DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO, CA 95814-2922

Planning Division

TO ALL INTERESTED PARTIES:

Following the requirements of the National Environmental Policy Act, a draft Supplemental Environmental Assessment No. 5 (SEA) for the Sacramento and Stockton Deep Water Ship Channels (DWSCs) Maintenance Dredging Operations and Bank Protection Project in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties has been prepared and is now available for public review and comment at:

Port of Stockton
2201 West Washington Street, Stockton, CA 95202

City of West Sacramento City Hall
1110 West Capitol Avenue, 3rd Floor, West Sacramento, CA 95691

Cesar Chavez Central Library
605 North El Dorado Street, Stockton, CA 95202

Arthur F. Turner Community Library
1212 Merkley Avenue, West Sacramento, CA 95691

Margaret K. Troke Branch Library
502 W. Benjamin Holt Dr., Stockton, CA 95207

Sacramento Central Library
828 I Street, Sacramento, CA 95814

or online at:
https://www.spk.usace.army.mil/Media/USACE-Project-Public-Notices/
or
https://www.cityofwestsacramento.org/government/departments/city-manager-s-office/port-of-west-sacramento

Operations and maintenance actions for the Stockton DWSC are authorized by the Rivers and Harbors Act of October 27, 1965 (Public Law 89-298, 89th Congress, 1st Session). Operations and maintenance actions for the Sacramento DWSC are authorized by the Rivers and Harbors Act of July 24, 1946 (Public Law 525, 79th Congress, 2nd Session). The SEA evaluates the environmental effects associated with the addition of elements to current dredging operations and maintenance in both the Stockton and Sacramento DWSCs, including the use of mechanical dredging on both channels, the creation of nine

dredged material placement sites, and a two-week extension of the existing work windows in each channel.

The public review period for the draft SEA begins May 5, 2023 and will end on June 5, 2023. All comments received on the draft document will be considered and incorporated into the final SEA, as appropriate. Please submit any comments to: U.S. Army Corps of Engineers, Sacramento District (CESPK-PD), Attn: Sacramento and Stockton DWSC, 1325 J Street, Sacramento, CA 95814, or via email to SPK-PAO@usace.army.mil.

Sincerely,

HARPER.MARSHALL.KEVIN.1536114358

Digitally signed by HARPER.MARSHALL.KEVIN.1536114358
Date: 2023.05.04 11:33:24 -07'00'

Kevin Harper
Chief, Environmental Resources Branch

DRAFT

Supplemental Environmental Assessment No. 5

Sacramento and Stockton Deep Water Ship Channels Maintenance Dredging Operations and Bank Protection Project

Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties, California

US Army Corps of Engineers®

Sacramento District

South Pacific Division

April 2023

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

Environmental Resources Branch

FINDING OF NO SIGNIFICANT IMPACT
Supplemental Environmental Assessment No. 5
Sacramento and Stockton Deep Water Ship Channels
Maintenance Dredging Operations and Bank Protection Projects, California

The U.S. Army Corps of Engineers (USACE) has prepared a Supplemental Environmental Assessment (EA) in accordance with the National Environmental Policy Act of 1969, as amended. The Sacramento and Stockton Deep Water Ship Channels (DWSCs) Maintenance Dredging Operations and Bank Protection Projects were authorized by the River and Harbor Act of July 24, 1946 and the River and Harbor Act of October 27, 1965. The Projects allow for USACE to maintain adequate depths for the commercial shipping traffic in the navigation channels.

The enclosed Supplemental EA supplements the Sacramento River Deep Water Ship Channel, California Feasibility Report/Environmental Impact Statement (EIS) for Navigation and Related Purposes, dated July 1980 and the San Francisco Bay to Stockton, California (John F. Baldwin and Stockton Ship Channels), Avon to Stockton EIS, dated September 1980.

The Projects are located in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties, California. The enclosed Supplemental EA evaluates the No-Action Alternative and the Proposed Action. The No-Action Alternative assumes that operations and maintenance (O&M) dredging and associated activities would continue with no change to current operations. The Proposed Action addressed the addition of nine placement sites, the use of mechanical dredging on both channels, and extensions of the dredging work windows to August 1 to November 15 and July 1 to December 15 on the Sacramento and Stockton DWSCs, respectively. Best management practices, avoidance protocols, minimization, and mitigation measures detailed in the SEA would be implemented as appropriate during operations to minimize impacts.

The potential effects associated with the Proposed Action are included in Table 1. All impacts are less than significant.

Table 1. Summary of potential effects of the Proposed Action

	Less than significant effects	Less than significant effects as a result of mitigation	Resource unaffected by action
Aesthetics/Visual Resources	✓		
Air Quality		✓	
Climate Change	✓		
Cultural Resources			✓
Environmental Justice			✓
Federal Special Status Species		✓	
Fisheries		✓	
Geology and Soils	✓		
Hazardous, Toxic, and Radioactive Waste (HTRW)			✓
Hydrology and Water Quality		✓	
Land Use			✓
Marine Navigation and Transportation	✓		
Noise		✓	
Public Utilities and Services			✓
Recreation		✓	
Traffic and Circulation			✓
Vegetation and Wildlife		✓	

There are no effects expected to Cultural Resources, Environmental Justice, HTRW, Land Use, Public Utilities and Services, or Traffic and Circulation.

Impacts to Aesthetics/Visual Resources, Climate Change, and Marine Transportation and Navigation would be less than significant. Effects to Geology and Soils would also be less than significant, and measures are provided in the Supplemental EA to further minimize impacts to the resource.

Nitrogen oxide (NOx) emissions from the Proposed Action are expected to exceed local thresholds. To reduce the impacts to Air Quality to a less than significant level, a mitigation fee payment would be made to the local air district(s) as needed. Additional avoidance and minimization measures identified in the Supplemental EA will help to ensure impacts to Air Quality remain less than significant.

Effects to Federal Special Status Species, Fisheries, Hydrology and Water Quality, Noise, Recreation, and Vegetation and Wildlife are less than significant as a result of mitigation. Avoidance and minimization measures are identified in the Supplemental EA.

Based on the evaluation of the effects of the Proposed Action as described in the Supplemental EA; the reviews by other Federal, State, and local agencies; Tribes, input of the public; and the review by my staff, I find that the Proposed Action will cause no significant impacts not already disclosed in the 1980 EISs; therefore, preparation of an

Environmental Impact Statement is not required at this time. The FONSI evaluates the effects as described in the Supplemental EA.

_____ _____

Date

Kevin P. Arnett
Lieutenant Colonel, U.S. Army
Commander and District Engineer

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ACRONYMS AND ABBREVIATIONS

ADNWR	Antioch Dunes National Wildlife Refuge
BAAQMD	Bay Area Air Quality Management District
BU	Beneficial use
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAPs	criteria air pollutants
CARB	California Air Resources Board
CCP	Comprehensive Conservation Plan
CDFW	California Department of Fish and Wildlife (formerly known as CDFG)
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CVRWQCB	Central Valley Regional Water Quality Control Board
dB	decibels
diesel PM	particulate matter emissions from diesel exhaust
DMPS	dredged material placement site(s)
DWR	Department of Water Resources
DWSC	Deep Water Ship Channel(s)
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ER	Ecosystem Restoration
ESA	Endangered Species Act
EWN	Engineering With Nature
FRM	Flood Risk Management
FY	fiscal year

GHG	greenhouse gas
GO	General Order
hp	Horsepower
HTRW	Hazardous, Toxic, and Radioactive Waste
IDIQ	Indefinite Delivery/Indefinite Quantity
L_{dn}	Day/Night Average Sound Level
LWD	Left Wing Dam
MIAD	Mormon Island Auxiliary Dam
MLLW	mean lower low water
MOU	Memorandum of Understanding
NAA	Non-attainment area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
N2O	nitrous oxide
NOx	nitrogen oxides
OSHA	Occupational Safety and Health Administration
$PM_{2.5}$	Particulate Matter less than 2.5 micrometers in diameter
PM_{10}	Particulate Matter less than 10 micrometers in diameter
RD	Reclamation District
RM	river mile
ROG	reactive organic gases
RWD	Right Wing Dam
SC-GHG	Social cost of greenhouse gases
sDPS	Southern Distinct Population Segment
SEA	Supplemental Environmental Assessment
SF6	sulfur hexafluoride
SIP	State Implementation Plan
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMAQMD	Sacramento Metropolitan Air Quality Management District
SRA	State Recreation Area

TAC(s)	toxic air contaminant(s)
TDS	Total Dissolved Solids
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VELB	valley elderberry longhorn beetle
WQC	Water Quality Certification
WRDA	Water Resources Development Act
YSAQMD	Yolo-Solano Air Quality Management District

1 INTRODUCTION

1.1 Proposed Action

The U.S. Army Corps of Engineers (USACE) proposes to perform routine operations and maintenance (O&M) dredging and bank protection along the entire length of the Sacramento Deep Water Ship Channel (DWSC) and the Stockton DWSC, which lie within Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties. The Proposed Action includes dredge work using hydraulic or mechanical dredging methods. The exact methods could include hydraulic cutterhead pipeline, mechanical bucket, or mechanical backhoe dredging and would depend on the contractor and site conditions. Rock placement to repair damaged banks of both DWSC would be accomplished with a clamshell crane using rock transported via barges. Routine O&M dredging and bank protection would occur annually under the methods described to the authorized depths, as needed, for the life of the authorized project. However, there would potentially be a need to assess for any changes in the existing conditions or with the implementation of the dredging work that would require an environmental review as changes or deviations occur.

Any dredged material would be deposited at authorized dredged material placement sites (DMPS). Dredge slurry would be routed to the DMPS via pipelines or barges. The DMPS would be diked to allow dredge slurry to settle and consolidate. From some DMPS, decant water would then be discharged back into the Sacramento or Stockton DWSC, respectively, as determined during annual coordination among USACE, dredge contractor, and Central Valley Regional Water Quality Control Board (CVRWQCB). Dredged spoils would be allowed to dry in the DMPS. The bank protection rock placement may be placed at any site that previously contained bank protection work, and where there is a need for additional rock due to bank erosion.

The Proposed Action would occur within specific work windows to minimize impacts to fish and wildlife species.

1.2 Project Area

The “action area” is the area in which the direct effects of construction would occur; however, this document analyzes potential direct and indirect effects in the action area and surrounding areas (see Figure 1 and Figure 2). The area of potential effects is considered the “project area.” The project area is within the Delta, which consists of about 1,100 square miles of land and over 700 miles of meandering waterways (USACE 1980). Water levels in the Delta are influenced by tributary inflow and by tidal action.

1.2.1. Sacramento Deep Water Ship Channel

The Sacramento DWSC lies within Solano, Sacramento, and Yolo Counties, and extends for 43 miles from Collinsville to the city of West Sacramento. The lower portion of the channel follows the natural channel of the Sacramento River and Cache Slough; the upper portion is manmade, extending overland to terminate at the Port of West Sacramento. The Port of West Sacramento facilities include a harbor and turning basin. The Sacramento DWSC varies in width from 200 to 400 feet. The turning basin at the Port of Sacramento is triangularly shaped, being 3,100 feet long and 1,800 feet wide at the widest point. The Water Resources Development Act of 1986 (Public Law 99-662) provided authorization to deepen the Sacramento DWSC from 30

feet to 35 feet below mean lower low water (MLLW) and widen the bottom width from 250 feet to 400 feet along its entire length. Due to funding and other constraints, this authorized project has not been completed. As of today, only the upstream-most eight miles, from river mile (RM) 35 to the turning basin of the ship channel, have been deepened, and widening has only occurred as necessary to maintain a 1:3 side slope for this deeper section of the channel.

