to add existing points of diversion for the Occidental Community Service District and the Town of Windsor as authorized points of diversion in the Water Agency's water right permits. The proposed changes to minimum instream flow requirements are in response to the Russian River Biological Opinion's Reasonable and Prudent Alternatives to avoid jeopardizing listed salmonids. The Water Agency would implement the proposed Fish Flow Project if the water-right modifications are made by the SWRCB.

3.7.2 Effects Analysis

In determining the past, present, and reasonably foreseeable actions with potential to contribute to cumulative effects, when combined with effects of the Proposed Action, the USACE considered other planning efforts (listed above) that would be likely to result in effects that could interact cumulatively with those from Proposed Action. Sections 3.2 to 3.6 identify potential direct and indirect environmental effects of the Proposed Action, including cultural resources, recreation, special-status species, vegetation and wildlife, and water quality. The Proposed Action would not have any significant and adverse effects on any of the discussed resources. These less than significant effects are assessed in the following analysis in terms of their potential to combine with similar environmental effects of the projects listed above, resulting in cumulative impacts. The analysis is focused on considering the potential for those impacts identified in Sections 3.2 to 3.6 to result in an incrementally significant effect.

The extent of the geographic area that may be affected with implementation of the alternatives varies depending on the resource under consideration. Therefore, for each discussion below, the past, present, and reasonably foreseeable future projects that are considered are limited to those having potential effects similar to those of the Proposed Action that could interact with impacts generated by the Proposed Action.

The Proposed Action would not have any significant adverse effects on any of the discussed resources. These resources are discussed below and the potential for the project to incrementally contribute to a significant cumulative effect to these resources.

Short-term and long-term effects

There are no temporary or minor adverse impacts associated with the Proposed Action. The Proposed Action would not have significant adverse indirect or cumulative impacts on the physical, biological, and human environment. The timing for the Proposed Action of a maximum additional storage of 11,650 acre-feet between November 1 and February 28 would not coincide with the local projects listed above. The planned major deviation would allow the USACE to have the discretion to utilize the additional information provided to inform (but not control) reservoir operations. With the reduction in PVP transfers, Lake Mendocino has become dependent on late spring storm events to adequately fill in order to meet water demands. However, late spring storm events do not reliably occur which creates a vulnerability in Lake Mendocino's water supply. The Proposed Action would help reservoir operators adapt to an increasingly variable environment.

Long-term effects of the Proposed Action would be beneficial in terms of improving water supply reliability, adapting to increasingly variable environmental conditions, and maintaining a cold-water pool in the reservoir for the fall Chinook salmon migration for a longer duration.

Resource effects

Cultural Resources

Potential for incremental effects to cultural resources would be from water inundation through the raising of the water level along the project APE. Cultural resources would be vulnerable to damage by inundation of areas not previously subject to inundation. Vegetation along the shore of Lake Mendocino has been determined by seasonal fluctuations in reservoir elevation that occur under existing operations. Because there would be no change in maximum water surface elevation, new areas of inundation are not expected and upland vegetation beyond the shoreline is not anticipated to change. No incremental effect to cultural resources is anticipated.

Recreation

The Fish Flow Project Draft EIR identified less than significant impacts to Lake Mendocino recreational facilities as a result of increased water storage during the recreational season. Many of the recreation facilities are built at or slightly above 748 feet msl and within the maximum pool of Lake Mendocino (764.8 feet msl). High water surface elevations can inundate low-lying parking lots, access roads, day use areas and campground sites. The modified storage curve included in the Proposed Action would be at 744.36 msl. If the Proposed Action and the local project were implemented concurrently, the range of water surface elevations in Lake Mendocino would remain within below the modified storage curve and no incremental effects to recreation would be anticipated.

Special-status Species

As discussed above in Section 3.4.2 and in detail in Appendix C, the Russian River Biological Opinion evaluated the USACE's flood control operations of Coyote Valley Dam/Lake Mendocino under the WCM, including the described releases from Flood Control Schedules 1, 2, and 3 used to empty the flood control pool following a storm (NMFS, 2008). The Proposed Action is consistent with the requirements of the Russian River Biological Opinion and therefore would not contribute to incremental effects to ESA-listed species.

The Proposed Action and the Fish Flow Project could benefit Lake Mendocino water storage reliability. The proposed action of a planned major deviation to store additional water above the existing guide curve for the Coyote Valley Dam Lake Mendocino WCM combined with the present, and reasonably forseeable future actions pertaining to the Fish Flow Project would maximize the conservation of the cold water pool in Lake Mendocino, which will increase the likelihood that water temperatures would remain suitably cool for rearing steelhead throughout the summer and help ensure that sufficient flow could be released to facilitate upstream migration of fall run Chinook salmon.

Vegetation and Wildlife

At Lake Mendocino, riparian and marsh habitat is generally absent from the shoreline due to managed, fluctuating water levels. The shoreline is typically barren with an upland plant

community at the high water line. Changes in water releases from Coyote Valley Dam would affect water levels in Lake Mendocino, however the maximum water level would remain unchanged. Downstream of Lake Mendocino, flows in the East Fork Russian River and mainstem Russian River would remain within the range of existing levels with extreme high winter flows and low summer flows potentially slightly moderated. The Proposed Action would not permanently remove or disturb sensitive native communities, nor would it significantly reduce the amount of native vegetation and wildlife habitat in downstream areas. No incremental effect to vegetation and wildlife is anticipated.

Water Quality

Implementation of the Proposed Action would not would not negatively impact Lake Mendocino's water quality. The range of water surface elevations in Lake Mendocino would remain within reservoir's existing operational levels and no new areas would be inundated or subject to shoreline erosion as a result of the Proposed Action; therefore, no water quality impact is anticipated.

The Proposed Action and the Fish Flow Project would provide benefits to Lake Mendocino water quality by providing greater reservoir storage reliability, improving the ability to maintain a "cold water pool" and release cooler water in late summer. No incremental significant effect to water quality is anticipated.

CHAPTER 4.0 Compliance with Environmental Laws and Regulations

- Clean Air Act of 1972, as amended, 42 U.S.C. § 7401, *et seq*. *Full Compliance*. The Proposed Action is not expected to violate any Federal air quality standards, exceed the U.S. EPA's general conformity de minimis threshold, or hinder the attainment of air quality objectives in the local air basin. The USACE has determined the Proposed Action would have no significant effects on the future air quality of the area.
- Clean Water Act of 1972, as amended, 33 U.S.C. § 1251, *et seq*. *Full Compliance*. The Proposed Action is not expected to adversely affect surface or ground water quality or deplete ground water supplies. No discharge of dredge or fill materials into navigable water or adjacent wetlands would occur under the project. The USACE has determined that the Proposed Action would have no significant effects on future water quality of the area.
- Endangered Species Act of 1973, as amended, 16 U.S.C. § 1531, *et seq*. *Full Compliance*. The USACE obtained a list from the USFWS of Federally listed and proposed species likely to occur in the project area. After reviewing the species list and conducting a desktop survey of the potential action area, the USACE determined that no listed species have the potential to be affected by the Proposed Action.

  The USACE, as the action agency, has made the determination that there would be "no effect" on any listed species under the jurisdiction of NMFS. No significant effects to Federally listed, proposed, or candidate species or critical habitat are anticipated from the Proposed Action. No potential for significant effects to Federally listed, proposed, or candidate species or critical habitat under the jurisdiction of the USFWS is anticipated. Given the presence of critical habitat and potential for presence of listed salmonid species downstream of Lake Mendocino, coordination with NMFS was conducted. A summary of the coordination is provided in Appendix C.

- Executive Order 11988, Floodplain Management. Executive Order 11988 was signed into law on May 24, 1977, requiring that Federal agencies provide leadership and take action to restore and preserve the natural and beneficial values served by floodplains. Before proposing, conducting, supporting, or allowing an action in the floodplain, each Federal agency must determine if planned activities would affect the floodplain and evaluate the potential effects of the intended action on the floodplain's functions.

  As described in the PVA (Jasperse, et al., 2017), the analyses completed for the PVA demonstrated forecast informed operation, as simulated in the studies, improved reliability of meeting water management objectives without adversely affecting flood risk management in the basin. The increased reservoir pool levels would have no adverse

effects on floodplain functions, and the Proposed Action is recommended as the most responsive option to planning objectives and requirements established by Executive Order 11988.

- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. *Full Compliance*. This Executive Order states that Federal agencies are responsible for conducting their programs, policies, and activities that substantially affect human health of the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. No relocations would occur as a result of the water control manual deviation, and no populations would be displaced as a result of approving the temporary change in operation.
- Migratory Bird Treaty Act (15 U.S.C § 701-18h). *Full Compliance*. There would be no construction activities or vegetation removal as part of the Proposed Action and therefore, no impacts to nesting migratory birds are anticipated.
- National Environmental Policy Act of 1969, as amended, 42 U.S.C. § 4321, *et seq. Full Compliance*. This EA is in compliance with this Act. Comments received during the public review period were incorporated in the EA, as appropriate, and a comments and responses appendix was prepared. The final EA will be accompanied by a FONSI.
- National Historic Preservation Act of 1966, as amended, 16 U.S.C. § 470 *et seq*. *Full Compliance*. The project is in compliance with Section 106 of the National Historic Preservation Act (36 C.F.R. pt. 800). There are no resources found in the APE and therefore no impacts to cultural resources.

CHAPTER 5.0 Coordination and Review of the Draft Environmental Assessment

The draft EA was circulated for a 30-day public review period from July 2 to 31, 2018, to federal, state, and local agencies, organizations, and individuals who have an interest in the project. Copies of the draft EA were posted on the USACE website at https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-by-Category/Projects-for-Flood-Risk-Management/Coyote-Dam/, the Water Agency's website at http://www.scwa.ca.gov/environmental-documents/ and made available for viewing at the Mendocino County Ukiah Branch Library and Sonoma County Central Library and the USACE office at Lake Mendocino and the Water Agency in Santa Rosa.

All comments received during the public review period were considered and USACE responses are included as Appendix D to this final EA.

