Biological Assessment on the Continued Long-term Operations of the Central Valley Project and the State Water Project

U.S. Department of the Interior

Bureau of Reclamation

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Mission Statement

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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List of Abbreviations/Acronyms

°F	degrees Fahrenheit
°C	degrees Celsius
1995 Bay-Delta Plan	San Francisco Bay/Sacramento-San Joaquin Delta Estuary
8500 Banks	Banks Pumping Plant
ACID	Anderson-Cottonwood Irrigation District
af	acre-feet
af/yr	acre-feet per year
AFRP	Anadromous Fish Restoration Program
ALPI	aleutian low pressure index
ANN	Artificial Neural Network
ARG	American River Group
ASIP	Action Specific Implementation Plan
Authority	San Luis and Delta Mendota Water Authority
B2IT	CVPIA Section 3406 (b)(2) Implementation Team
BA	biological assessment
Banks	Banks Pumping Plant
BDCP	Bay Delta Conservation Plan
BO	biological opinions
BR	breached
BY	brood year
CA	California Aqueduct
Cal EPA	California Environmental Protection Agency
CALFED	CALFED Bay-Delta Program
CalSim II	California Simulation computer model
CAMP	Comprehensive Assessment and Monitoring Program
CCC	Contra Costa Canal

CCF	Clifton Court Forebay
CCWD	Contra Costa Water District
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFC	California Fish Commission
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHO	Constant Head Orifice
City	City of Sacramento
cm	centimeters
CMARP	Comprehensive Monitoring Assessment and Research Program
COA	Coordinated Operation Agreement
Conjunctive Use Agreements	Principles of Agreement for Proposed Conjunctive Use Agreements
Corps	U.S. Army Corps of Engineers
cpm	catch per minute
CPUE	catch per unit effort
CRR	Cohort Replacement Rate
CRWQ CB-NCR	California Regional Water Quality Control Board-North Coast Region
CVOO	Bureau of Reclamation's Central Valley Operations Office
CVP	Central Valley Project
CVPA	Central Valley Project Act
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
CWT	coded-wire-tag
D-1485	SWRCB Decision 1485
DAT	CVPIA Section 3406 (b)(2) Data Assessment Team

DBEEP	Delta-Bay Enhanced Enforcement Program
DCC	Delta Cross Channel
Delta	Sacramento-San Joaquin Delta
DFG	California Department of Fish and Game
DMC	Delta-Mendota Canal
DO	dissolved oxygen
DPS	Distinct Population Segment
DSM2	Delta Simulation Model 2
DSDT	delta smelt decision tree
DW	dewatered (at some point throughout the year)
DWR	California Department of Water Resources
E/I	export/inflow
EBMUD	East Bay Municipal Utility District
EC	electroconductivity
EFH	essential fish habitat
E/I	Export/Inflow Ratio
EID	El Dorado Irrigation District
EIR	Environmental Impact Report
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ESA	(Federal) Endangered Species Act
ESU	Evolutionarily Significant Unit
EWA	Environmental Water Account
EWAT	Environmental Water Account Team
FB	flashboards removed during winter

FERC	Federal Energy Regulatory Commission
Fisheries Agreement	Principles of Agreement for Proposed Lower Yuba River Fisheries Agreement
FL	Fork length
FLD	fish ladder
FMWT	Fall Midwater Trawl Survey
FPA	Federal Power Act
FRH	Feather River Hatchery
FRWA	Freeport Regional Water Authority
FRWP	Freeport Regional Water Project
ft/s	foot/feet per second
FWS	U.S. Fish and Wildlife Service
GCID	Glenn-Colusa Irrigation District
GIS	geographic information system
GLM	Generalized Linear Models
GORT	Gate Operations Review Team
GS	Georgiana Slough
GSI	Genetic Stock Identification
HFC	high-flow channel
HGMP	Hatchery Genetics Management Plan
HORB	Head of Old River Barrier
IEP	Interagency Ecological Program
ID	Irrigation District
IFIM	Instream Flow Incremental Methodology
IHN	Infectious Hematopoietic Necrosis
Interior	U.S. Department of the Interior
IOS	Interactive Object-Oriented Salmon Simulation
IPO	Interim Plan of Operation