The project area in the Sacramento DWSC consists of primarily riverine and riparian habitat types, as well as the Sacramento-San Joaquin River estuary at the downstream end of the Sacramento DWSC. The area that may be affected by the proposed project, either directly or indirectly, includes the Sacramento River, Montezuma Slough, Suisun Bay, Horseshoe Bend, Three Mile Slough, Steamboat Slough, Cache Slough, Miner Slough, Prospect Slough, and Babel Slough (Figure 1). The Sacramento DWSC currently utilizes five DMPS and one additional DMPS is being proposed; these sites are listed in Table 1.

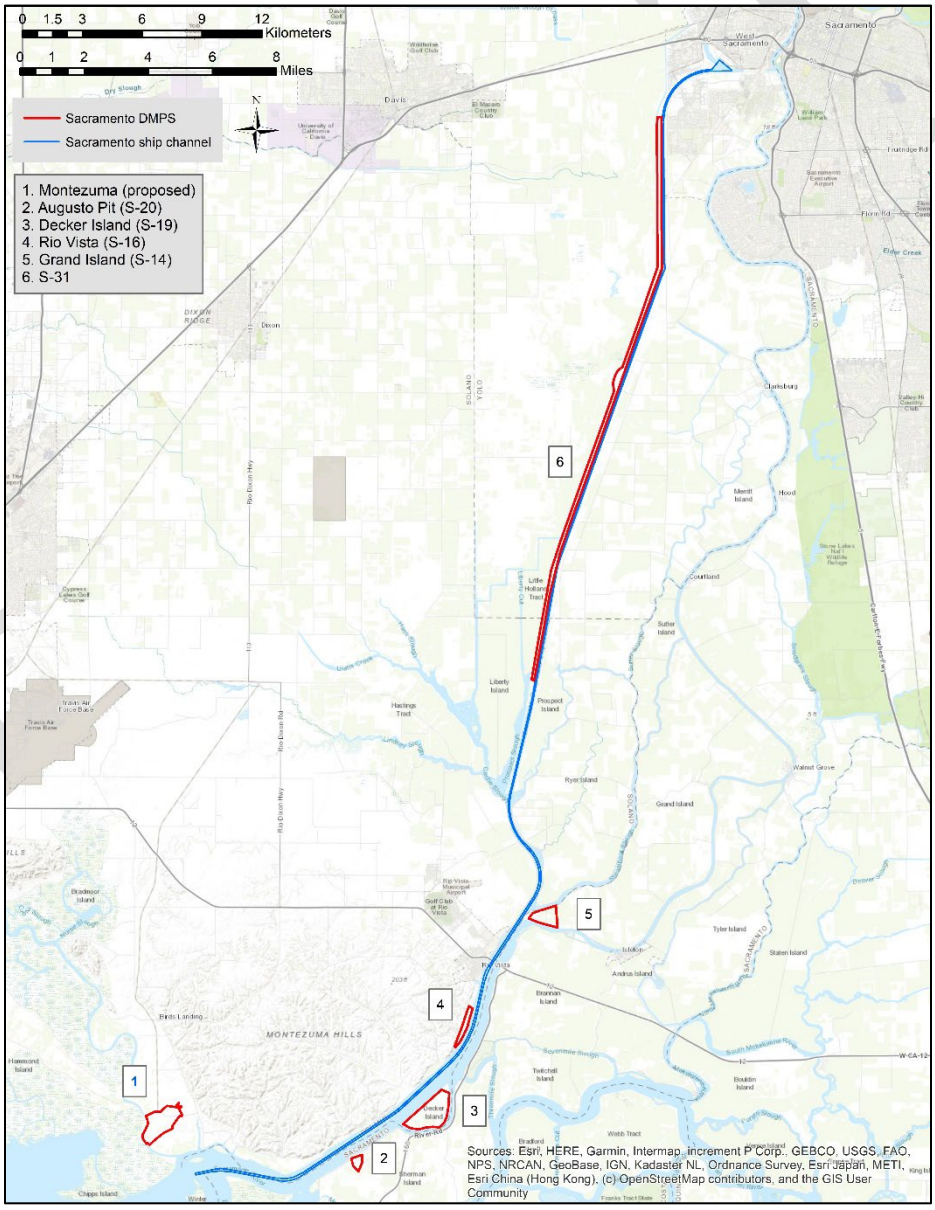

Figure 1. Sacramento DWSC and DMPS, including the proposed DMPS

Table 1. Sacramento DWSC DMPS, listed in order going upstream with proposed site highlighted

Placement Site	Method of Return Water	Point of Contact	Special Requirements	Landing Point; Line Pump Allowance
Montezuma Wetlands	Gravity. Water leaves site through return water channel, which conveys it to the make-up pond.	Montezuma Wetlands, LCC	Habitat restoration site; Off-loading by barge/scow only	Station 2+00;
Augusto Pit (S-20) Class I Site	Gravity. Water leaves site by agricultural ditch with pump out provided by RD-341. Ponding time: 52 hours Ponding area: 30 acres Ponding vol: 96,800 cubic yards	Port of West Sacramento/ DWR	Site underlain by peat	Station 274+10 Allowance = 2,100 feet
Decker Island (S-19) Class II Site	Gravity. Water leaves site by existing weir box. Ponding time: 825 hours Ponding area: 320 acres Ponding vol: 1,548,000 cubic yards	Port of West Sacramento	Placement around ongoing mining operations; Only access to island is by boat; elevated site.	Station number. 368+00; Allowance = 2,200 feet + 1,300 feet Station number 432+00; Allowance = 2,200 feet + 1,000 feet
Rio Vista (S-16) Class I Site	Gravity. Water leaves site by existing weir box. Ponding time: 415 hours Ponding area: 140 acres Ponding vol: 900,000 cubic yards	US Army Corps of Engineers	May have sand trucks hauling through site; elevated site	Station number. 518+00; Allowance = 900 feet + 2,100 feet Station number 586+00; Allowance = 800 feet + 1,200 feet
Grand Island (S-14) Class I Site	Gravity. Water leaves site by existing weir box. Ponding time: 127 hours Ponding area: 73 acres Ponding vol: 235,547 cubic yards	US Army Corps of Engineers	Portion of the site is heavily wooded; Elevated site	Station number. 795+00; Allowance = 1,300 feet Station number 768+00; Allowance = 1,100 feet
S-31 Class I Site	Pump. Ponding time: 415 hours Ponding area: 1020 acres Ponding vol: 770,000 cubic yards	Port of West Sacramento	Long narrow site; Landing point will move along site; Portions of the site are heavily vegetated with limited inundation permitted per task order	Station number. = variable; Allowance = 450 feet

1.2.2. Stockton Deep Water Ship Channel

The Stockton DWSC lies within Contra Costa and San Joaquin Counties, and extends for 41 miles within the San Joaquin River from the upstream end of New York Slough near Antioch to the city of Stockton. The Stockton DWSC varies in width from 200 to 600 feet, except in the turning basin at the Port of Stockton where it is 970 feet wide. The 36.4 miles of waterway from RM 3.8 to RM 39.3 and RM 40.2 to RM 41.1 have a design depth of 35 feet below MLLW. The reach from RM 39.9 to RM 40.2 has a design depth of 40 feet and is designed to function as a sediment trap.

The Stockton DWSC project area consists of primarily riverine and riparian habitat types. In addition, there is some estuarine habitat on Donlon Island, which is located at the most downstream tip of Sherman Island (downstream of the Scour Pond DMPS). The area that may be affected by the Proposed Action either directly or indirectly includes the San Joaquin River, Montezuma Slough, Suisun Bay, the Sacramento River, New York Slough, Middle Slough, Broad Slough, Cabin Slough, Mayberry Slough, Dutch Slough, Gallagher Slough, False River, Three Mile Slough, Fisherman's Cut, Seven Mile Slough, Mokelumne River, Potato Slough, Old River, Little Connection Slough, Whiskey Slough, Disappointment Slough, Turner Cut, Fourteen Mile Slough, Buckley Cove, Burns Cutoff, Calaveras River, and Smith Canal (Figure 2). The Stockton DWSC currently uses eleven DMPS; eight additional DMPS are proposed (Table 2).

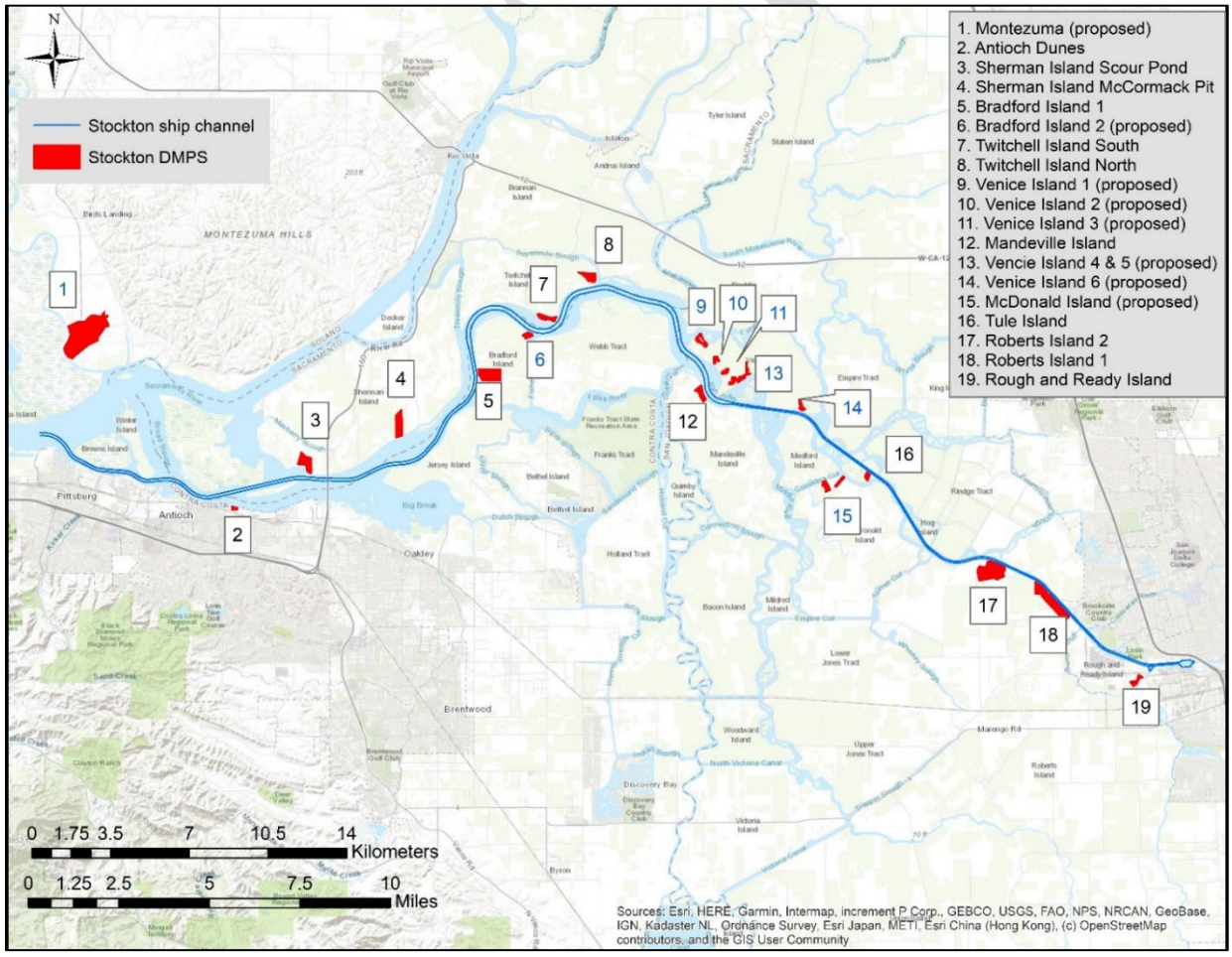

Figure 2. Stockton DWSC and DMPS, including proposed DMPS

Table 2. Stockton DWSC DMPS, listed in order going upstream with proposed sites highlighted