CHAPTER 6.0 Findings

6.1 Finding #1

This EA evaluated the environmental effects of the proposed Coyote Valley Dam – Lake Mendocino Major Deviation Request. Potential adverse effects to the following resources were evaluated in detail: cultural resources, recreation, special-status species, vegetation and wildlife, and water quality.

Results of the EA and coordination with other agencies indicated that the Proposed Action does not have the potential to cause significant environmental effects.

Based on this evaluation, the Proposed Action meets the definition of a FONSI as described in 40 C.F.R. § 1508.13. A FONSI may be prepared when an action would not have a significant effect on the human environment and for which an environmental impact statement would not be prepared. Therefore, FONSI has been prepared and accompanies this EA.

CHAPTER 7.0 List of Preparers

Chris Eng
Environmental Planner, U.S. Army Corps of Engineers, San Francisco District
Report review

Jessica Martini-Lamb
Water Agency Environmental Resources Manager, Sonoma County Water Agency
Report preparation and coordination

Connie Barton
Water Agency Senior Environmental Specialist, Sonoma County Water Agency
Report preparation

Anne Crealock
Water Agency Senior Environmental Specialist, Sonoma County Water Agency
Report preparation

CHAPTER 8.0 References Cited

Barbour, M. G., Keeler-Wolf, T., & Schoenherr, A. A. (2007). *Terrestrial Vegetation of California* (3rd ed.). Berkeley: University of California Press.

Barrow, E. (2016). *An Archival Study for the Fish Habitat Flows and Water Rights Project Mendocino and Sonoma Counties, California.* Rohnert Park: Tom Origer & Associates.

Barrow, E., & Caskey, C. (2015). *A Cultural Resources Study for the Dry Creek Habitat Enhancement Project, Miles 2-6 Sonoma County, California.* Rohnert Park: Tom Origer and Associates.

Beedy, E. C., & Hamilton, W. I. (1999). *The Birds of North America.* Philadelphia: The Birds of North America, Inc.

Bulger, J. B., Scott, N. J., & Seymour, R. B. (2003). Terrestrial activity and conservation of adult California red-legged frogs (Rana aurora draytonii) in coastal forests and grasslands. *Biological Conservation*, 110:85-95.

Burridge, B. (1995). *Sonoma County Breeding Bird Altas.* Santa Rosa: Madrone Audubon Society, Inc.

California Energy Commission. (n.d.). Retrieved 12 17, 2017, from http://ecdms.energy.ca.gov/elecbyutil.aspx

California Indian Library Collections. (2015). *California Tribal Communities: California Indian Pre-contact Tribal Territories.* Retrieved from California Courts, The Judicial Branch of California: http://www.courts.ca.gov/3066.htm

California Native Plant Society. (2018). *Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39).* Retrieved January 9, 2018, from http://www.rareplants.cnps.org

CDFW. (2016a). Occurrence Report. *California Natural Diversity Database.* Sacramento: California Department of Fish and Wildlife.

CDFW. (2016b). Special Animals List. *California Natural Diversity Data Base.* Sacramento: California Department of Fish and Wildlife.

CDFW. (2018). Occurrence Report. *California Natural Diversity Database.* Sacramento: California Department of Fish and Wildlife.

City of Ukiah. (n.d.). Retrieved December 17, 2017, from http://www.cityofukiah.com/electric-utility/

City of Ukiah. (2014). *City of Ukiah Climate Action Plan.* Retrieved from http://www.cityofukiah.com/NewWeb/wp-content/uploads/2013/05/Final-Draft-Climate-Action-Plan.pdf

Cook, D. G., & Jennings, M. R. (2007). Microhabitat use of the California red-legged frog and introduced bullfrog in a seasonal marsh. *Herpetologica*, 430-440.

Cook, D. G., & Martini-Lamb, J. (2004). Distribution and habitat use of Pacific pond turtles in a summer impounded river. *Transactions of the Western Section of The Wildlife Society*, 84-89.

Cook, D. G., White, S., White, P., & White, E. (2011). Rana boylii (Foothill yellow-legged frog) upland movement. *Herpetological Review*, 325-326.

County of Mendocino. (2011). *County of Mendocino General Plan Update Draft Environmental Impact Report.*

Grandi, M. (2016, June 28). Personal Communication.

Grewell, B. (2012a). Ludwigia. *The Jepson Manual: Vascular Plants of California, 2nd.* (B. G. Baldwin, D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rossati, & D. H. Wilken, Eds.) Berkeley: University of California Press.

Grewell, B. (2012b, July 6). USDA Aquatic Weed Researcher. (K. Foster, Interviewer)

Grewell, B., Netherland, M., & Skaer Thomason, M. (2016). *Establishing Research and Management Priorities for Invasive Water Primroses (Ludwigia spp.).* Environmental Laboratory, Vicksburg, MS: ERD/EL TR-16-2, US Army Corp of Engineers Research and Development Center.

Holland, R. F. (1986). *Preliminary Descriptions of the Terrestrial Natural Communities of California.* Nongame-Heritage Program. Sacramento: State of California, The Resources Agency, Department of Fish and Game.

Holland, R. F. (1990). *California Vegetation 4th edition.* San Luis Obispo: California Polytechnic State University.

Jasperse, J., Ralph, F., Anderson, M., Brekke, L., Dillabough, M., Dettinger, M., . . . Webb, R. (2017). *Preliminary Viability Assessment of Lake Mendocino Forecast Informed Reservoir Operations. Final Report.* La Jolla, California: Steering Committee.

Jennings, M. R., & Hayes, M. P. (1988). *Habitat correlates of distribution of the California red-legged frog (Rana aurora draytonii) and the foothill yellow-legged frog (Rana boylii).Proceedings of the symposium on the management of amphibians, reptiles, and small mammals in North America, USDA* (pp. 144-158). Forest Service General Technical Report RM-166.

Jennings, M. R., & Hayes, M. P. (1990). *Status of the California red-legged frog, Rana aurora draytonii, in the Pescadero Marsh Natural Reserve.* Sacramento: California Department of Parks and Recreation.

Jennings, M. R., & Hayes, M. P. (1994). *Amphibian and reptile species of special concern in California, Final Report.* Sacramento: California Department of Fish and Game, Inland Fisheries Division.

Kroeber, A. L. (1970). *Handbook of the Indians of California.* . Berkeley: California Book Company, Ltd.

Martini-Lamb, J., & Pecharich, A. (2016). *Russian River Estuary Management Project, Marine Mammal Project Act incidental harrassment authorization, report of activities and monitoring results - January 1 to December 31, 2015.* Santa Rosa: Sonoma County Water Agency.

Martini-Lamb, J., Luna, M., & Mortenson, J. (2009). *Russian River Estuary Management Activities – Pinniped Monitoring Plan.* Santa Rosa: Sonoma County Water Agency.

National Recreation Reservation Service. (2014). *KYEN CAMPGROUND AND OAK GROVE DAY USE AREA, CA.* Retrieved June 29, 2016, from http://www.recreation.gov/camping/kyen-campground-and-oak-grove-day-use-area/r/campgroundDetails.do?contractCode=NRSO&parkId=73240

NatureService. (2016, April 26). *Dubiraphia giulianii - (Van Dyke, 1949).* Retrieved from NatureService Explorer: http://explorer.natureserve.org/servlet/NatureServe?searchName=Dubiraphia+giulianii

NMFS. (2008). *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement D.* National Marine Fisheries Service.

NMFS. (2011, March 8). Takes of marine mammals incidental to specific activities; Russian River Estuary management activities. 14924-14942. National Marine Fisheries Service: Federal Register.

NMFS. (2016, April 14). Letter to Mike Dillabough, US Army Corps of Engineers.

Poor Pocket Moss Recovery Team. (2001). *Recovery Strategy for poor pocket moss (Fissidens paupercaulus M. Howe) in British Columbia.* Victoria: B.C. Ministry of Environment.

Remsen, J. J. (1978). *Bird Species of Special Concern in California.* Sacramento: California Department of Fish and Game.

Riparian Habitat Joint Venture. (2004). *The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California.* Stinson Beach: California Partners in Flight.

Schooley, C. (2016, June 1). Supervising Park Ranger at Lake Mendocino. (J. Smith, Interviewer)

SCWA & Stewards. (2016). *Russian River Estuary Management Project Pinniped Monitoring Plan. R e v i s e d.* Stewards of the Coast and Redwoods. Santa Rosa: Sonoma County Water Agency.

Shaffer, H. B., Fellers, G. M., Voss, S. R., Olivers, J. C., & Pauly, G. B. (2004). Species boundaries, phylogeography and conservation genetics of the red-legged frog (Rana aurora/draytonii) complex. *Molecular Ecology*, 2667-2677.

Sonoma County Agricultural and Open Space District. (2016, April 21). *Sonoma County Veg Map.* Retrieved from 1942 and 2011 aerials of the Santa Rosa Plain: http://sonomavegmap.org/1942/?appid=204eaae5687f4ff9886afc66a2289877#

Stebbins, R. C. (2003). *Field Guide to Western Reptiles and Amphibians* (3rd ed.). New York: Houghton Mifflin Company.

Storer, T. I. (1925). *A synopsis of the amphibia of California.* Berkeley: University of California Press.

Thomason Skaer, M. J., Grewell, B. J., & Netherland, M. D. (2016). *Hydrologic Variation Drives Invasive Plant Spread dynamics at Three Spatial Scales in a Managed River.* Davis: USDA Agricultural Research Service, Exotic and Invasive Weed Research Unit, University of California.

TMMC. (2016, April 21). *Current Patients.* Retrieved from The Marine Mammal Center: http://www.marinemammalcenter.org/patients/current-patients-page/

U.S. Army Corps of Engineers. (2015). *Lake Mendocino.* Retrieved June 16, 2016, from http://corpslakes.usace.army.mil/visitors/projects.cfm?Id=L374645.