IWOFF	Integrated Water Operations Fisheries Forum
Jones	C.W. “Bill” Jones Pumping Plant. Formerly known as Tracy Pumping Plant
JPE	Juvenile Production Estimate
JPOD	joint point of diversion
KCWA	Kern County Water Agency
KFE	Kern Fan Element
km	kilometer
LFC	low-flow channel
LOD	Level of Development
LP	linear programming
LWD	large woody debris
M&I	municipal and industrial
maf	million acre-feet
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MAs	Management Agencies (FWS, NOAA Fisheries, and DFG for EWA)
mg/L	milligrams per liter
mgd	millions of gallons per day
MIB	methylisoborneol
MIDS	Morrow Island Distribution System
MILP	mixed integer linear programming
MLR	multiple linear regression
mm	millimeters
mmhos/cm	millimhos per centimeter
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mS/cm	milliSiemens per centimeter

msl	mean sea level
NBA	North Bay Aquaduct
NCCPA	Natural Community Conservation Planning Act
NCWA	Northern California Water Association
NDO	Net Delta Outflow
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NMIPO	New Melones Interim Plan of Operation
NMFS	National Marine Fisheries Service
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries (also know as National Marine Fisheries Service [NMFS])
NOD	North of Delta
NRC	National Research Council
OCAP	Operations Criteria and Plan
OFF	Operations and Fishery Forum
OID	Oakdale Irrigation District
ONCC	Oregon/Northern California Coast
Ops Group	CALFED Operations Coordination Group
PAs	Project Agencies (DWR and Reclamation)
PCBs	Polychlorinated biphenyls
PCWA	Olacer County Water Agency
PEIS	Programmatic Environmental Impact Statement
PFMC	Pacific Fishery Management Council
PG&E	Pacific Gas and Electric
PHABSIM	Physical Habitat Simulation
PIT	passive integrated transponder
POD	Pelagic Organic Decline
POP	Persistent organic pollutants

ppm	parts per million
ppt	parts per trillion
Project	CVP and SWP (as in CVP and SWP water rights)
PSL	Pre-screen loss
psu	Practical Salinity Units
RBDD	Red Bluff Diversion Dam
Reclamation	U.S. Bureau of Reclamation
RM	River Marker (similar to mile marker)
RMIS	Regional Mark Information System
ROD	Record of Decision
RPA	reasonable and prudent alternative
RRDS	Roaring River Distribution System
RST	rotary screw (fish) trap
RWQCB	Regional Water Quality Control Board
SA	Settlement Agreement
SAFCA	Sacramento Area Flood Control Agency
Salmod model	A computer model that simulates the dynamics of freshwater salmonid populations
SCDD	Spring Creek Debris Dam
SCE	Southern California Edison
SCWA	Sacramento County Water Agency
SDFF	South Delta Fish Facility Forum
SDIP	South Delta Improvement Project
SDP	Station Development Plan
SDTB	South Delta Temporary Barriers
SJRA	San Joaquin River Agreement
SJRTC	San Joaquin River Technical Committee
SJRWR	San Joaquin River water rights

SL	sloped dam
SMPA	Suisun Marsh Preservation Agreement
SMSCG	Suisun Marsh Salinity Control Gates
SMWC	Sutter Mutual Water Company
SOD	South of Delta
SOD	Safety of Dams
SONCC	Southern Oregon/Northern California Coast
SPME	Solid Phase Micro-extraction
SRCD	Suisun Resource Conservation District
SRPP	Spring-run Chinook Salmon Protection Plan
SRTTG	Sacramento River Temperature Task Group
SRWQM	Sacramento River Water Quality Management
SSJID	South San Joaquin Irrigation District
SWP	State Water Project
SVWMP	Sacramento Valley Water Management Program (Phase 8)
SWRCB	(California) State Water Resources Control Board
SWRI	Surface Water Resources, Inc.
T&E	Threatened and Endangered
taf	thousand acre-feet
TAO	Thermalito Afterbay Outlet
TCCA	Tehama-Colusa Canal Authority
TCD	temperature control device
TDS	total dissolved solids
TFCF	Tracy Fish Collection Facility
TFFIP	Tracy Fish Facility Improvement Program
TFPL	Trust for Public Lands
TNS	Townet Survey