Placement Site	Method of Return Water	Point of Contact	Special Requirements	Landing Point; Line Pump Allowance
Montezuma Wetlands	Gravity. Water leaves site through return water channel, which conveys it to the make-up pond.	Montezuma Wetlands, LCC	Habitat restoration site; Off-loading by barge/scow only	Station 2+00;
Antioch Dunes, Class I Site	Water leaves site through gravity drain into San Joaquin River.	Port of Stockton	Habitat restoration site so minimize impacts.	Station 314+00; Allowance = 2,300 feet 8-acre site
Sherman Island Scour Pond	Water leaves site by gravity into agriculture canal with pump out provided by Reclamation District (RD) 341.	Port of Stockton/ RD 341	Site underlain by peat; no placement or decant water in adjacent pond.	Station 423+00; Allowance = 900 feet 125-acre site
Sherman Island McCormack Pit	Water leaves site by gravity into agriculture canal with pump out provided by RD 341.	Port of Stockton/ RD 341	Site underlain by peat.	Station 564+00; Allowance = 3,700 feet 26-acre site
Bradford Island I	Water leaves site by gravity canal which contractor must then pump out.	Port of Stockton	Only access to island is by boat; agriculture ditch pumped out by RD 2059 / Port owned pumps.	Station 740+00; Allowance = 500 feet 110-acre site
Bradford Island II, Class II site	Water leaves site by gravity into agriculture canal which contractor must then pump out.	Port of Stockton	Only access to island is by boat; agriculture ditch pumped out by RD 2059 / Port owned pumps.	Station 940+00; Allowance = 650 feet 18-acre site
Twitchell Island South	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 950+00; 18-acre site
Twitchell Island North	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Berm construction and dredged material placement should avoid irrigation/ drainage canal; dredge pipeline may be positioned across the canal.	Station 1050+00; 35-acre site
Venice Island I	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1210+00; Allowance = 5,300 feet; 24-acre site
Venice Island II	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1260+00; Allowance = 480 feet; 13-acre site
Venice Island III	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1280+00; Allowance = 750 feet;

Placement Site	Method of Return Water	Point of Contact	Special Requirements	Landing Point; Line Pump Allowance
				11-acre site
Mandeville Island	Water leaves site by gravity into agriculture canal.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1300+00; 34-acre site
Venice Island IV	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1350+00; Allowance = 4,800 feet; 31-acre site
Venice Island V	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1360+00; Allowance = 5,450 feet; 13-acre site
Venice Island VI	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1430+00; Allowance = 750 feet; 16-acre site
McDonald Island	Water leaves site by gravity into agriculture canal, then to San Joaquin River via pump.	Port of Stockton	Irrigation/drainage canal likely regulated by USACE, CVRWQCB, and CDFW.	Station 1515+00; Allowance = 4,100 feet; 18-acre site
Tule Island	Gravity. Water leaves site by exiting weir box.	Port of Stockton	Adjacent property CDFW owned and operated conservation easements.	Station 1586+00; Allowance = 300 feet; 9-acre site
Roberts Island II Class I Site	Pump.	Port of Stockton	May be under cultivation.	Station 1618+00; Allowance = 300 feet Sta. 1840+00; Allowance = 300 feet; 220-acre site
Roberts Island I Class I Site	Pump.	Port of Stockton	May be under cultivation.	Station 1895+00; -Allowance = 300 feet Station 1975+00; Allowance = 300 feet; 250-acre site
Rough and Ready Island West Complex	Pump.	Port of Stockton	N/A	Station 2105+00; Allowance = 2,750 feet; 50-acre site

1.3 Authority

Operations and maintenance actions for the Sacramento DWSC are authorized by the River and Harbor Act of July 24, 1946 (Public Law 525, 79th Congress, 2nd Session). In addition, authorization is given by "An Act Making Supplemental Appropriations for the Fiscal Year Ending September 30, 1985, and for Other Purposes," as contained in Public Law 99-88 dated August 15, 1985. Operations and maintenance actions for the Stockton DWSC are authorized by the River and Harbor Act of October 27, 1965 (Public Law 89-298, 89th Congress, 1st Session).

1.4 Project Purpose and Need

The purpose of the proposed project is to ensure that the Sacramento and Stockton DWSC remain accessible to commercial shipping traffic by maintaining the required channel depths and preventing erosion of the channel banks. The navigation channels must be maintained to ensure commercial ship traffic can safely access the Ports of West Sacramento and Stockton. Failure to perform maintenance dredging would result in unsafe conditions for ship traffic and restrict access to the Ports from the San Francisco Bay, and would pose a substantial risk to human safety and economic harm to the Ports and the commercial activities that use the Ports' facilities. Maintenance of existing bank protection is essential to prevent erosion of the ship channel banks from wave action caused by ship traffic. Maintenance of the bank protection features, in the form of rock replenishment, will stabilize the channel alignment and preserve the general uniformity of the bank lines. The channel banks protect ship channel traffic from adverse crosscurrents during the occurrence of flood flows in the Yolo Bypass or the San Joaquin River.

1.5 Background

Construction of the Sacramento DWSC was completed by USACE in 1963. The Stockton DWSC was created within the Lower San Joaquin River in 1928, when a project began to deepen and widen the river to allow continued ship access to the Port of Stockton. The channels join the John F. Baldwin Ship Channel at New York Slough, thereby affording access to Bay Area harbors and the Pacific Ocean. Together with its non-Federal sponsors, the Port of West Sacramento and the Port of Stockton, the USACE O&M program is responsible for conducting annual maintenance dredging on the Sacramento and Stockton DWSCs.

It is policy for USACE to maximize beneficial use (BU), in an environmentally acceptable manner, of suitable dredged material obtained from O&M of water resources development projects (Water Resources Development Act [WRDA] of 2020, Section 125(a)(1)). Section 125(a)(2)(C) of WRDA 2020 amends Section 204(d) of WRDA 1992 (33 U.S.C. 2326(d)) to authorize the Secretary to use funds appropriated for construction or operation and maintenance of a project involving the disposal of dredged material when selecting a disposal method that is not the least cost option based on a determination that the incremental costs of the disposal method are reasonable in relation to the environmental benefits or the hurricane and storm or flood risk reduction benefits. In accordance with Section 204(d), USACE District Commanders must evaluate and advance all opportunities to beneficially place dredged material from Federal navigation projects (Department of the Army 2022).

Recently, the USACE Civil Works Program has been prioritizing the development of solutions that provide multiple project benefits, including the inclusion of the natural or nature-based features in project design. Engineering with Nature (EWN) is the "intentional alignment of natural and engineering processes to deliver economic, environmental, and social benefits efficiently and sustainably" (USACE 2022). EWN, including the BU of dredged material, allows USACE to bring multiple benefits to projects, such as the potential to foster environmental restoration. USACE is committed to integrating EWN to facilitate the inclusion of natural and nature-based features into projects and processes, including in existing Civil Works projects. Indeed, a letter from Congress instructs USACE to place dredged material at two existing restoration sites, including the Montezuma Wetlands Restoration Project (United States Congress 2022).

1.5.1. Previous Environmental Documentation

The Sacramento DWSC was completed in 1963, prior to the initiation of the National Environmental Policy Act (NEPA). The feasibility report for the Sacramento River Deep Water Ship Channel, dated 1 June 1945 (Senate Document 142), resulted in authorization of the channel by the River and Harbor Act of 1946 (Public Law 525). An Environmental Impact Statement (EIS) was prepared in July 1980 to examine the effects of a proposed plan to deepen the channel from 30 feet to 35 feet below MLLW and widen the channel to bottom widths ranging from 250 to 400 feet along its entire length (USACE 1980). A supplemental EIS was finalized in March 1986 to update the description of the impacts for the proposed plan (USACE 1986). Due to funding and other constraints, the originally proposed project has not been completed. As of 2016, only the upstream most eight miles of the ship channel had been deepened and the only widening that occurred was that necessary to maintain a 1:3 side slope for the deeper channel.

A feasibility report on the navigation channels between San Francisco and Stockton, dated 15 November 1963 (House Document 208), resulted in authorization of deepening the Suisun Bay Channel (Stockton DWSC) to 35 feet, along with other improvements, by the River and Harbor Act of 1965. An EIS was prepared in September 1980 to assess the effects of deepening the Stockton DWSC to 35 feet.

A full list of project documentation which may be relevant to this EA includes:

Sacramento DWSC

- 1980. U.S. Army Corps of Engineers, Sacramento River Deep Water Ship Channel, California, Feasibility Report and Environmental Impact Statement for Navigation and Related Purposes. July 1980.
- 1986. General Design Memorandum and Supplemental Environmental Impact Statement for the Sacramento River Deep Water Ship Channel. March 1986. [Supplement No. 1]
- 1988. Environmental Assessment, Sacramento Deep Water Ship Channel, Sacramento, California. Finding of No Significant Impact (FONSI) signed April 29, 1988. [Supplement No. 2]
- 1998. Sacramento Deep Water Ship Channel Environmental Assessment for Maintenance Dredging. FONSI signed August 1998. [Supplement No. 3]

- 2008. Sacramento Deep Water Ship Channel Levee Maintenance Road Regrading and Resurfacing, West Sacramento, Yolo County, California. Determination of Categorical Exclusion, dated August 14, 2008.
- 2018. Draft Environmental Assessment, Sacramento and Stockton Deep Water Ship Channel Maintenance Dredging and Bank Protection Project, California. [Supplement No. 4]

Stockton DWSC

- 1980. U.S. Army Corps of Engineers, Environmental Impact Statement, San Francisco Bay to Stockton, California (John F. Baldwin and Stockton Ship Channels), Avon to Stockton. September 1980.
- 1997. Environmental Assessment, Stockton Ship Channel Maintenance Dredging. FONSI signed October 30, 1997. [Supplement No. 1]
- 2004. Final Environmental Assessment, Sherman Island Expanded Scour Pond Dredged Material Placement Site. FONSI signed February 25, 2004 [Supplement No. 2]
- 2018. Draft Environmental Assessment, Sacramento and Stockton Deep Water Ship Channel Maintenance Dredging and Bank Protection Project, California. [Supplement No. 3]
- 2019. Final Environmental Assessment, Stockton Deep Water Ship Channel Maintenance Dredging and Bank Protection Project, California, Tule Island Dredge Material Placement Site. FONSI signed April 5, 2019. [Supplement No. 4]

1.6 Decision Needed/Purpose of this Document

This Supplemental Environmental Assessment (SEA) (1) describes the existing environmental resources in the project area, (2) evaluates the environmental effects of the proposed alternatives on these resources, and (3) identifies measures to avoid or reduce any effects to a less-than-significant level. This SEA has been prepared in accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 *et. seq.*)). A draft Finding of No Significant Effect (FONSI) has been prepared to accompany this SEA. Prior to making a final decision, the Sacramento District Engineer will consider environmental and socioeconomic impacts, along with any required avoidance, minimization, and mitigation measures, and all other relevant information, such as public issues of concern identified during the comment period. If the District Engineer determines that there are no significant environmental impacts as a result of the proposed action, the decision will be documented in the final FONSI. USACE may initiate a Notice of Intent for an EIS if new information warrants the need for additional analysis of potentially significant environmental impacts.