U.S. Census. (2016). *Population estimates, July 1, 2016, (V2016).* Retrieved from https://www.census.gov/quickfacts/fact/table/ukiahcitycalifornia/PST045216

UCCE. (n.d.). *University of California Cooperative Extension.* Retrieved from https://caseagrant.ucsd.edu/project/coho-salmon-monitoring

United States Fish and Wildlife Service. (2017). *Official Species List.* Arcata: US Fish and Wildlife Service, Arcata Fish and Wildlife Office. Retrieved December 27, 2017

USACE. (1986a, April). Coyote Valley Dam and Lake Mendocino, Russian River, California, Water Control Manual. *Appendix I to Master Water Control Manual, Russian River Basin, California.* Sacramento District: U.S. Army Corps of Engineers.

USFWS. (2002). *Recovery Plan for the California Red-legged frog (Rana aurora draytonii).* United States Fish and Wildlife Service. Portland, Oregon: U.S. Fish and Wildlife Service.

USFWS. (2010, March 17). Endangered and threatened wildlife and plants; revised designation of critical habitat for the California red-legged frog. 12816-12959. U.S. Fish and Wildlife Service.

USFWS. (2015a, April 10). Endangered and threatened wildlife and plants: 90-day findings on 10 petitions. 19259-19263. U.S. Fish and Wildlife Service.

USFWS. (2015b, September 18). Endangered and threatened wildlife and plants; 90-day findings for 25 petitions. 56423-56432. U.S. Fish and Wildlife Service.

USFWS. (2015c). Endangered and threatened wildlife and plants; 90-day findings for 31 petitions. 37568-37579. U.S. Fish and Wildlife Service.

USFWS. (2016a, April 26). Giuliani's Dubiraphian riffle beetle (Dubiraphia giulianii). U.S. Fish and Wildlife Service. Retrieved from ECOS Environmental Conservation Online: http://ecos.fws.gov/tess_public/profile/speciesProfile?spcode=I0C8#status

USGS. (2016). *USGS North American Breeding Bird Atlas.* (United States Geological Survey) Retrieved June 27, 2016, from Sonoma County: http://www.pwrc.usgs.gov/bba/index.cfm?fa=explore.ProjectHome&BBA_ID=CA-Son2011

USGS. (2018). *USGS North American Breeding Bird Atlas.* (United States Geological Survey) Retrieved June 27, 2016, from Sonoma County: http://www.pwrc.usgs.gov/bba/index.cfm?fa=explore.ProjectHome&BBA_ID=CA-Son2011

Warner, R. a. (1984). *California Riparian Systems, Ecology, Conservation, and Productive Management.* Berkeley and Los Angeles: University of California Press.

Zeiner, D. C., Laudenslayer, W. J., Mayer, K. E., & White, M. (1988). *California's Wildlife. Vol. I: Amphibians and Reptiles.* Sacramento: California Department of Fish and Game.

Zeiner, D. C., Laudenslayer, W. J., Mayer, K. E., & White, M. (1990a). *California's Wildlife. Vol. II: Birds.* Sacramento: California Department of Fish and Game.

Zeiner, D. C., Laudenslayer, W. J., Mayer, K. E., & White, M. (1990b). *California's Wildlife. Vol. III: Mammals.* Sacramento: California Department of Fish and Game.

Appendices

Appendix A

Table A-1. Coyote Valley Dam - Lake Mendocino Maximum Daily Deviation Limit Values (acre-feet)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	111,000	80,050	80,050	80,050	80,050	80,050	93,127	106,205	111,000	111,000	111,000	111,000
2	111,000	80,050	80,050	80,050	80,050	80,050	93,563	106,641	111,000	111,000	111,000	111,000
3	109,968	80,050	80,050	80,050	80,050	80,486	93,999	107,077	111,000	111,000	111,000	111,000
4	108,937	80,050	80,050	80,050	80,050	80,922	94,435	107,513	111,000	111,000	111,000	111,000
5	107,905	80,050	80,050	80,050	80,050	81,358	94,871	107,949	111,000	111,000	111,000	111,000
6	106,873	80,050	80,050	80,050	80,050	81,794	95,307	108,385	111,000	111,000	111,000	111,000
7	105,842	80,050	80,050	80,050	80,050	82,230	95,743	108,820	111,000	111,000	111,000	111,000
8	104,810	80,050	80,050	80,050	80,050	82,665	96,179	109,256	111,000	111,000	111,000	111,000
9	103,778	80,050	80,050	80,050	80,050	83,101	96,615	109,692	111,000	111,000	111,000	111,000
10	102,747	80,050	80,050	80,050	80,050	83,537	97,051	110,128	111,000	111,000	111,000	111,000
11	101,715	80,050	80,050	80,050	80,050	83,973	97,487	110,564	111,000	111,000	111,000	111,000
12	100,683	80,050	80,050	80,050	80,050	84,409	97,923	111,000	111,000	111,000	111,000	111,000
13	99,652	80,050	80,050	80,050	80,050	84,845	98,358	111,000	111,000	111,000	111,000	111,000
14	98,620	80,050	80,050	80,050	80,050	85,281	98,794	111,000	111,000	111,000	111,000	111,000
15	97,588	80,050	80,050	80,050	80,050	85,717	99,230	111,000	111,000	111,000	111,000	111,000
16	96,557	80,050	80,050	80,050	80,050	86,153	99,666	111,000	111,000	111,000	111,000	111,000
17	95,525	80,050	80,050	80,050	80,050	86,589	100,102	111,000	111,000	111,000	111,000	111,000
18	94,493	80,050	80,050	80,050	80,050	87,025	100,538	111,000	111,000	111,000	111,000	111,000
19	93,462	80,050	80,050	80,050	80,050	87,461	100,974	111,000	111,000	111,000	111,000	111,000
20	92,430	80,050	80,050	80,050	80,050	87,896	101,410	111,000	111,000	111,000	111,000	111,000
21	91,398	80,050	80,050	80,050	80,050	88,332	101,846	111,000	111,000	111,000	111,000	111,000
22	90,367	80,050	80,050	80,050	80,050	88,768	102,282	111,000	111,000	111,000	111,000	111,000
23	89,335	80,050	80,050	80,050	80,050	89,204	102,718	111,000	111,000	111,000	111,000	111,000
24	88,303	80,050	80,050	80,050	80,050	89,640	103,154	111,000	111,000	111,000	111,000	111,000
25	87,272	80,050	80,050	80,050	80,050	90,076	103,589	111,000	111,000	111,000	111,000	111,000
26	86,240	80,050	80,050	80,050	80,050	90,512	104,025	111,000	111,000	111,000	111,000	111,000
27	85,208	80,050	80,050	80,050	80,050	90,948	104,461	111,000	111,000	111,000	111,000	111,000
28	84,177	80,050	80,050	80,050	80,050	91,384	104,897	111,000	111,000	111,000	111,000	111,000
29	83,145	80,050	80,050	80,050		91,820	105,333	111,000	111,000	111,000	111,000	111,000
30	82,113	80,050	80,050	80,050		92,256	105,769	111,000	111,000	111,000	111,000	111,000
31	81,082		80,050	80,050		92,692		111,000		111,000	111,000	

Appendix B

U.S. Fish & Wildlife Service

ECOS

ECOS / Species Reports / Species By County Report

Species By County Report

The following report contains Species that are known to or are believed to occur in this county. Species with range unrefined past the state level are now excluded from this report. If you are looking for the Section 7 range (for Section 7 Consultations), please visit the IPaC application.

County: Sonoma, California

CSV

Need to contact a FWS field office about a species? Follow this link to find your local FWS Office.

Group	Name	Population	Status	Lead Office	Recovery Plan	Recovery Plan Action Status	Recovery Plan Stage
Amphibians	California tiger Salamander (*Ambystoma californiense*)	U.S.A. (CA - Sonoma County)	Endangered	Sacramento Fish and Wildlife Office	Recovery Plan for the Santa Rosa Plain	Implementation Progress	Final
Amphibians	California red-legged frog (*Rana draytonii*)	Wherever found	Threatened	Sacramento Fish and Wildlife Office	Recovery Plan for the California Red-legged Frog (Rana aurora draytonii)	Implementation Progress	Final
Birds	Short-tailed albatross (*Phoebastria (=Diomedea) albatrus*)	Wherever found	Endangered	Anchorage Fish and Wildlife Field Office	Short-Tailed Albatross (Phoebastria albatrus) Final Recovery Plan	Implementation Progress	Final
Birds	California least tern (*Sterna antillarum browni*)	Wherever found	Endangered	Carlsbad Fish and Wildlife Office	Revised California Least Tern Recovery Plan	Implementation Progress	Final Revision 1
Birds	California clapper rail (*Rallus longirostris obsoletus*)	Wherever found	Endangered	San Francisco Bay-Delta Fish and Wildlife	Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California	Implementation Progress	Final
Birds	Yellow-billed Cuckoo (*Coccyzus americanus*)	Western U.S. DPS	Threatened	Sacramento Fish and Wildlife Office			

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Mendocino County, California

Local office

Arcata Fish And Wildlife Office

(707) 822-7201
(707) 822-8411

1655 Heindon Road
Arcata, CA 95521-4573

Appendix B-3. Special-status Species with Potential to Occur in the Vicinity of the Coyote Valley Dam – Lake Mendocino Major Deviation Request Project.

Scientific Name Common Name	Legal Status[1]	Habitat	Nearest Documented Occurrence[2] and Potential Presence in Project Area
Flowering plants			
Lasthenia burkei Burke's goldfields	FE	Annual herb. Flowering period April-June. Meadows and seeps (mesic), vernal pools	Moderate. Reported in depressions within grassland west of Coyote Valley Dam.
Lasthenia conjugens Contra Costa goldfields	FE	Annual herb. Flowering period March-June. Cismontane woodland, playas (alkaline),valley and foothill grassland, and vernal pools	Unlikely. No reports from the project area. No critical habitat designation within the project area.
Trifolium amoenum Greene Showy Indian clover	FE	Annual flower. Flowering April-June. Coastal bluff scrub and valley and foothill grasslands.	Unlikely. No reports from the project area. No critical habitat designation within the project area.
Fishes			
Oncorhynchus tshawytscha Chinook salmon, California Coastal ESU	FT	Associated with migratory and rearing habitat in Estuary and mainstem Russian River. Spawning habitat in mainstem Russian River and larger tributaries.	Not present. Coyote Valley Dam (Lake Mendocino) is a terminal dam that prevents riverine fish from migrating to the lake. Chinook salmon inhabiting the Russian River are considered "fall-run." Chinook salmon occupy the upper and lower Russian River seasonally from the estuary upstream into the West Fork Russian River. Chinook salmon have been documented to spawn in selected tributaries to the Russian River, but usage of tributaries appears to be limited. Chinook salmon spawn in the Russian River, primarily upstream of Healdsburg.
O. kisutch Coho salmon, central California coast ESU	FE	Associated with migratory habitat in Dry Creek and the Russian River. Spawning and rearing occurs in select streams with cold water, deep pools, and submerged large woody cover.	Not present. Coyote Valley Dam (Lake Mendocino) is a terminal dam that prevents riverine fish from migrating to the lake Coho salmon primarily occupy a small set of streams in the Russian River watershed, primarily from the Maacama Creek sub watershed downstream. Coho salmon do not spawn or rear in the mainstem Russian River, but use it seasonally as a migration corridor.