TU	temperature units
U.S.C.	United States Code
UN	unscreened diversion
USFC	U.S. Commission of Fish and Fisheries
USGS	U.S. Geological Survey
USRFRHAC	Upper Sacramento River Fisheries and Riparian Habitat Advisory Council
VAMP	Vernalis Adaptive Management Plan
VSP	Viable Salmonid Population
Water Purchase Agreement	Principles of Agreement for Proposed Long-term Transfer Agreement
WDSC	(Metropolitan) Water District of Southern California
Western	Western Area Power Administration
Westlands	Westlands Water District
WOMT	Water Operations Management Team
Working Group	Delta Smelt Working Group
WQCP	Water Quality Control Plan
WRESL	Water Resources Engineering Simulation Language
WTP	Water Treatment Plant
WUA	weighted usable (spawning) area
WY	water year
YCWA	Yuba County Water Agency
YOY	young-of-the-year

Preface

The Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) propose to operate the Central Valley Project (CVP) and State Water Project (SWP) to divert, store, re-divert, and convey CVP and SWP (Project) water consistent with applicable law and contractual obligations. These operations are summarized in this biological assessment (BA) and described in more detail in Chapter 2.

This BA is intended to provide a thorough analysis of the continued long-term operations of the CVP and SWP and the effects of those operations on listed species and designated Critical Habitat. The document is divided into chapters. Chapter 1 outlines the statutory, regulatory and other parameters that influence Project operations. Chapter 2 is the complete project description. Chapters 3 and 4 address basic biology, life history, and baseline of Central Valley steelhead and factors that may influence their distribution and abundance. Chapters 5 and 6 address basic biology, life history, and baseline of winter-run Chinook and Coho salmon and factors that may influence their distribution and abundance. Chapter 7 addresses basic biology, life history, and baseline of delta smelt and factors that may influence their distribution and abundance. Chapter 8 addresses basic biology, life history, and baseline of green sturgeon and factors that may influence their distribution and abundance. Chapter 9 articulates the assumptions made in the modeling used in the effects analysis. Chapters 10 through 13 are the effects analyses. Chapter 14 addresses effects of Project operations on southern Killer Whales. Chapter 15 is the summary of the effects analyses and effects determinations. Chapter 16 addresses Essential Fish Habitat. Chapter 17 addresses technical assistance for longfin smelt. Chapter 18 is a discussion of ongoing actions to improve habitat and lessen Project impacts.

The CVP and the SWP are two major inter-basin water storage and delivery systems within California that divert and re-divert water from the southern portion of the Sacramento-San Joaquin Delta (Delta). Both CVP and SWP include major reservoirs upstream of the Delta, and transport water via natural watercourses and canal systems to areas south and west of the Delta. The CVP also includes facilities and operations on the Stanislaus and San Joaquin Rivers. The major facilities on these rivers are New Melones and Friant Dams, respectively.

The projects are permitted by the California State Water Resources Control Board (SWRCB) to store water during wet periods, divert water that is surplus to the Delta, and re-divert Project water that has been stored in upstream reservoirs. Both projects operate pursuant to water right permits and licenses issued by the SWRCB to appropriate water by diverting to storage or by directly diverting to use and re-diverting releases from storage later in the year. As conditions of their water right permits and licenses, the SWRCB requires the CVP and SWP to meet specific water quality, quantity, and operational criteria within the Delta and on various project-controlled rivers. Reclamation and DWR closely coordinate the CVP and SWP operations, respectively, to meet these conditions.

The project description for this BA includes the ongoing operations of the CVP and SWP and potential future actions that are foreseeable to occur within the period covered by the project description. Inclusion of future activities in the project description does not constitute agency approval of those actions. Any future actions will be required to comply with all applicable laws, including those regarding agency decision making, before those actions are approved or implemented. The Biological Opinions (BOs) issued by the United States Fish and Wildlife

Service (FWS) and National Marine Fisheries Service (NMFS) in compliance with the Federal Endangered Species Act (ESA) as a result of this Section 7 consultation will be considered in the decision making process on future actions as the BOs will analyze the effects of those potential actions on listed species.

The proposed action in this consultation includes activities undertaken by DWR in operating the SWP. As such, DWR will also consult with the California Department of Fish and Game (DFG), as may be appropriate, to address applicable requirements of the California Endangered Species Act (CESA). This BA will serve to describe the proposed SWP activities to be consulted under CESA.

The listed species and designated Critical Habitat to be analyzed in this document have been derived from species lists provided by FWS and NMFS. The species analyzed in this document under the jurisdiction of FWS are delta smelt. The species analyzed in this document under the jurisdiction of NMFS are: winter-run Chinook salmon, spring-run Chinook salmon, Coho salmon, Central Valley steelhead, green sturgeon, and southern Killer Whales. Supplemental information regarding longfin smelt is also provided.

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