2 ALTERNATIVES

2.1 Alternatives Eliminated from Further Consideration

2.1.1. No Operations and Maintenance (O&M) Dredging Operations

USACE would discontinue dredging the Sacramento and Stockton DWSC during the extent of the Proposed Action. Sediment would continue to accumulate and shoal within the navigation channels. The increased shoaling would reduce or even preclude the ability of vessels to use the navigation channel, particularly the ability of barges to enter and leave safely under full load. Eventually the situation could warrant emergency action by USACE or the Ports. This alternative would result in impacts to local and regional economies, as local companies would be forced to limit the quantities of materials shipped out of the Sacramento and Stockton Ports. This alternative would not continuously maintain the Federal navigation channels in the Sacramento or Stockton DWSC, which fails to meet the purpose of the authorized project, and was therefore eliminated from further consideration.

2.2 Alternative 1 - No Action

Under NEPA, in cases where the project involves modification of an existing program or management plan, no action may be defined as no change from current program implementation, or no change in management direction or intensity. As such, the No Action Alternative may be thought of in terms of continuing with the present course of action until that action is changed. Therefore, under the No Action Alternative, USACE would continue current maintenance dredging practices for the Sacramento and Stockton DWSCs as described in the EISs and subsequent NEPA documents. The following sections describe maintenance dredging and associated activities as well as placement sites that would occur under the No Action Alternative, based on these current practices. All dredging and bank protection maintenance activities under this Alternative would occur within the authorized work window, which currently is August 1 through October 31 in the Sacramento DWSC and August 1 through November 30 in the Stockton DWSC.

2.2.1. Dredging Methods

All sites would be dredged to maintain the current depth: the lower portion of the Sacramento DWSC would be maintained at a depth of 30 feet below MLLW, and the upper portion of the channel would be maintained at a depth of 35 feet below MLLW; the Stockton DWSC would be maintained at a depth of 35 feet below MLLW, excluding the sediment trap which would be maintained at 40 feet below MLLW. An allowable over depth of one to two feet is anticipated for all sites except for the sediment trap at 40 feet below MLLW. These depths maintain safe conditions for ships using the channels while not increasing the quantity or size of commercial navigation traffic.

Current maintenance operations utilize primarily hydraulic cutterhead pipeline dredges, though the use of mechanical dredging has been previously analyzed and is authorized in the Stockton DWSC. Thus, under the No Action Alternative, use of these methods would continue. The quantity of material to be dredged each dredging season is not expected to exceed 500,000 cubic yards in the Sacramento DWSC and 800,000 cubic yards in the Stockton DWSC, barring

monumental flood events. Dredging is expected to operate within schedule 24 hours a day, seven days a week.

2.2.1.1 Hydraulic Cutterhead Pipeline Dredging

A hydraulic cutterhead pipeline dredge is a barge-type vessel (approximately 1,500 to 2,000 horsepower [hp]) that consists of an onboard pump(s), spud piles (long pipes), and a toothed cutterhead attached to a pipeline (USACE 2015). The cutterhead is mounted to a ladder that can be lowered, raised, and angled to increase the dredge path. The discharge pipeline exits the back (stern) of the dredge. Flexible pipeline sections are added to the dredge's pipeline opening, as needed, depending on the distance between the dredge site and the DMPS. Approximately every 500 feet, the flexible pipeline sections are anchored in the bottom of the channel using spud piles. Pipeline sections and anchors not in use would either be secured on a floating barge, capped and lashed together to float in the channel, or stored at the designated staging areas.

Once the dredge is positioned, the pipeline and cutterhead would be lowered to the bottom of the channel. The cutterhead would then slowly start to rotate and break up sediment along the seafloor, continuing from side to side in a sweeping arc using the swing anchor. The dredge would move along the channel self-propelled or by tugboat, and a crew would always maintain and operate the dredging equipment. Skiffs and a tugboat would be used for crew transport, maintenance, and other operations associated with dredging activities. The collected dredge slurry is expected to consist of 80 to 90% water and 10 to 20% solids by weight (USACE 2003). This ratio is ultimately determined by the difficulty of material removal experienced by the dredge operator.

A dredge pipeline would transport dredge slurry to the nearest available DMPS. The pipeline would be made of durable plastic and would float approximately 2 inches above the water surface when filled with water or air and would rest on the river bottom during dredging operations. Depending on which dock is being dredged, the length of the pipeline could range from 1,500 to 22,000 feet. The contractor and a qualified biologist would determine the preferred route for the pipeline from the dredge site to the placement site while avoiding special status species or habitat. The pipeline would be marked by buoys and/or high visibility paint to warn boaters of its presence. Additional safety measures may include signs, flaggers, and/or other measures as required.

When the dredge is positioned in a location where shoaling is to be removed, the dredge anchors itself by alternatively planting one or two "spuds," or vertical poles, into the bottom sediment. The dredge rotates around whichever of the two spuds is planted by pulling on "swing" anchors, alternately raising and planting the spud as the dredge "walks" forward. The hydraulic pipeline cutterhead dredge is equipped with a rotating cutterhead (excavator) surrounding the intake of the suction line. At that point, the solids and a large volume of the surrounding water are passed through the dredge centrifugal pump to the discharge pipeline as slurry.

Dredging activities would be limited to depths greater than 25 feet, and the cutterhead would be kept within three feet of the channel bottom while drawing in water. The cutterhead is mounted on a "ladder" that is free to pivot in the vertical plane and rotated down to various depths. The ladder would be mounted on a floating dredge that swings left and right while

proceeding along the channel. The dredge could be self-propelled or transported to the area by a tugboat. Typically, the dredge is tended by two tenders that pick up and place the swing anchors as the dredge progresses and can move the dredge short distances. There are also two outboard engine-powered skiffs that transport crews and conduct water sampling upstream and downstream of the dredge.

2.2.1.2 Mechanical Dredging

Effects of mechanical dredging were evaluated under the 1997 EA for the Stockton DWSC. Therefore, this type of dredging is included as part of the No Action Alternative, but only for the Stockton DWSC. The effects of mechanical dredging on the Sacramento DWSC are evaluated in the Proposed Action Alternative.

Mechanical dredges remove bottom sediments by direct application of mechanical force to dislodge sediments, scooping the sediments from the bottom and placing them into a barge or scow for transport to a dredge disposal or reuse site (USACE 2015). Mechanical dredging is typically used at the larger port and wharf facilities. Buckets on mechanical dredges typically range in size from 1 to 50 cubic yards (USACE 2015). A clamshell dredge (Figure 3 and Figure 4) employs a vertical loading grabber connected to wire rope which is lowered in the open position into the sediment, closed around the sediment load, and raised above the water surface where the sediment is deposited on a barge. Several diverse bucket configurations are available to be specifically tailored to the various sediment types.

Figure 3- Mechanical clamshell dredger operating in a channel. Photo by USACE Sacramento District.

Figure 4- Closeup of an environmental clamshell dredging bucket. Photo by USACE Sacramento District.

Excavator dredging (Figure 5) involves a backhoe excavator mounted to a barge. The excavator bucket is lowered to the seafloor where it scoops up sediment, brings the sediment up through the water column in the open bucket, where it is deposited on the barge.

Figure 5- An excavator dredge in operation on a river. Photo by USACE San Francisco District.

For the Proposed Action, the clamshell bucket capacity would range between 20 to 50 cubic yards, depending on dredge availability. Up to seven scows, with a capacity of 2,000 to 4,000 cubic yards, and up to four 1,800-hp tugs would be used to transport dredged material to placement sites. In addition, one 1,000 hp tender tug would be required to maneuver each dredge plant.

The estimated daily production rate would range between 3,000 and 7,000 cubic yards, depending on the location of dredging and the DMPS being used. For example, the production rate would be approximately 5,000 cubic yards if a nearby DMPS was available, while the production rate would decrease if material would have to be transported farther.

A mechanical clamshell dredge consists of a crane mounted on a floating deck barge, with a clamshell bucket on the end of the crane boom. The deck barge has two to four spud piles attached to the platform, generally at the corners. The spud piles are long pipes that would be driven vertically into the DWSC bottom by hydraulic assistance. The spud piles are used to anchor the dredge barge. Clamshell dredges are not self-propelled, so they require a tugboat to tow or push the dredge to and from the dredge sites. Once a tug moves the dredge into place, the spuds are driven into the bay bottom anchoring the dredge. Once the dredge is anchored in place, dredging can begin. Relocating the dredge would require approximately one hour to complete. On average, the mechanical clamshell dredge plant for this project would need to be relocated

approximately every three hours. In addition, when working in the ship channel, the dredge would need to be moved out of the shipping channel to allow deep draft vessels to transit the channel.

The crane would be equipped with a boom that is long enough to extend out beyond the end of the work barge in any direction and is able to swivel 360 degrees on its mount. A large clamshell bucket would be attached to the end of a series of cables at the end of the boom, which would allow the bucket to be raised and lowered into the water. The cables would open and close the bucket as it is filled with sediment and then emptied into scows. Scows are open barges that can carry large quantities of sediment and are towed with tugboats to and from disposal sites. As soon as one scow is filled and hauled away, another empty scow would be maneuvered into place alongside the dredge and digging would continue.

Clamshell buckets would be raised and lowered to the bottom of the DWSC using a system of cables. The weight of the bucket would be sufficient for it to fall through the water column into the bottom sediment. Cables would restrict the clamshell from going too deep, or beyond the maximum allowable overdepth. During mechanical dredging, the clamshell would close and be pulled up through the water column to above the scow. Once over the scow, the clamshell would open and deposit the dredged material into the scow. The bucket's full cycle would take approximately 75 seconds from entry into the water column, capturing sediment in the bucket, raising in the water column, and dropping sediment into the scow; for approximately 25 seconds of the cycle the bucket would be below water. When all the material within reach of the clamshell is dredged, the spuds would be raised, and the tender tug would transport the dredge and scow to the next area requiring dredging. The process would be repeated until all material is dredged from the channel. Following dredging, hydrographic surveys would be conducted to ensure that the entire area is dredged to the desired depth.