Scientific Name **Common Name**	**Legal Status[1]**	**Habitat**	**Nearest Documented Occurrence[2] and Potential Presence in Project Area**
O. mykiss Steelhead, central California coast DPS	FT	Associated with migratory and rearing habitat in Dry Creek and mainstem Russian River. Utilize Upper Russian River and tributaries for spawning.	Not present. Coyote Valley Dam (Lake Mendocino) is a terminal dam that prevents riverine fish from migrating to the lake Steelhead in the Russian River are considered "winter run." Steelhead are the most widely distributed salmonid in the Russian River watershed, inhabiting most permanent tributary streams. Steelhead also utilize the mainstem Russian River as spawning and rearing habitat. Spawning habitat overlaps with Chinook salmon (mainly above Cloverdale). Limited steelhead rearing occurs in the mainstem Russian River with peak abundances recorded in the Canyon Reach located between Cloverdale and Hopland and near Ukiah (Cook 2003).
Amphibians			
Rana draytonii California red-legged frog	FT	Creeks, ponds, and marshes with permanent or temporary water bordered by emergent or riparian vegetation. Requires 4-6 months of permanent water for larval development.	Moderate. Reported occurrences from tributaries and ponds in the lower Russian River area. No reports from the Russian River mainstem or Lake Mendocino.
Birds			
Brachyramphus marmoratus Marbled murrelet	FT	This coastal seabird from the North Pacific nests in old-growth coniferous forests. Foraging occurs in open ocean for small fish.	Unlikely. No old-growth forest or Critical Habitat within the Project area. Unlikely to nest or forage in the project area.
Charadrius alexandrinus nivosus Western snowy plover	FT	This species breeds on sandy coasts and brackish inland lakes, and is uncommon in freshwater.	Unlikely. No critical habitat designation along the Sonoma Coast. No suitable nesting habitat and unlikely to occur in the project area.
Coccyzus americanus Yellow-Billed Cuckoo	FT	Requires patches of at least 25 acres of dense riparian forest with a canopy cover of at least 50 percent in both the understory and overstory; nests typically in mature willows.	Low. A single cuckoo was observed in Bodega Head in 2014, located 9 miles south of the Russian River. The project area is located outside the normal breeding range for this species; may occur as an infrequent transient.

Scientific Name **Common Name**	**Legal Status**[1]	**Habitat**	**Nearest Documented Occurrence**[2] **and Potential Presence in Project Area**
Falco peregrines Peregrine falcon (nesting)	Delisted	Ranges throughout most of California. Forages in grassland, rangeland, and other open habitats. Nests on cliffs, escarpments, and rock outcrops.	Moderate. Nests near Lake Sonoma, but unlikely to nest in project area. May infrequently hunt over the project area.
Haliaeetus leucocephalus Bald eagle	Delisted	Occurs throughout California, except desert regions. May be resident in northern California. Forages primarily in large water bodies. Nests in large trees.	High. Known to nest and forage at Lake Sonoma. Observed foraging along the Russian River in Alexander Valley, Lake Mendocino, and Russian River estuary. Likely a winter visitor to the Russian River and Lake Mendocino.
Pelecanus occidentalis californicus California brown pelican	Delisted	Found in marine and estuarine waters along the California coast. Forages for anchovy and other fish in open water. Rarely found in freshwater. Nests on Channel Island in Southern California.	Unlikely. Commonly observed foraging and resting in the Russian River estuary. No nesting habitat in the project area.
Strix occidentalis caurina Northern spotted owl	FT	Old growth forests or mixed stands of old growth and mature trees. High, multistory canopy dominated by big trees, many trees w/cavities or broken tops, woody debris, and space under canopy.	Low. No reports from the project area, but likely uses mature forests in the vicinity. May be infrequent visitor to the project area.
Agelaius tricolor Tricolored blackbird	FC	Colonial nests located over or near freshwater, especially in emergent wetland. Usually nests in dense cattails or tules. Also, may nest in thickets of willow, blackberry, wild rose, and tall herbs.	Moderate. Reported from a pond near Hopland in 1990. Potential marginal habitat along Russian River project area. Unlikely at Lake Mendocino due to limited marsh vegetation.

[1]Legal Status:
FE: Listed as endangered under the ESA.
FT: Listed as threatened under the ESA.
FC: A candidate for listing under the ESA.
FSC: USFWS Species of Concern.
MMA: protected by the federal Marine Mammal Act
[2]Source of Nearest Documented Occurrence: (CDFW, 2018); Bill Cox, pers. comm. (California freshwater shrimp), David Cook, pers. comm. (western pond turtle, California red-legged frog, foothill yellow-legged frog); breeding bird atlas (USGS, 2018). Sonoma County Water Agency Russian River Estuary Management Project Pinniped Monitoring Plan, monitoring database.

Sources:
CDFW. (Jan 9, 2018). Occurrence Report. *California Natural Diversity Database*. Sacramento: California Department of Fish and Wildlife.

SCWA & Stewards. (2016). *Russian River Estuary Management Project Pinniped Monitoring Plan. Revised.* Stewards of the Coast and Redwoods. Santa Rosa: Sonoma County Water Agency.
USFWS. (Dec 27, 2017). Official Species List. Sacramento: U.S. Fish and Wildlife Service, Arcata Field Office.

Appendix C

Summary of Coordination with National Marine Fisheries Service regarding Lake Mendocino Forecast Informed Reservoir Operations (FIRO) Steering Committee Major Deviation Request from the Coyote Valley Dam – Lake Mendocino Water Control Manual

Members of the Lake Mendocino Forecast Informed Reservoir Operations (FIRO) Steering Committee requested a major planned deviation to the Coyote Valley Dam – Lake Mendocino Water Control Manual (WCM) (USACE, 1986a). In preparation of the Steering Committee's request, staff from U.S. Army Corps of Engineers (USACE), National Marine Fisheries Service (NMFS), and the Sonoma County Water Agency (Water Agency) met to coordinate preparation of the request and ensure avoidance of potential effects to listed salmonid species downstream of Lake Mendocino in the Russian River. A meeting took place on October 5, 2017, to discuss the proposed major deviation request. Participants included staff from the USACE (Patrick Sing, Rachal Marizon, Christopher Eng), NMFS (Bob Coey, Josh Fuller, Tom Daugherty), and the Water Agency (Don Seymour, Chris Delaney, Jessica Martini-Lamb). Participants discussed the background and purpose of the major deviation request, reviewed the Russian River Biological Opinion evaluation of Coyote Valley Dam/Lake Mendocino flood operations and corresponding requirements under the Incidental Take Statement issued by NMFS, and reviewed model results of flood control operations that consider the FIRO decision support model (DSM) in decision making. The model results reviewed simply demonstrated use of the DSM, as the USACE would have several existing tools to utilize, therefore the results were not predictive. However, flood control operations would continue to be implemented in light of the Incidental Take Statement issued by NMFS under the Russian River Biological Opinion (see below).

Background on Major Deviation Request and Lake Mendocino Operations

The FIRO effort is led by a steering committee formed in 2014 consisting of representatives from the USACE, Water Agency, Scripps Institute of Oceanography (Scripps), National Oceanic and Atmospheric Administration (NOAA), U.S. Geologic Survey (USGS), U.S. Bureau of Reclamation and the California Department of Water Resources. NOAA staff that participate in the FIRO effort include technical staff from the NOAA Restoration Center and National Marine Fisheries Service, National Weather Service (NWS), California Nevada River Forecast Center (CNRFC), and NOAA Earth System Research Laboratory (ESRL).

The purpose of the major deviation request is to improve water supply reliability and environmental conditions while maintaining flood management capacity of Lake Mendocino. Lake Mendocino has experienced significantly reduced water supply reliability over the past several years due to a significant reduction of trans-basin transfers from the Eel River. The goal of FIRO is to help restore some of the diminished water supply reliability without reducing the existing flood protection capacity of Lake Mendocino. Potential ecosystems benefits include increased flexibility in reservoir storage that can improve the timing and volume of releases to improve water quality conditions and provide reliable flow for endangered salmonids. For example, greater spring reservoir storage volumes lead to wetter "year type" classifications

which result in higher minimum in-stream flow requirements during the summer period (Jasperse et al., 2017).

Operation of Lake Mendocino is governed by WCM rules that allocate storage to flood management and conservation (water supply) purposes in a seasonally varying manner and specify how water may be stored in the flood pool and conservation pool. The WCM rules allocate the 122,400 acre-feet (AF) of storage in Lake Mendocino to storage for flood management and storage for conservation purposes. The seasonally varying flood storage pool varies from a maximum of 54,000 AF in the winter rainy season to 11,400 AF in the drier summer season. Rules require the flood pool to be empty except briefly in periods of greatest inflow. Then flood runoff is stored and released at a rate that avoids or minimizes exceedance of downstream flow targets at Hopland (a key stream gage downstream from the reservoir), Healdsburg, Guerneville, and elsewhere (Jasperse et al., 2017).

The conservation storage, used for water management objectives and meeting minimum instream flow requirements, is filled as water is available to do so. However, operation following the WCM rules strictly does not permit storage in the flood pool for conservation purposes. These rules apply even if inflow forecasts do not indicate an immediate need for empty space to manage flood water (Jasperse et al., 2017).

Members of the FIRO Steering Committee are requesting USACE approval of a planned major deviation to store additional water above the existing guide curve for the Coyote Valley Dam Lake Mendocino WCM. If approved, this would result in a maximum additional storage of 11,650 acre-feet between November 1 and February 28. The requested major deviation to the WCM represents the next phase of the FIRO viability assessment. The *Preliminary Viability Assessment of Lake Mendocino Forecast Informed Reservoir Operations* (Jasperse et al., 2017) provides an initial evaluation of the viability of FIRO as a concept.

It is important to emphasize that if water levels are within the storage space allowed by this deviation, the USACE will have the discretion to utilize the additional information provided to inform (but not control) reservoir operations. USACE reservoir operators will retain full operational control and authority, with the DSM providing an additional tool for operators.

Coyote Valley Dam/Lake Mendocino Flood Operations and Russian River Biological Opinion

The NMFS issued its *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River Watershed* (Russian River Biological Opinion) on September 24, 2008 (NMFS, 2008). The Russian River Biological Opinion is a culmination of more than a decade of consultation among the USACE, the Water Agency, the Mendocino County Water Conservation and Flood Control Improvement District (MCDWFCID), and NMFS regarding the impacts of the USACE and Water Agency flood control and water supply activities on three fish species listed under the federal Endangered Species Act: Central California coast steelhead (*Oncorhynchus mykiss*); Central California Coast coho salmon (*O.*

kisutch); and California Coastal Chinook salmon (*O. tshawytscha*). Coho salmon are also listed under the California Endangered Species Act (CESA).

The Russian River Biological Opinion includes an Incidental Take Statement with a term of 15 years that authorizes the USACE and the Water Agency to conduct specified lawful operations and make specified changes in operations as a result of the Russian River Biological Opinion so long as the terms and conditions of the Incidental Take Statement are met, even if incidental take may result from such operations. The Incidental Take Statement includes Reasonable and Prudent Measures (RPMs) that the USACE and Water Agency must implement to minimize and monitor the impacts of the incidental take of listed species due to implementation of the Water Agency and USACE's water supply and flood control activities and Reasonable and Prudent Alternatives (RPAs) (NMFS, 2008).

The Russian River Biological Opinion evaluated the USACE's flood control operations of Coyote Valley Dam/Lake Mendocino under the WCM, including the described releases from Flood Control Schedules 1, 2, and 3 used to empty the flood control pool following a storm (NMFS, 2008). The Biological Opinion identified Coyote Valley Dam flood operations as including both water storage and water releases. Water storage reduces the magnitude of flood peaks, while flood releases have the potential to scour the streambed, erode banks, increase turbidity, and may create dewatered channel conditions during ramp downs of flood releases. NMFS' analysis found potential adverse impacts to Chinook salmon spawning habitat from scour and bank erosion, and potential impacts to Chinook and steelhead spawning and rearing habitat from the release of turbid waters. Ramping of flows was found to create intermittent flow and/or dewatered conditions in rearing habitat used by both Chinook salmon and steelhead fry and juveniles during the winter and spring. Pre-flood and periodic inspections during the fall (September) are likely to cause dewatered channel conditions, adversely affecting rearing habitat for juvenile steelhead.

The Russian River Biological Opinion includes an Incidental Take Statement. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the Endangered Species Act, taking that is incidental to and not the purpose of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of an incidental take statement. Incidental take measures related to flood control activities at Coyote Valley Dam and Lake Mendocino are identified beginning on page 304 of the Russian River Biological Opinion (NMFS, 2008).

Discussion of Preliminary Viability Assessment Results

As mentioned above, the DSM simulated results reviewed simply demonstrated use of the DSM, as the USACE would have several existing tools to utilize, therefore the results were not predictive. However, flood control operations would continue to be implemented in light of the Incidental Take Statement issued by NMFS under the Russian River Biological Opinion (see below).

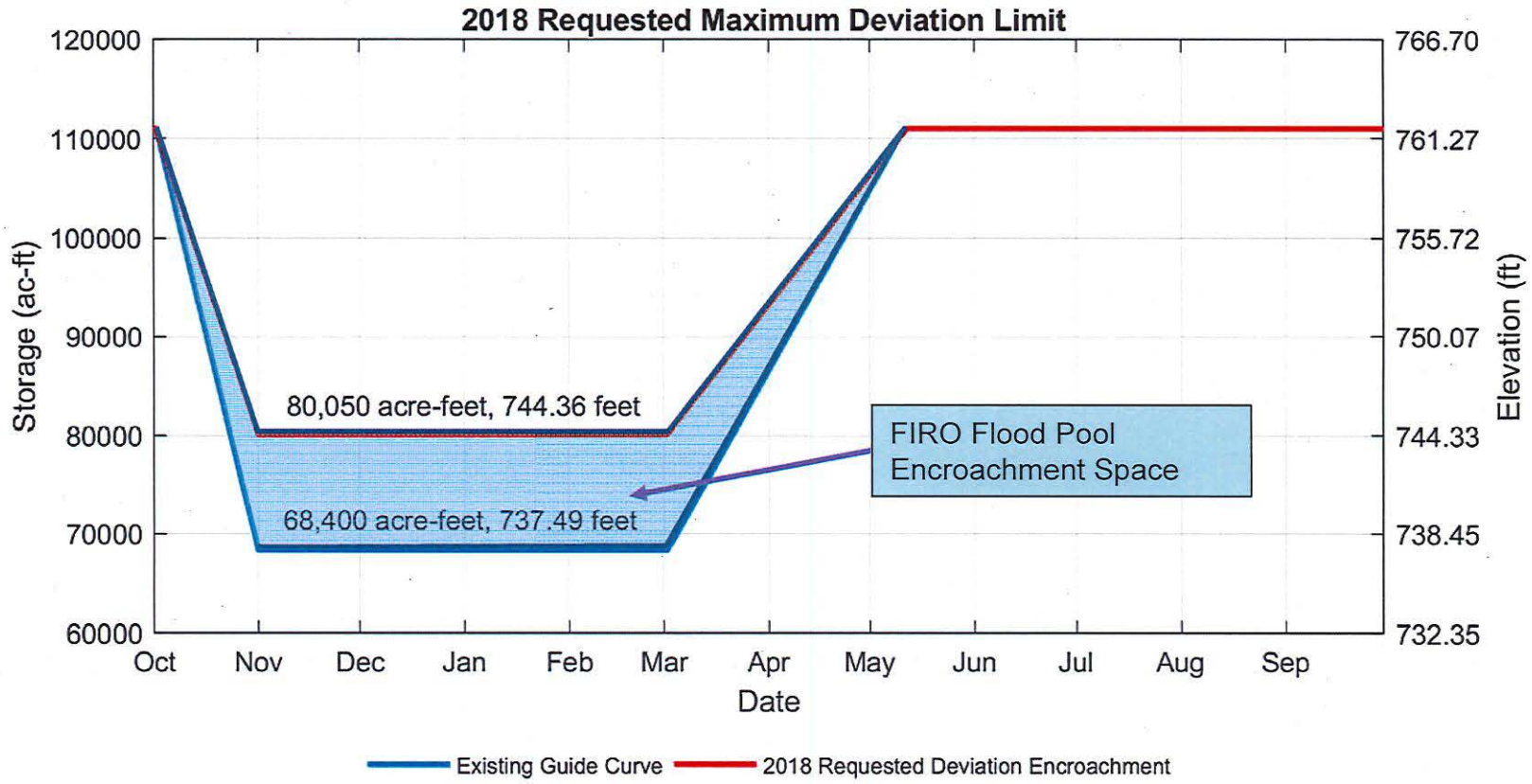
The 2018 major deviation request, if approved by the USACE, would increase storage of the conservation pool by 11,650 acre-feet; increasing the storage guide curve from November 1 to February 28 from 68,400 acre-feet to 80,050 acre-feet (Figure C-1). From October 1 to 31, it would decrease the conservation pool by 1,030 acre-feet per day if storage is above 80,050 acre-feet. From March 1 to May 10 it would increase the conservation pool by 436 acre-feet per day. The proposed modification to the storage guide curve is within the flood control pool schedules (see Figure 2 in EA) identified in the WCM and evaluated in the Russian River Biological Opinion. The DSM would consider if reservoir storage is below the modified storage guide curve, then apply the decision support tool. If reservoir storage is above the modified storage guide curve, then regular operations would be assumed.

The DSM operates to comply with existing operations, including Decision 1610 minimum instream flow requirements and the Russian River Biological Opinion, flood release requirements including that there would be no flood releases when Russian River flows at Hopland are greater than 8,000 cubic feet per second, and in compliance with new ramping schedule criteria identified by the NMFS and USACE (NMFS, 2016).[3] Modeling of historical hydrology (1985-2010) demonstrated that the tool helps support improvements in reliable reservoir storage (Figure C-2) and in meeting recommended Russian River Biological Opinion juvenile steelhead rearing minimum instream flows (Figure C-3). Model results demonstrate that these improvements would not increase flood or spill risk (Figures C-4 and C-5). These model results are also presented in the *Preliminary Viability Assessment of Lake Mendocino Forecast Informed Reservoir Operations* (Jasperse et al., 2017).

Meeting participants discussed these results and reviewed more specific model results related to Lake Mendocino storage, flood releases and downstream flows at Hopland from 1986 to 2010 during the salmonid migration and spawning season (September 1 to April 30). These results were evaluated to ensure that the major deviation request and DSM, if used by the USACE for flood control operations, would not increase potential flood control operations impacts to salmonid migration and spawning. Figures C-6 (1986) and C-7 (1997) demonstrate implementation of the FIRO decision tool in years of atmospheric rivers with associated flood events, with a storm event preceded by a flood control release in advance of the storm and reduced flows after the storm event in comparison to existing operations. One issue raised by NMFS staff was related to model results for 1996 (Figure C-8) when the DSM shows a fall flood release to maintain storage levels below the modified storage curve. NMFS requests an advanced opportunity to provide technical assistance to the USACE the timing of such fall releases in order to determine the appropriate release strategy for spawning and migrating salmonids. The USACE will provide notifications of proposed release changes electronically on the internet and by electronic mail to NMFS and will continue to make these notifications during implementation of the major deviation request.