During dredging, clamshells would place a slurry of sediment and water in the scows. Depending on the sediment type being dredged, the sediment-to-water ratio of the slurry is expected to be approximately 60 to 70 percent sediment and 30 to 40 percent water. To increase the sediment volume in the scows, the scows may decant water back to the water column in a process called overflow. Overflowing the scows increases the sediment volume, compared to water, which can decrease the number of scow-tug trips to placement sites, thereby decreasing construction costs. The CVRWQCB sets the standards for water quality within the action area. Any overflow would have to meet the water quality standards set by the 401 Water Quality Certification (See Section 3.2.6 and Appendix A).

2.2.2. Bank Protection and other Maintenance Actions

Under the No Action Alternative, bank protection maintenance would continue as described in the prior NEPA documents. Suitable rock protection would be placed at eroded sites. This may entail either rock replenishment at sites with pre-existing rock, or placing rock on a vegetated site if the site no longer has evidence of pre-existing rock. The rock placement would be accomplished with a clamshell crane with rock transported via barges. Any potential habitat losses would be mitigated as needed by planting additional riparian habitat with the appropriate native vegetation, according to the guidelines issued by NMFS.

Along reaches of the Stockton or Sacramento DWSC where filter material was originally placed or where it may be required based on inspection, maintenance repair of existing rock

protection would include the placement of a properly graded filter layer under the rock protection. In the event an inspection reveals that due to scour, settlement or other causes, rock protection on the bank is required beyond the limits of the original construction, or in reaches of the bank not originally provided with such protection, USACE would alter the slope to conform with standards by placing rock, as needed, to protect completed works.

In addition to bank protection, levee maintenance roads would be improved and repaired as needed. Improvements may include regrading, resurfacing, etc. in order to meet specifications. During levee road repairs, turnouts and turnarounds may be temporarily constructed by placing aggregate material adjacent to the levee to facilitate turning around and/or yielding to oncoming equipment. Staging areas would be established as well. Such sites would be selected to minimize disturbance to sensitive habitats.

Ruts or soft yielding spots, areas having inadequate compaction, and deviations of the surface from the requirements would be corrected by loosening and removing soft or unsatisfactory material and by adding material from other areas of the road, reshaping to line and grade, and recompacting to specified density requirements. Any holes or craters left by the removal of roots would be backfilled with either imported aggregate or existing material. Some imported aggregate material may be required. Each layer of the aggregate surface course would be compacted as specified with approved compaction equipment. The surface of the top layer of aggregate surface course would be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller.

The need to improve the gravel levee maintenance road that runs through S-31 has been immediately identified. Work would proceed north to south. Approximately two to three percent of the road would be regraded or resurfaced each year. Up to ten turnouts would be temporarily constructed by placing aggregate material adjacent to the western levee. The volume of imported aggregate material is not expected to exceed 4,200 tons.

2.2.3. Dredge Material Placement Sites

For hydraulic cutterhead dredging, the dredge material would be transported to the DMPS via discharge pipes. The discharge pipeline would run from the dredge in the channel, across the bank, and onto the relevant DMPS. At all DMPS, a nominal area of outboard levee would be temporarily disturbed during the positioning of the slurry pipe. Upon completion of the dredging operation, any disturbed banks would be restored to pre-project conditions. All pipes would be placed to avoid affecting any listed species or habitat.

Currently there are five areas used as DMPS for the Sacramento DWSC, and 11 DMPS for the Stockton DWSC. Each of these DMPS would remain in use under the No Action Alternative. A brief description of the sites follows.

2.2.3.1 Sacramento DWSC DMPS

Five DMPS are currently authorized for use for material from the Sacramento DWSC: Augusto Pit, Decker Island, Rio Vista, Grand Island, and S-31 (see Figure 1). For complete descriptions and aerial images of the sites, please refer to the Biological Assessments, included in Appendix B. Table 3 lists recent dredging seasons that each DMPS has been utilized.

2.2.3.2 Stockton DWSC DMPS

Eleven DMPS are currently authorized for use for material from the Stockton DWSC: Antioch Dunes, Sherman Island Scour Pond, Sherman Island McCormack Pit, Bradford Island I, Twitchell Island North and South, Mandeville Island, Tule Island, Roberts Island I and II, and Rough and Ready Island Complex (see Figure **2**). For complete descriptions and aerial images of the sites, please refer to the Biological Assessments, included in Appendix B. Table 3 lists recent dredging seasons that each DMPS has been utilized.

Table 3. Recent DMPS utilization for the Sacramento and Stockton DMPS

Channel	DMPS	Years Utilized
Sacramento	Augusto Pit	2001, 2002, 2005
	Decker Island	2000-2003, 2006-2008, 2016, 2017, 2021
	Rio Vista	2000, 2006, 2008, 2010, 2011, 2013, 2017, 2019, 2021
	Grand Island	2000, 2021
	S-31	2000, 2001, 2003, 2005, 2007-2011, 2013, 2017, 2020, 2021
Stockton	Antioch Dunes	2013, 2015, 2020, 2022
	Sherman Island Scour Pond	2007-2011, 2013, 2019, 2020
	Sherman Island McCormack Pit	2002, 2008-2011, 2013-2015, 2019, 2020
	Bradford Island I	2000, 2003, 2006, 2010, 2015, 2019-2021
	Twitchell Island South	n/a
	Twitchell Island North	2019
	Mandeville Island	n/a
	Tule Island	2019-2021
	Roberts Island II	2000, 2001, 2003-2005, 2009-2011, 2015, 2019-2021
	Roberts Island I	2016, 2020
	Rough and Ready Island Complex	n/a

2.3 Alternative 2 - Proposed Action

Under the Proposed Action (Alternative 2), USACE would perform dredging practices to maintain the appropriate 30-, 35-, or 40-foot depth in the Sacramento and Stockton DWSC as

applicable, as well as perform bank protection activities in the form of rock placement, road repairs, and other maintenance activities, similar to the No Action Alternative. The frequency of maintenance dredging would be the same as described in the No Action Alternative, though additional dredging methods may be utilized (see Section 2.3.1). All dredged material would be disposed at authorized DMPS, which would include all of the sites described under the No Action Alternative, as well as additional proposed sites for the Stockton DWSC (see Section 2.3.3.2).

All dredging and bank protection maintenance activities under this Alternative would occur yearly within the proposed work windows of August 1 through October 31 with case-by-case extensions until November 15 on the Sacramento DWSC, and July 1 through November 30 with case-by-case extensions until December 15 on the Stockton DWSC. From July 1 to July 31, dredging on the Stockton DWSC would only be permitted between the Roberts Island II DMPS and the Port of Stockton.

2.3.1. Dredging Methods

Similar to the No Action Alternative, all sites would be dredged to maintain the current depth: the lower portion of the Sacramento DWSC would be maintained at a depth of 30 feet below MLLW, and the upper portion of the channel would be maintained at a depth of 35 feet below MLLW; the Stockton DWSC would be maintained at a depth of 35 feet below MLLW, excluding the sediment trap which would be maintained at 40 feet below MLLW. An allowable over depth of one to two feet is anticipated for all sites except for the sediment trap.

Under the Proposed Action, hydraulic and mechanical methods for dredging may be utilized. The quantity of material to be dredged each dredging season is not expected to exceed 500,000 cubic yards in the Sacramento DWSC and 800,000 cubic yards in the Stockton DWSC, barring monumental flood events. Dredging is expected to operate 24 hours a day, seven days a week within the work window.

Under the Proposed Action Alternative, dredging equipment would be similar to the No Action Alternative (see Section 2.2.1), except with the addition of potential mechanical dredging in the Sacramento DWSC. Dredging methods that may be employed under this alternative would include hydraulic cutterhead pipeline dredging and/or mechanical dredging (on both DWSCs).

2.3.2. Bank Protection and other Maintenance Actions

Under the Proposed Action, bank protection and additional maintenance activities would not change from current operations, and thus would be the same as those activities under Alternative 1 (see Section 2.2.2).

2.3.3. Dredge Material Placement Sites

2.3.3.1 Sacramento DWSC DMPS under the Proposed Action

Under the Proposed Action, placement at all of the DMPS currently in use for the Sacramento DWSC would continue (see Section 2.2.3.1). One additional DMPS at Montezuma Wetlands would be created for the Sacramento DWSC under the Proposed Action. The proposed DMPS would beneficially use dredged material at the Montezuma Wetlands Restoration Project

to restore tidal habitat. For a detailed description of the proposed DMPS, refer to the Biological Assessments in Appendix B.

2.3.3.2 Stockton DWSC DMPS under the Proposed Action

All of the DMPS included in the No Action Alternative would also be utilized under the Proposed Action (see Section 2.2.3.2). Nine additional DMPS for the Stockton DWSC would be created under the Proposed Action: Montezuma Wetlands (the same site proposed for the Sacramento DWSC), Bradford Island II, Venice Island I, II, III, IV, V, and VI, and McDonald Island.

Each late summer and fall, USACE hydraulically dredges the Stockton DWSC and pumps the dredged slurry (with a solids content of 10% to 20%) via dredge pipeline to a DMPS typically within 15,000 feet of the dredging location. While cost effective, this methodology limits USACE's ability to fully maintain the Stockton DWSC to its authorized depth of 35 feet MLLW in areas that lack a DMPS within 15,000 feet. As a result, certain areas within the DWSC—specifically in the curved portions of the DWSC between Sherman Island and the Port—have been difficult to maintain.

Additional upland DMPS are being proposed to allow for greater dredge material placement capacity. This will aid in USACE's ability to provide proper and regular maintenance of the Stockton DWSC, necessary to maintain the operating depths of the Stockton DWSC and avoid negative impacts to the Port operations. The Port and USACE identified the following objectives when considering new DMPS:

- Sites must be located between Sherman Island and the Port in order to service portions of the authorized Stockton DWSC far from existing DMPS with available placement capacity.
- Sites must be located next to the Stockton DWSC to maximize its utility for operations and maintenance dredging activities where pumping cannot exceed 15,000 feet.

Bradford Island and Venice Island (located between Sherman Island and the Port) have historically been and are currently being used for agricultural purposes and require diversified soil sources to maintain soil quality and support crop growth. Dredged sediment from the O&M Program would be beneficially used by the landowners on both islands.

The proposed upland DMPS involve the following activities:

- Constructing contaminant berms at the new sites
- Placing dredged slurry in the sites as part of USACE O&M Program
- Discharging decant water back to the surface waters adjacent to the DMPS as needed
- Maintaining the sites between dredging episodes in the future

For detailed descriptions and images of the proposed DMPS, refer to the Biological Assessments in Appendix B.

2.4 Comparison of Alternatives

In order to easily compare the features of the Proposed Action to the No Action Alternative, each alternative is summarized in Table 4 below.