[3] Development of the new ramping schedule criteria was in response to the Russian River Biological Opinion Reasonable and Prudent Measure 3 to minimize and avoid adverse impacts to listed salmonids.

2018 Major Deviation Request



1. November 1 – February 28: Increase storage of the conservation pool by 11,650 acre-feet (80,050 acre-feet)
2. October 1 – 31: Decrease conservation pool by 1,030 acre-feet/day if storage is above 80,050 acre-feet
3. March 1 – May 10: Increase conservation pool by 436 acre-feet/day
4. Request USACE to incorporate the Decision Support Model (DSM) developed by the Water Agency as part of the tools and protocols USACE currently uses to manage reservoir operations at Lake Mendocino

Figure C-1.

Results: 1985-2010 Historical Simulation End of Water Year Storage

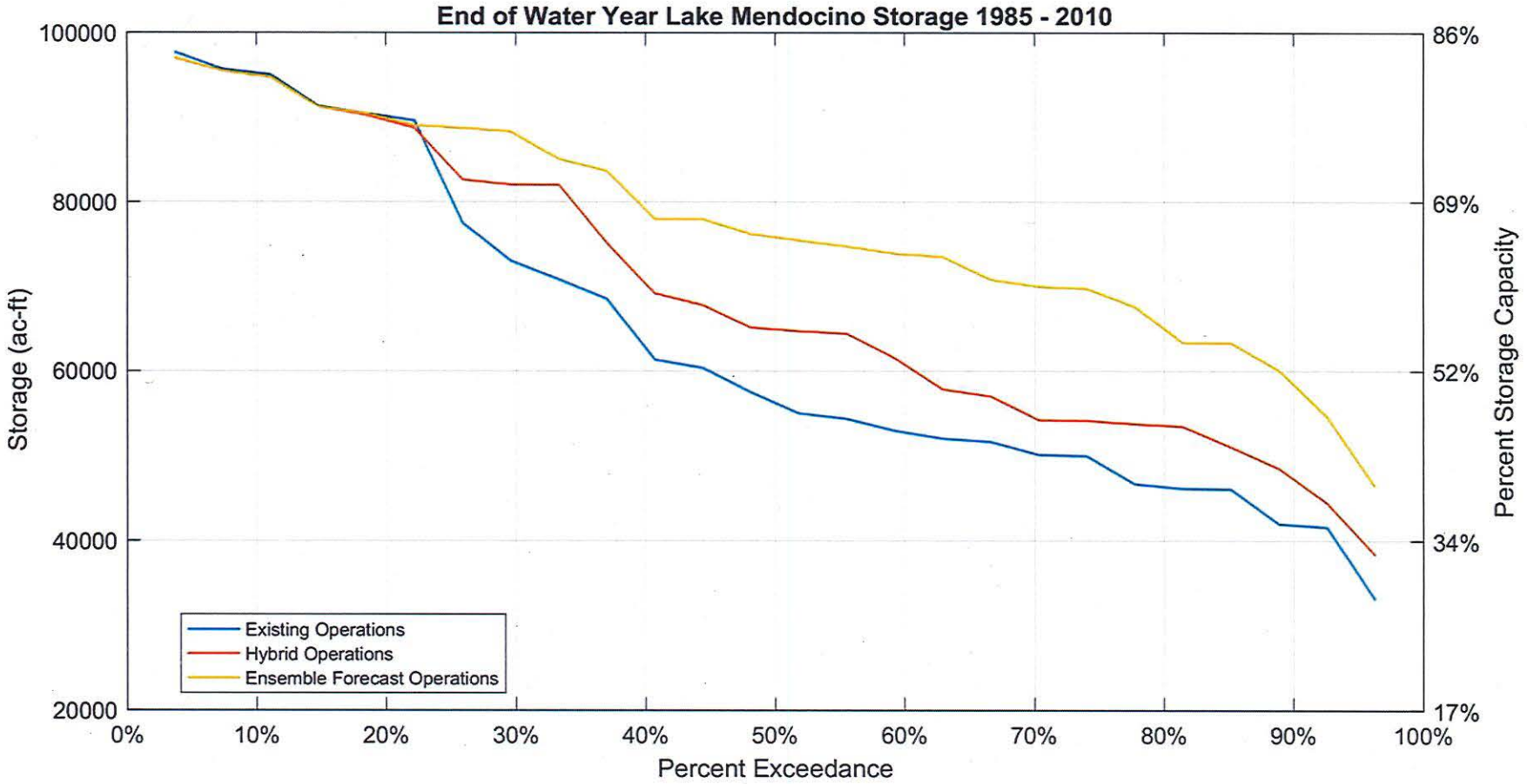


Figure C-2

Results: 1985-2010 Historical Simulation Improved Habitat Conditions

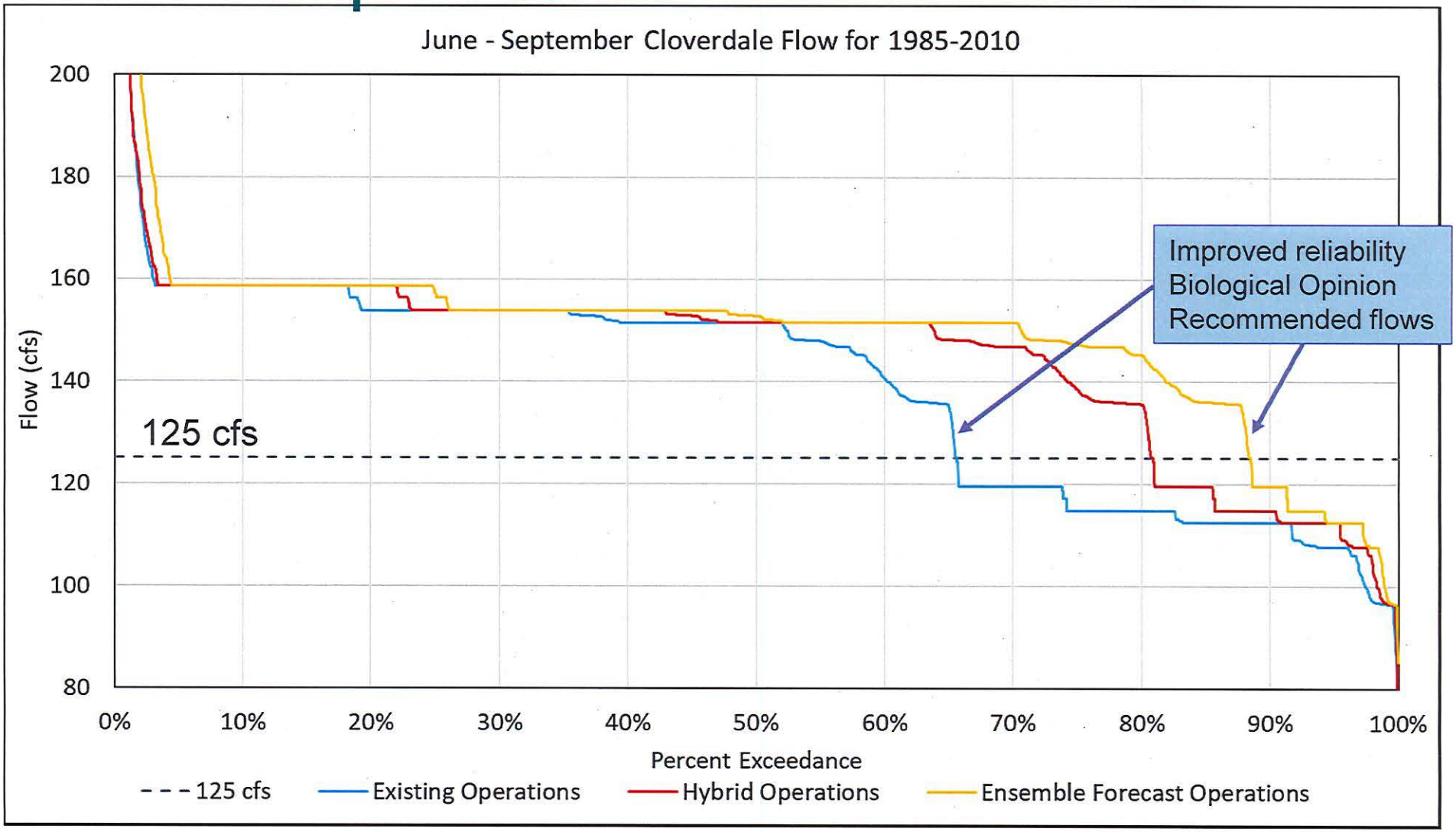


Figure C-3

Results: 1985-2010 Historical Simulation Hopland Flows > 8,000 cfs

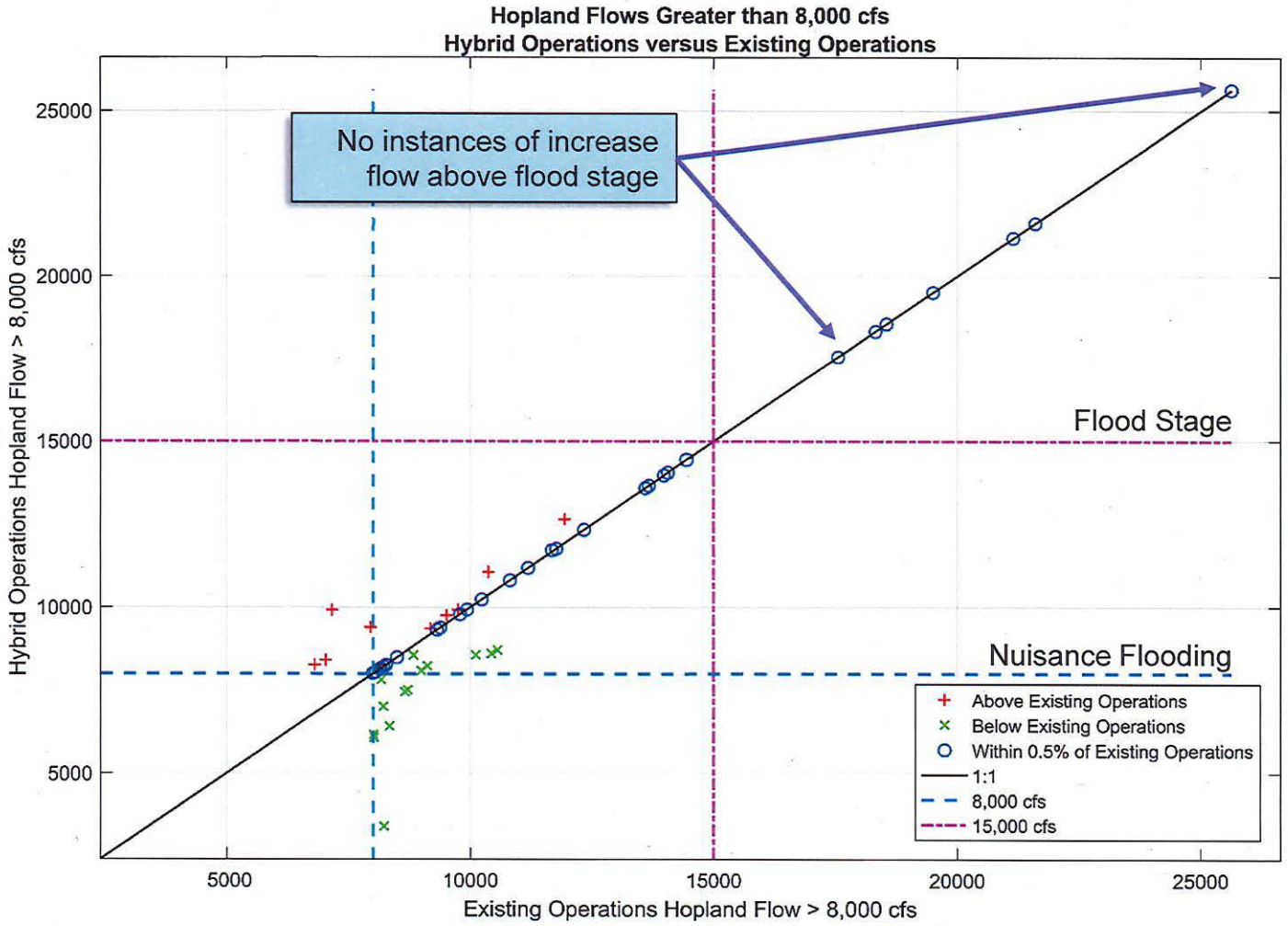
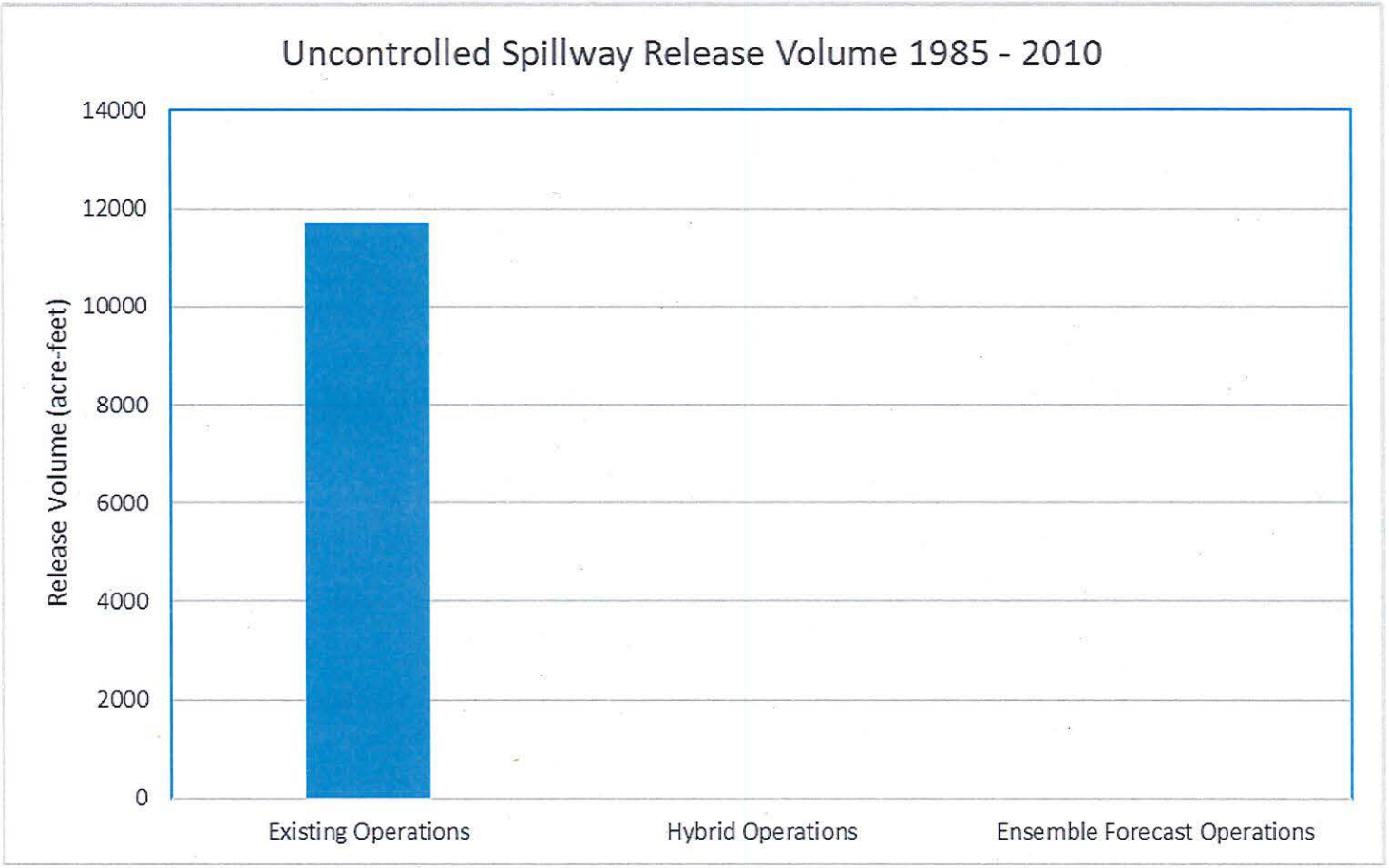


Figure C-4

Results: 1985-2010 Historical Simulation Uncontrolled Spillway Releases



- FIRO - No simulated uncontrolled spillway releases

Figure C-5

1986 Spawning and Migration Season

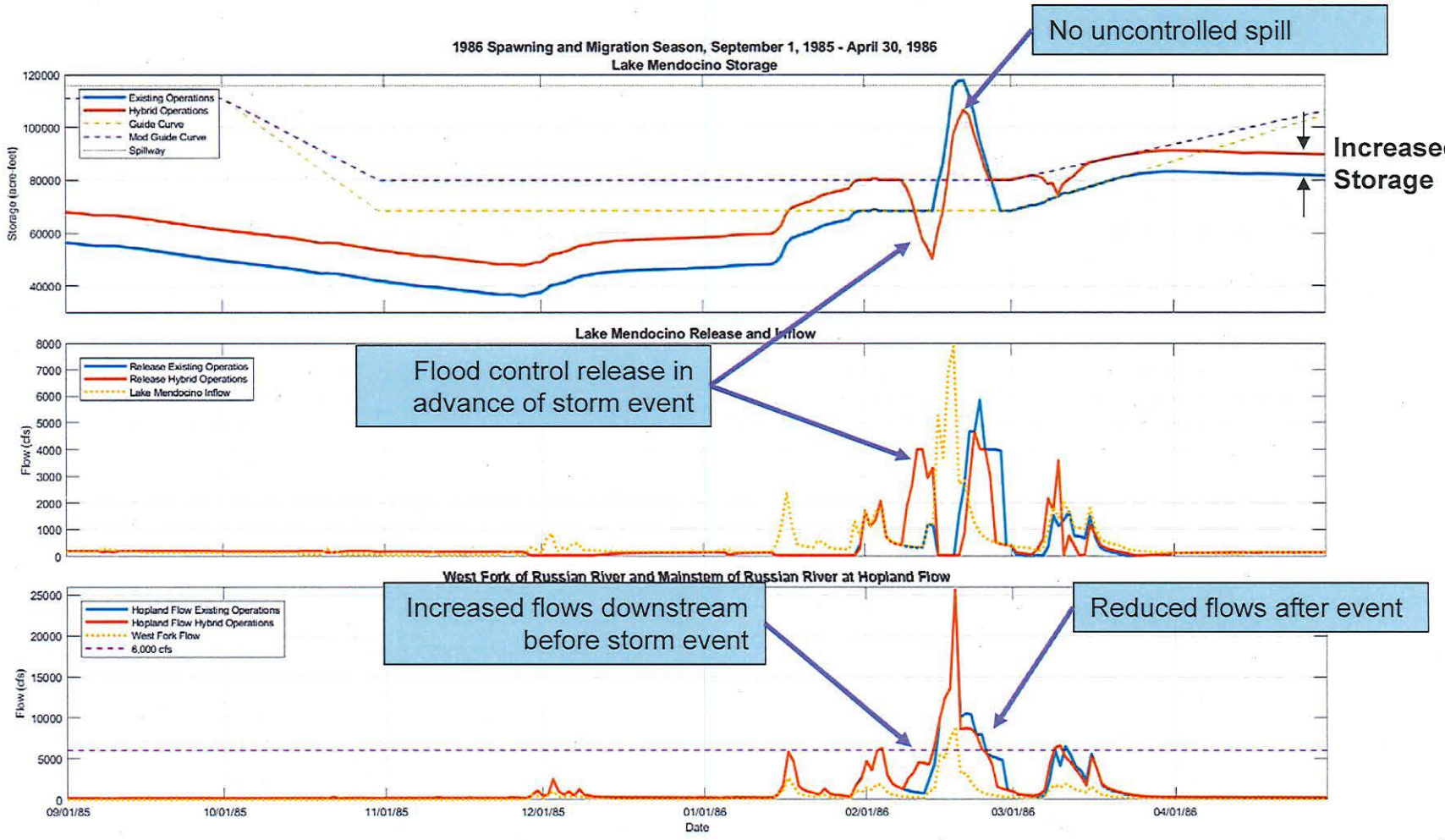


Figure C-6.