Table 4. Summary of features included in the Proposed Action as compared to the No Action Alternative

	Alternative 1 – No Action	Alternative 2 – Proposed Action
Maximum Work Window	August 1 to October 31 (Sacramento DWSC); August 1 to November 30 (Stockton DWSC)	August 1 to November 15 (Sacramento DWSC); July 1 to December 15 (Stockton DWSC)
Potential Dredging Method(s)	Hydraulic cutterhead pipeline dredging Mechanical dredging (Stockton DWSC only)	Hydraulic cutterhead pipeline dredging Mechanical dredging (both DWSCs)
Bank Protection, Road Repairs, and Other Maintenance	Maintenance activities would remain the same as current conditions	Maintenance activities would remain the same as current conditions
Sacramento DWSC Dredge Material Placement Sites	Augusto Pit Decker Island Rio Vista Grand Island S-31	Montezuma Wetlands Augusto Pit Decker Island Rio Vista Grand Island S-31
Stockton DWSC Dredge Material Placement Sites	Antioch Dunes Sherman Island Scour Pond Sherman Island McCormack Pit Bradford Island I Twitchell Island South Twitchell Island North Mandeville Island Tule Island Roberts Island II Roberts Island I Rough and Ready Island Complex	Montezuma Wetlands Antioch Dunes Sherman Island Scour Pond Sherman Island McCormack Pit Bradford Island I *Bradford Island II* Twitchell Island South Twitchell Island North *Venice Island I, II, III, IV, V, VI* Mandeville Island *McDonald Island* Tule Island Roberts Island II Roberts Island I Rough and Ready Island Complex

3 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. The section is arranged by environmental resource.

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 briefly discussed below to add to the overall understanding of the project area.

3.1.1. Traffic and Circulation

Most activities under Alternative 1 and Alternative 2 would occur from the water, thus having no effect on traffic or circulation on land. Construction of the new DMPS would require construction vehicles to access the site; at most sites (Bradford Island II, Venice Island I-VI), construction equipment and personnel would access the site via barge. Once on site, construction equipment would travel along sparsely trafficked, rural levee roads. Construction trucks and equipment would likely access the proposed site on McDonald Island via Zuckerman Bridge on the southeast corner of the island, then continue along Zuckerman Road until reaching the site. Again, this is a rural, lightly used road. Montezuma is already constructed and would not require construction access.

Levee road repairs, like the one planned for road S-31, would also be accessed from the land. Again, all of the roads that would be utilized by the construction crew within the project areas are rural, and lightly utilized only by local traffic

Overall, Alternatives 1 and 2 would have no effect on the existing flow of traffic and circulation in the project area.

3.1.2. Marine Navigation and Transportation

Dredging—and the associated transport and placement activities—has occurred in the Sacramento and Stockton DWSC for decades (see Sections 1.3 through 1.6). Under both alternatives, USACE's current maintenance dredging program for the Federal navigation channels in the Sacramento and Stockton DWSC would continue. Dredging is a temporary activity that varies in duration depending on the amount of shoaled sediment in each channel, the frequency at which a channel is dredged, and the equipment used for dredging. The typical duration of dredging for each channel varies; but because dredges are always moving along the channel, the duration that a dredge would be operating in any specific location would be limited. The Federal navigation channels are generally wide enough to accommodate dredge equipment and allow passage of other vessel traffic, and dredges would move out of the way to allow passage of larger vessels. The dredging and placement activity under both alternatives would comply with all applicable vessel traffic and safety requirements, including specifications for dredge pipelines.

Maintenance dredging, placement activities, and bank protection would add to vessel traffic in the project area, particularly during transport to placement sites; however, traffic from O&M activities would be similar to that which has occurred during USACE's past maintenance

dredging operations and would be negligible considering the existing volume of vessel movement in the study area.

Adverse impacts to marine navigation and transportation under both alternatives would be minimal and short-term. Both alternatives would have a long-term beneficial impact by removing shoaled sediment and maintaining the navigability of the Federal channels.

3.1.3. Public Utilities and Services

The project area in the Sacramento and Stockton DWSC consists of primarily riverine and riparian habitat types, as well as the Sacramento-San Joaquin River estuary at the downstream end of the DWSC. Ongoing maintenance dredging, bank protection, or other maintenance actions under each alternative are not expected to interrupt public services such as mail delivery, trash pickup, street sweeping, etc. No project activities, such as levee road repair or the creation of new DMPS under Alternative 2 would require relocation of utilities infrastructure or interruption to service. McDonald Island Station, PG&E's largest natural gas storage field, is located just over two miles south of the proposed DMPS, but no pipelines run through the proposed site (PG&E 2022); therefore, the project would have no impact to this station.

Similarly, the creation of new DMPS under Alternative 2 would not involve the relocation of any utilities' infrastructure.

3.1.4. Aesthetics/Visual Resources

Aesthetic resources are generally defined as the natural and built features of the landscape that can be seen by the public and that contribute to their appreciation of the environment. Lands contributing to the visual resources in the study area include waterways, recreation areas, agricultural production, wildlife refuges and preserves, marinas, and shoreline recreation facilities. Agricultural lands account for the primary land use in the delta, and the extensive tracts of agricultural land shape the delta's visual character. In some areas, residences and businesses are situated on the waterfront of the shipping channels, particularly in Collinsville, Rio Vista, along Brannan Island Road, on Vulcan Island, and on the western edge of Stockton.

Route 160 is a state designated scenic highway from the Contra Costa County line to the southern city limit of Sacramento (Caltrans 2022). The highway crosses over the Stockton DWSC via the Antioch Bridge and continues north along the Sacramento DWSC until about 1.5 miles northeast of Rio Vista, where the DWSC separates from the Sacramento River.

Minor impacts to these visual resources would occur due to the presence of dredges, barges, and/or tugboats in the channels during maintenance dredging, which some may find visually unappealing. However, the dredging vessels are similar in appearance to the large commercial and industrial vessels that frequently pass through the DWSC, and their presence in the channels would be temporary. Therefore, neither alternative would result in a significant change in the existing aesthetics or visual resources in the area, and the effects of either alternative would be negligible.

3.1.5. Land Use

The project area is located within parts of Sacramento, San Joaquin, Contra Costa, Solano, and Yolo counties. The predominant land uses in the area include agricultural, residential, commercial, industrial, and public lands maintained by the various counties. The in-channel dredging and bank maintenance practices under either Alternative would not have an effect on the surrounding land uses. Under Alternative 1, material will only be placed at previously approved and utilized DMPS; hence, this alternative would have no effect on land use in the project area. Under Alternative 2, nine new DMPS would be created: seven in San Joaquin County, one in Contra Costa County, and one in Solano County.

The sole proposed site in Contra Costa County, Bradford Island II, is located on Bradford Island, all of which is designated as Delta Recreation in the County's General Plan (Contra Costa County 2005). Although that is the County's designation, all of Bradford Island is privately owned by individuals or agencies for specific use (primarily wheat farming, cattle grazing, or natural gas extraction). A handful of residents live on the island. No public access is permitted on any lands on the island (Bradford Island RD 2059 2021). The proposed DMPS would be located on the northeast corner of the island, and no structures or natural gas extraction wells lie in the footprint of the proposed site. Just as the existing DMPS on Bradford Island does not preclude any of the existing land uses, nor would the creation of a new DMPS on the island.

Montezuma, the only proposed site in Solano County, is located on land designated as Marsh Protection (Solano County 2008). Because the material placed at Montezuma Wetlands will be beneficially used to aid in the restoration of tidal and seasonal wetlands, transport of dredged material to the site is consistent with designated land use and regulatory objectives for dredged materials (United States Congress 2022, Department of the Army 2022, USACE 2022).

Six of the sites proposed in San Joaquin County would be located on Venice Island. The entire island is designated as General Agriculture land use (San Joaquin County 2016). As of 2015, Venice Island had one resident and no critical infrastructure (Kjeldsen Sinnock and Neudeck, Inc. 2015). The construction of the six DMPS on the island would not affect current land use in the area.

The final proposed DMPS, McDonald Island, is also located in San Joaquin County, and this island is also designated as General Agriculture (San Joaquin County 2016). There are no structures on McDonald Island in the vicinity of the proposed DMPS, and the creation of a site would not preclude agricultural land use.

3.1.6. Climate Change

Human influence on the earth's climate has become unequivocal, increasingly apparent and widespread. Multiple changes in the climate system have become more marked in recent years, including increasing global temperatures, loss of ice volume, rising sea levels and changes in global precipitation patterns (IPCC 2022). The changes in the physical climate system have adversely affected natural and human systems around the world.

Human activities have contributed substantially to climate change through our emission of greenhouse gases (GHGs). GHGs in the earth's atmosphere absorb energy, slowing or preventing the loss of solar radiation to space, acting as a blanket and keeping the earth warmer than it otherwise would be. Key GHGs of concern are carbon dioxide (CO_2), methane (CH_4), and

nitrous oxide (N_2O). Concentrations of these GHGs have all increased since the Industrial Revolution due to human activity, particularly the burning of fossil fuels (EPA 2022a).

Observations from across the state of California and the delta confirm changes in the climate are also occurring on a local scale (Barnett et al. 2008; Williams et al. 2015) with earlier runoff, higher sea levels, and a greater frequency and intensity of extreme events (Fritze et al. 2011, Kunkel et al. 2013, Dettinger 2016, Dettinger et al. 2016). Similar effects are expected to intensify over the coming century (Jay et al. 2018).

In January 2023, the Council on Environmental Quality (CEQ) released interim guidance regarding the consideration of GHG emissions and climate change in NEPA documents for Federal actions. According to the guidance, when analyzing a proposed action's climate change effects under NEPA, agencies should (1) quantify the reasonably foreseeable GHG emissions of each alternative; (2) disclose and provide context for the GHG emissions and climate impacts associated with the alternatives, including by monetizing climate damages using estimates of the social cost of GHG (SC-GHG), placing emissions in the context of relevant climate action goals, and providing common equivalents; and (3) analyze reasonable alternatives, including those that would reduce GHG emissions relative to baseline conditions, and identify available mitigation measures to avoid, minimize, or compensate for climate effects.

Daily carbon dioxide equivalent (CO_2e) emission rates were calculated using the Sacramento Metropolitan Air Quality Management District's (SMAQMD) Harborcraft, Dredge, and Barge Emission Factor Calculator. CO_2e emissions are calculated by summing the emissions of CO_2, CH_4, and N_2O and multiplying by their respective global warming factors. For the No-Action Alternative, dredging operations were assumed to occur for 24 hours a day over a four-month (120-day) period to calculate the annual emissions (Table 5). For comparison, total emissions are expressed in the equivalent number of passenger vehicles, assuming one vehicle emits 4.6 metric tons of CO_2 annually (EPA 2022b). The SC-GHG was also calculated for the No-Action Alternative (IWG 2021) (Table 6).

The maximum emissions under the No-Action Alternative would be 2,456 metric tons CO_2e per year, in the case of utilizing hydraulic dredging on the Sacramento DWSC and clamshell dredging on the Stockton DWSC. This represents approximately 0.0007% of all of California's 2020 CO_2e emissions , or 0.003% of the state's industry related CO_2e emissions. The maximum SC-GHG equates to $132,738.

Table 5. Daily and annual emissions for the No-Action Alternative

	CO_2	CH_4	N_2O	CO_2e	Equivalent passenger vehicles
Hydraulic cutterhead dredging daily CO_2e emissions (lbs)	31,471	1.3	0.3	31,593	-
Clamshell dredging daily CO_2e emissions (lbs)	58,427	2.4	0.5	58,456	-
Annual emissions, hydraulic cutterhead dredging (metric tons)	1,713	0.071	0.016	1,720	372

Annual emissions, hydraulic cutterhead and clamshell dredging[1] (metric tons)	2,447	0.10	0.022	2,456	534

[1]Calculation assumes 60 days of clamshell dredging on the Stockton DWSC and 60 days of hydraulic dredging on the Sacramento DWSC.