1997 Spawning and Migration Season

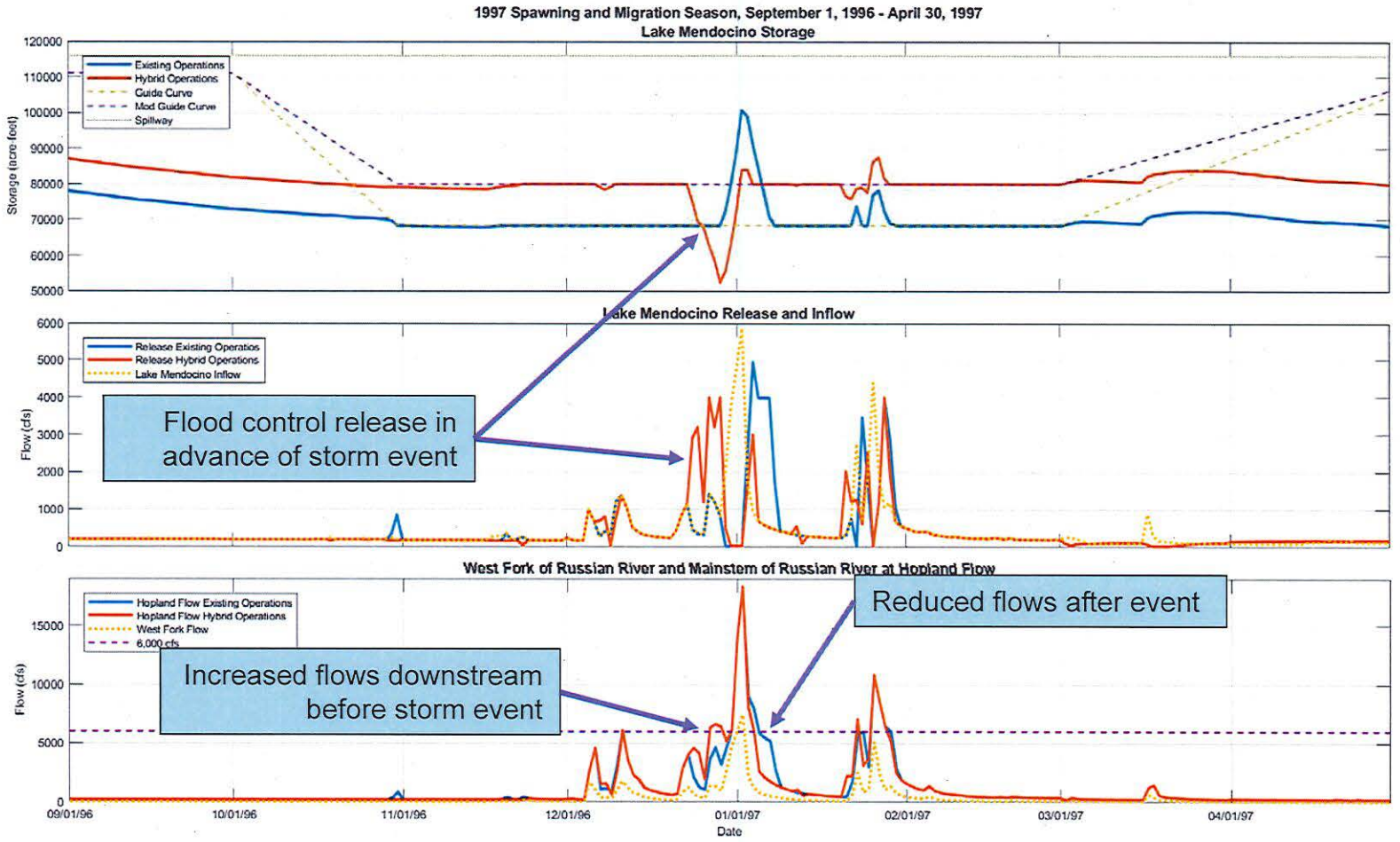


Figure C-7.

1996 Spawning and Migration Season

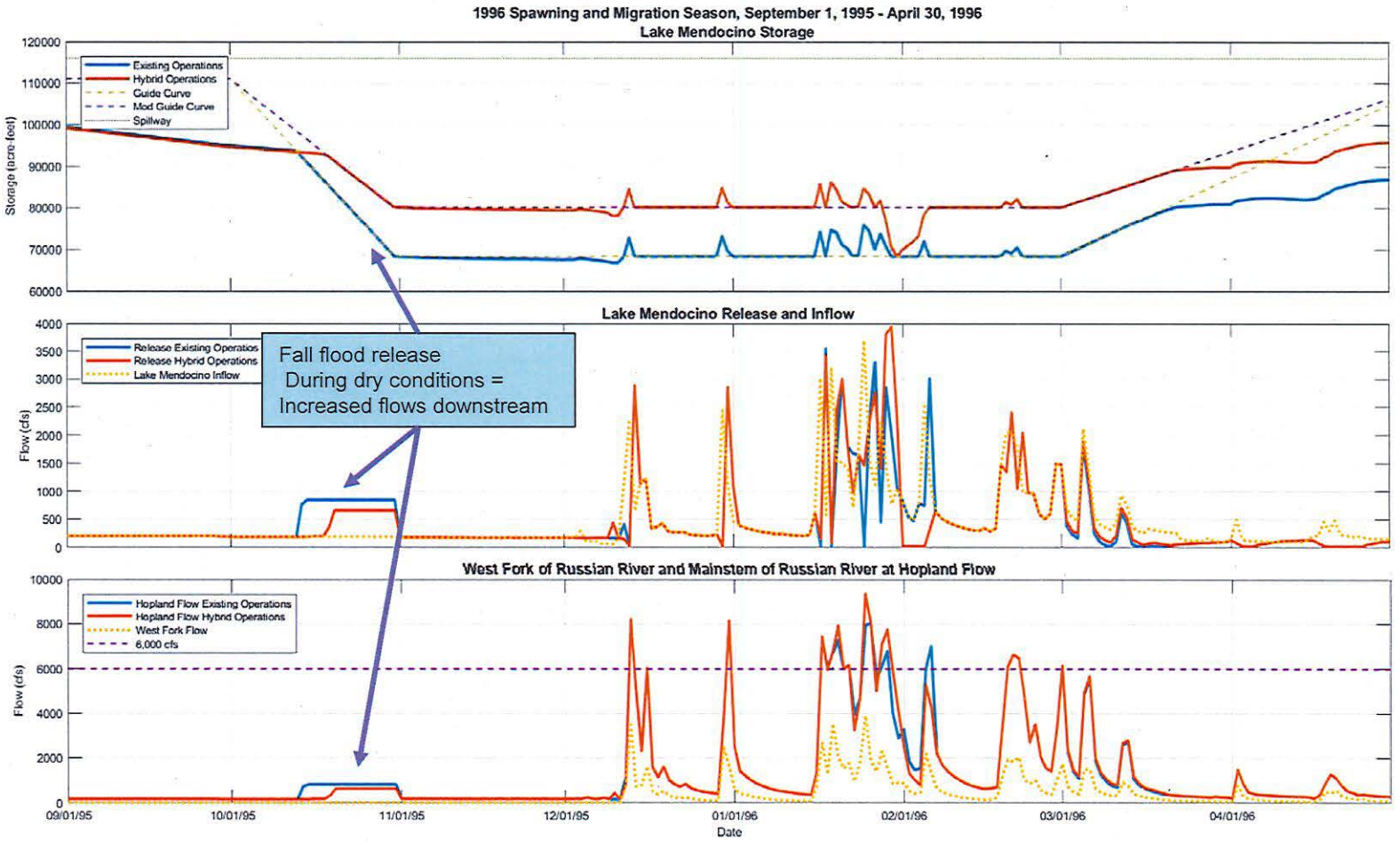


Figure C-8

References

Jasperse, J., Ralph, F., Anderson, M., Brekke, L., Dillabough, M., Dettinger, M., . . . Webb, R. (2017). *Preliminary Viability Assessment of Lake Mendocino Forecast Informed Reservoir Operations. Final Report.* La Jolla, California: Steering Committee.

NMFS. (2008). *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement D.* National Marine Fisheries Service.

NMFS. (2016, April 14). Letter to Mike Dillabough, US Army Corps of Engineers.

USACE. (1986a, April). Coyote Valley Dam and Lake Mendocino, Russian River, California, Water Control Manual. *Appendix I to Master Water Control Manual, Russian River Basin, California.* Sacramento District: U.S. Army Corps of Engineers.

Appendix D

Responses to Public Comments Received on Major Planned Deviation to the Coyote Valley Dam-Lake Mendocino Water Control Manual Draft Environmental Assessment

A. Comments submitted by text from Mr. Mike Dillabough (see dates below).

1. Submitted July 20, 2018, page 20 under Proposed Action, second paragraph. Disagree that the statement "additional water storage" would actually cause cultural damage. Within the normal summer conservation pool there are no cultural resources. Since the winter pool plus deviation amount is less there can be no cultural impacts.

2. Submitted July 27, 2018, page 38 under Local Projects, first sentence, "water agency is the local sponsor" is not quite a true statement. Under the federal eyes the project has two sponsors. Overall the EA looks great.

B. Response to Comments:

Comment 1 USACE Response: The draft Environmental Assessment concurs with this statement. The Area of Potential Effect, which is a narrow strip of Lake Mendocino's shoreline between the reservoir's gross pool level of 734 feet and the proposed increased level of 744.36 feet mean sea level (msl), do not contain sites that are potentially eligible for listing in the National Register of Historic Places within the APE and therefore, no impact to cultural resources is anticipated from the project.

Comment 2 USACE Response: The Water Agency typically identifies itself as the local sponsor of Lake Mendocino. The Environmental Assessment was revised on page 38 under Local Projects to identify the USACE as the federal sponsor of Lake Mendocino.