Table 6. The No-Action Alternative SC-GHG, including SC-CO_2, SC-CH_4, and SC-N_2O

	SC-CO_2	SC-CH_4	SC-N_2O	**Total**
Hydraulic cutterhead dredging	$92,502	$114	$320	**$92,936**
Hydraulic cutterhead and clamshell dredging	$132,138	$160	$440	**$132,738**

Per the requirements of NEPA, the Proposed Action is compared to baseline conditions, which are equivalent to conditions under the No Action Alternative. The frequency of dredging and the total volume dredged for each navigation channel would remain the same under each Alternative. With the creation of the proposed DMPS, the total distance traveled by the dredges may decrease, but for simplicity, distance traveled will be conservatively assumed to remain the same.

For the Proposed Action, dredging operations were assumed to occur for 24 hours a day over a 5.5-month (165-day) period to calculate the annual emissions (Table 7); total emissions in terms of the equivalent number of passenger vehicles are shown as well. The SC-GHG was also calculated for the Proposed Action (Table 8).

Table 7. Annual emissions for the Proposed Action

	CO_2 (metric tons)	CH_4 (metric tons)	NO_2 (metric tons)	CO_2e (metric tons)	Equivalent passenger vehicles
Hydraulic cutterhead dredging	2,355	0.097	0.022	2,364	512
Clamshell dredging	4,373	0.18	0.037	4,389	954

Table 8. The Proposed Action SC-GHG, include SC-CO_2, SC-CH_4, and SC-N_2O

	SC-CO_2	SC-CH_4	SC-NO_2	**Total**
Hydraulic cutterhead dredging	$127,170	$155	$440	**$127,765**
Clamshell dredging	$236,142	$288	$740	**$237,170**

Comparing the maximum CO_2e emissions generated by the No-Action Alternative, implementation of the Proposed Action could result in an additional 1,933 metric tons, which would occur if both channels were dredged entirely with a clamshell dredge. This increase represents 0.00005% California's CO_2e emissions in 2020, and 0.0023% of the state's industry-

related emissions. The maximum SC-GHG could increase by up to approximately $104,000, from $132,738 to $237,170.

Maintenance dredging would allow for the continued use of the DWSC by large commercial vessels, but there is no indication that it would cause number of vessels traveling to and from the Ports of Sacramento and Stockton to increase.

Other maintenance actions such as rock placement or levee road repair would be small actions, occurring infrequently and over a short duration. GHG emissions from these activities, even when considered cumulatively, would be negligible.

The consequences of climate change, particularly change in precipitation, temperature, and sea level rise, will continue to impact inland navigation in terms of changes in water depth and velocity, changes in sedimentation processes, etc. (PIANC 2008). The water depth determines the carrying capacity for river transportation, while changes in the movement of sediment may affect dredging needs and/or increase the likelihood of bank failure, scour, and erosion. Maintenance dredging and bank protection activities will be beneficial in counteracting the effects of climate change on navigation in the DWSC, as dredging will maintain the maneuverability for large vessels through the channels and bank protection will decrease erosion on the channel banks. Overall, the No-Action Alternative has the potential to result in moderate emissions. In order to ensure CO_2e emissions are minimized, engine idling will be avoided, engines will be maintained and kept in proper working condition, and dredging vessel speeds will be reduced, as this is one of the single most effective minimization measures applied to dredging operations (PIANC 2008). Because the dredging period will only occur on a short-term basis (four months out of the year), the effects to global climate change would be minimal.

3.1.7. Environmental Justice

Environmental Justice is defined by the EPA's Office of Environmental Justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Executive Order (EO) 12898 directs Federal agencies to "identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law" (EPA 2022c). Disproportionately high adverse health effects may include bodily impairment, infirmity, illness, or death. Disproportionately high adverse environmental effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Native American tribes when those impacts are interrelated to impacts on the natural or physical environment.

The majority of environmental impacts under either alternative are not expected to affect people outside of a 0.5-mile radius of dredging locations and DMPS. Disadvantaged communities with the potential to be affected by the project were located using the Council on Environmental Quality's Climate and Economic Justice Screening Tool (2022). A disadvantaged area is one that meets more than one burden threshold related to climate change, energy, health, housing, pollution, transportation, water and wastewater, or workforce development, *and* the associated socioeconomic threshold (typically, being higher than the 65th percentile of population with income less than twice the Federal poverty level). The Sacramento and Stockton DWSCs and the currently authorized as well as proposed DMPS are located within or adjacent to multiple

disadvantaged areas. Specifically, areas in West Sacramento at the north end of the Sacramento DWSC, in Contra Costa County near Antioch and Pittsburg, as well as in southern Sacramento and western San Joaquin Counties in the delta and into Stockton, including Sherman, Twitchell, Venice, Mandeville, McDonald, Roberts, and Rough and Ready Islands are classified as disadvantaged. According to the EPA tool, many of these areas are also home to high minority populations (greater than 50% of the total population).

During dredging and other maintenance activities, noise-related impacts would be short-term and temporary, and conditions would be stabilized upon completion of construction; likewise for noise levels during the construction of proposed DMPS under Alternative 2. Noise levels for sensitive receptors in close proximity to placement sites would be consistent with existing conditions.

As is discussed in Section 3.2.5, estimated project construction and operational emissions would not exceed thresholds for any criteria pollutant, excluding NOx, which would be compensated through the purchase of mitigation credits. As such, there would not be a disproportionate air quality impact to environmental justice populations in the project area as a result of either alternative.

Neither alternative would require construction of upland elements that would result in changes to traffic or patterns at the Sacramento or Stockton Port. Traffic conditions under both alternatives would be consistent with the existing conditions.

Thus, as compared to the environmental baseline, there would be no incremental disproportionate impacts to affected populations due to noise, human health, air quality, or traffic related to the implementation of either alternative.

3.1.8. Hazardous, Toxic, and Radioactive Waste

In 2019, USACE and the Central Valley Regional Water Quality Control Board (CVRWQCB) established a long-term Memorandum of Understanding (MOU) for ongoing operation and maintenance dredging activities within the Stockton and Sacramento DWSC (Resolution R5-2019-0041). General provisions of the MOU regarding dredging and operations of DMPS require that USACE does *not*:

- Create a condition of contamination, pollution, or nuisance as defined by California Water Code section 13050,
- Cause or contribute to acute toxicity in receiving waters through discharge from dredging operations, including material disturbed by dredging, or
- Discharge hazardous waste.

In addition, USACE must conduct pre-dredge sediment and leachate sampling and analysis every five years to demonstrate that the dredge material is not hazardous waste. Sampling last occurred in 2020 and did not find that the dredge materials violated the thresholds for measured materials.

For proposed DMPS that have not been included in past sampling, a search for surrounding sites potentially containing hazardous materials was conducted through a search of the California Department of Toxic Substances Control EnviroStor and the Water Resources Control Board GeoTracker database websites (DTSC 2022; WRCB 2022). Two sites were within two miles of any of the proposed DMPS. H&H Marina, directly east of Venice Island, is a

former cleanup site closed in 2018 when a permanent site remedy was successfully implemented. Petroleum hydrocarbon release was evaluated at the location between 1995 and 2015, and it was found that petroleum hydrocarbon impacts to groundwater were limited in extent and expected to attenuate within a reasonable time frame, thus were unlikely to pose a threat to human health or waters of the State. Another site one mile east of Montezuma Wetlands previously stored hazardous materials in containers that leaked into the soil. Soil remediation was performed in 1990 and confirmation samples concluded that the chemicals had been removed. Results from groundwater monitoring wells indicated that the shallow groundwater beneath the site had not been affected by the release of materials. In 1992, the site was recommended for closure.

Therefore there are no active hazardous, toxic, and radioactive waste (HTRW) sites near the DMPS and no expected impacts to HTRW associated with the proposed DMPS.

As evidenced by the MOU between USACE and the CVRWQCB, actions undertaken under the No-Action Alternative have no effect on HTRW in the area, nor do similar actions under Alternative 2 or the addition of the proposed DMPS. Remaining in compliance with the MOU, which is mandatory in order to continue O&M dredging operations, will ensure that neither alternative will have an effect on HTRW in the project area in the future.

3.2 Environmental Resources Evaluated in Detail

Initial evaluation of the effects of the project indicated that there could be an effect on several resources. Sections 3.2.1 through 3.2.9 describe the existing conditions, effects, and when necessary, mitigation measures proposed to avoid, reduce, minimize, or compensate for any potential significant effects. Cumulative effects are addressed separately in Section 4.2. Effects are assessed for significance based on significance criteria. The significance criteria presented in this chapter were developed to satisfy the requirements of NEPA, when feasible, and relevant agency thresholds.

3.2.1. Geology and Soils

3.2.1.1 Affected Environment

The Sacramento and Stockton DWSCs lie within the topographically flat and sediment-filled Central Valley, which is approximately 465 miles long and 40 to 60 miles wide. The valley is bounded by the Sierra Nevada on the east and the Coast Ranges on the west.

The historical Delta which comprises the DWSCs evolved at the inland margin of the San Francisco Bay Estuary as two overlapping geomorphic units. As the last ice age ended about 10,000 years ago, glaciers began to melt and the Sacramento and San Joaquin Rivers carried water and sediment from the Sierra Nevada. In the Sacramento River Delta, silts and sands were deposited adjacent to the river channel, forming natural levees above the marsh plain. In contrast, the larger San Joaquin River Delta—located in the central and southern portions of the Delta and having relatively small flood flows and low sediment supply—formed as an extensive, unleveed freshwater tidal marsh dominated by tidal flows and organic soil (peat and muck) accretion (Atwater and Belknap 1980). Because the San Joaquin River Delta had less well-defined levees, sediments were deposited more uniformly across the floodplain during high water, creating an extensive tule marsh with many small branching tributary channels. As a result of the differential amounts of inorganic sediment supply, the peats and mucks of the San Joaquin River Delta grade

northward into peaty mud and then into mud as it approaches the natural levees and flood basins of the Sacramento River Delta (Atwater and Belknap 1980).

The delta is blanketed by peat and peaty alluvium deposited where streams enter the San Francisco Bay system (Ingebritsen et al. 2000). These soils formed in the delta as the result of geologic processes over approximately the past 7,000 years. These processes produced landward accumulation of sediment behind the bedrock barrier at the Carquinez Strait, forming marshlands comprising approximately 100 islands that were surrounded by hundreds of miles of channels (Weir 1950). Generally, mineral soils formed near the channels during flood conditions and organic soils formed on marsh island interiors as plant residues accumulated faster than they could decompose. Prior to the mid-1800s, the delta was a vast marsh and floodplain, under which peat soils developed to a thickness of up to 30 feet in many areas (Weir 1950), with a thickness of approximately 55 feet in the vicinity of Sherman Island.

In the late-1800s, large-scale agricultural development in the Delta required levee-building to prevent frequent flooding. The leveed marshland tracts were drained, cleared of wetland vegetation, and tilled. Levees and drainage systems were largely complete by 1930 and the Delta had taken on its current appearance, with most of its 1,150-squaremile area reclaimed for agricultural use (Ingebritsen et al. 2000, Thompson 1957). Reclamation and agriculture have led to subsidence of the land surface on the islands in the central and western delta. The dominant cause of this subsidence is decomposition of organic carbon in the peat soils. Prior to agricultural development, the soil was waterlogged and anaerobic. Organic carbon accumulated faster than it could decompose. Drainage for agriculture led to oxygen-rich conditions that favor rapid microbial oxidation of the carbon in the peat soil. Most of the carbon loss is emitted as carbon dioxide gas to the atmosphere (Ingebritsen et al. 2000, Deverel and Rojstaczer 1996). Many of the delta islands are presently 10 to nearly 25 feet below sea level (Velasquez-Manoff 2019, Ingebritsen et al. 2000, Weir 1950).

The project area is considered seismically active and is subject to moderate to large earthquakes. The Midland fault zone crosses the Sacramento River at the tip of Grand Island and is the dominant structural feature. The Calaveras, San Pablo, and Hayward fault zones are located several miles to the south.

3.2.1.2 Environmental Consequences

Basis of Significance. The project would significantly affect geology and soils if it would (1) result in substantial soil erosion or permanent loss of topsoil; or (2) substantially degrade sediment quality.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue its maintenance dredging practices and rock placement for bank protection, and all DMPS used would be those that are currently in use. Approximately 13 miles of levee maintenance road S-31 would be repaired, along with other levee maintenance roads as needed. All activities would be conducted in accordance with the conditions described under the No Action Alternative to reduce effects to soils and geological resources.

Dredging would remove sediment that has accumulated since the prior dredging event. The design dimensions of the channels are intended to preclude sloughing of the channel sides. Although the alternative may result in minimal erosion of the channel sides from sloughing after the channels are dredged due to the disturbance of sediments, historic patterns of erosion and

sediment accumulation would not be expected to change. Transport of dredged materials would not disturb sediments, and therefore would not result in any erosion impacts.

The potential for erosion impacts due to placement activities would be minimal. The disposition of dredged material at upland placement sites is managed by site operators so that substantial erosion impacts do not occur. At Antioch Dunes, an existing habitat restoration site, the addition of dredged sediment would provide benefit to the site by providing sediment to facilitate ongoing restoration.

Generally, areas that are regularly dredged, as are the Sacramento and the Stockton DWSCs, produce dredge material with low concentrations of pollutants as opposed to areas infrequently dredged, such as agricultural sloughs.

As part of the MOU between USACE and CVRWQCB (see Section 3.1.8), USACE must conduct pre-dredge sediment and leachate sampling and analysis every five years to demonstrate that the dredge material is not hazardous waste. During the most recent sampling event in June and July of 2020, it was found that all but one sample from the Sacramento DWSC exceeded at least one of the criteria for metals set in the MOU. Therefore, the reuse of dredged material from these reaches would be limited to compatible reuse activities.

In the Stockton DWSC, only three of 25 samples exceeded one of the metals criteria; these three samples were from material that would be discharged into Antioch Dunes and Mandeville DMPS. No samples on either of the DWSC failed the criteria for whole sediment organics or Waste Extraction Test (WET) dissolved metals, which is in some form indicative of the concentrations in the leachate from the mass of the confined dredged material.

In general, the continued dredging of the Sacramento and Stockton DWSCs and placements of material at the authorized DMPS will not degrade the quality of the soils as compared to existing conditions.

Dredging and material placement under Alternative 1 are unlikely to contribute to erosion. The Alternative would actually have a beneficial effect to erosion at the Antioch Dunes habitat restoration site. Furthermore, because the dredged material is not known to contain high concentrations of pollutants or contaminants, disturbance of the material while dredging and placement of the material at DMPS would not degrade sediment quality in the project area. Therefore, the effects of Alternative 1 to geology and soil resources in the project area are **less than significant**.

Alternative 2 - Proposed Action. Under the Proposed Action, the frequency of dredging and volumes dredged would be the same as under the No Action Alternative. Dredging, bank protection, and placement of dredged materials would be conducted in accordance with the conditions described under the Proposed Action to protect against soil erosion and substantial degraded sediment quality including Avoidance and Minimization Measures.

Potential erosion impacts under Alternative 2 would be very similar to those under Alternative 1. In addition to the impacts described for Alternative 1, the disposition of dredged material at Montezuma Wetlands would have a beneficial effect on soil resources by providing sediments needed to implement habitat restoration.

Under Alternative 2, the same areas would be dredged as in Alternative 1. Then, the quality of the dredged material would be the same as Alternative 1, as would the effect to

sediment quality. Therefore, Alternative 2 also would not degrade the quality of soils as compared to existing conditions.

Dredging and material placement under Alternative 2 are unlikely to contribute to erosion or loss of topsoil; indeed, the alternative would have a beneficial effect to erosion at the proposed placement site at the Montezuma Wetlands habitat restoration site. Furthermore, because the dredged material is not known to contain high concentrations of pollutants or contaminants, disturbance of the material while dredging and placement of the material at DMPS would not degrade sediment quality in the project area. Therefore, the effects of Alternative 2 to geology and soil resources in the project area are **less than significant**.

3.2.1.3 Avoidance and Minimization Measures

1. USACE would continue to conduct testing following guidelines in the CVRWQCB MOU Resolution R5-2019-0041, and to ensure BU of dredged material as appropriate and feasible. Conformance with the above processes would ensure that dredged material placement activities would not substantially degrade existing sediment quality at the placement sites.
2. The contractor would be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations to ensure compliance with water quality standards. This would be accomplished by installing temporary and permanent erosion and sediment control best management practices. These may include, but are not limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Any temporary measures would be removed after the area has been stabilized.
3. Upon completion of the dredging operation, any disturbed banks would be restored to pre-project conditions.

3.2.2. Vegetation and Wildlife

3.2.2.1 Affected Environment

A plant community is a natural or human influenced assemblage of plants that have common characteristics and can be easily identified by key species. There are six major plant communities and cover types within and around the project area: early-successional/non-native herbaceous, riparian scrub, emergent marsh, agricultural lands, barren land, and open water. These communities and associated wildlife are described below. Sensitive native communities are considered native-diverse communities that are regionally uncommon or of special concern to Federal, state, and local resource agencies. The riparian forest and scrub, and open water habitats are considered sensitive native communities.

Early-successional/Non-native Herbaceous. These areas typically occur on the mid to upper slopes of levees and within levee crowns but also on the waterside of levees within gaps in the riparian forest canopy and as the herbaceous understory of riparian forest and riparian scrub. This plant community type is characterized by a dominance of non-native grasses and forbs that opportunistically colonize areas subject to past and/or ongoing disturbance (*e.g.*, plowing, mowing, herbicidal spraying). Representative species known to occur in the study area are ripgut

brome, Bermuda grass (*Cynodon dactylon*), Johnson grass (*Sorghum halapense*), ryegrass (*Lolium multiflorum*), wild oats, broadleaf filaree (*Erodium botrys*), whitestem filaree (*E. moschatum*), wild cudweed (*Gnaphalium* spp.), bedstraw (*Galium aparine*), fennel (*Foeniculum vulgare*), yellow star-thistle, and milk thistle (*Silybum marianum*). This community supports common birds and mammals including but not limited to sparrows, rabbits, and ground squirrels.

Riparian Scrub. This plant community is typically associated with the toe of levees and along the banks of rivers and streams and other drainages in the project area. It is distinguished from riparian forest by the dominance of shrubs and smaller trees less than 20 feet tall, particularly willows, and it lacks a well-developed overstory of tall trees. Dominant species are frequently arroyo willow (*Salix lasiolepis*), Goodding's black willow, and narrowleaf willow (*Salix exigua*). Other species commonly observed in riparian scrub are buttonbush, California wild rose, California blackberry, Himalayan blackberry, and blue elderberry. Associated wildlife species includes but is not limited to beaver, raccoon, striped skunk, rabbits, and ground squirrels.

Emergent Marsh. Emergent marsh is restricted to a relatively narrow saturation zone along toes of levee slopes and is characterized by the presence of hydrophytic (*i.e.*, "water-loving") herbaceous plant species that can tolerate fluctuating water levels and persist in continuously saturated soils. Vegetative cover for this plant community type is generally sparse due to bankline erosion caused by watercraft and high flow events, especially along major waterways, such as the Sacramento and San Joaquin Rivers. Representative species observed in emergent marsh in the study area include cattails (*Typha* spp.), tule (*Schoenoplectus* spp.), common rush (*Juncus effusus*), Santa Barbara sedge, Vasey's grass (*Paspalum urvillei*), smartweed (*Polygonum lapathifolium*), creeping water-primrose (*Ludwigia peploides* ssp. *montevidensis*), purple-top vervain (*Verbena bonariensis*), western goldenrod (*Euthamia occidentalis*), wild licorice (*Glycyrrhiza lepidota*), and bitter dogbane (*Apocynum androsaemifolium*). Associated wildlife species includes but is not limited to red-winged blackbirds, kingfisher, otter, and turtles.

Agricultural Lands. Agricultural lands occur at the outer boundary of the project area on the landside of levees. They include orchards, vineyards, row and field crops (*e.g.*, sweet corn, tomatoes, alfalfa), and pasturelands. Pasturelands typically contain a variety of native and nonnative grasses and forbs such as tall fescue (*Festuca arundiaceae*), white clover (*Trifolium repens*), dallis grass (*Paspalum dilatatum*), and chicory (*Chichorium intybus*).

Barren. Barren areas within the project area include paved and dirt roads, dirt lots, revetment areas dominated by quarry stone or rock, and other areas that are essentially devoid of vegetation, usually through vegetation management practices such as burning or discing (i.e., turning and loosening soil). Barren substrates consist primarily of rock, pavement, and bare soil. Vegetation is typically absent; however, sparse weedy grasses and forbs may be present. Classes of revetment include angular rock, cobble, and concrete rubble.

Open Water. Open water within the project area consists of rivers, creeks, sloughs, canals, and other unnamed drainages and ponds. Riparian shrub, and emergent marsh land cover types are generally located adjacent to open water areas at the outboard toes of land slopes, but areas designated as open water are essentially unvegetated.

3.2.2.2 Environmental Consequences

Basis of Significance. An alternative would significantly affect vegetation and wildlife if it would (1) reduce the amount of native vegetation and wildlife habitat in the project area to a point that native wildlife could not permanently live or survive in the project area or (2) permanently remove or disturb sensitive native communities.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue maintenance dredging for the projects it maintains in the Sacramento and Stockton DWSC, as described in Section 2.2, under the prior NEPA documents (1980, 1986, 1988, 1997, 1998, 2004, and 2019). There would be temporary effects to vegetation from the placement of dredged material. However, based on previous biological surveys, these communities generally recover within one to two years after material placement (USACE unpublished clearance surveys from 2019 through 2021). There would be minor disturbances to aquatic wildlife during dredging, up to and including entrainment of fish species (MGEC and NAS 2017, 2018a, 2018b; ICF 2019, 2020, 2021). Placement of dredge material could temporarily discourage birds and other wildlife from foraging within and near the DMPS due to vibration and noise from equipment. Since the No Action Alternative would not reduce the amount of native vegetation and wildlife habitat in the project area to a point that native wildlife could not permanently live or survive in the project area or permanently remove or disturb sensitive native communities, the effects would be **less than significant**. Additional avoidance and minimization measures would help to further reduce effects.

Alternative 2 - Proposed Action. Under the Proposed Action Alternative, dredging would be similar to the No Action, but would include the possibility of mechanical dredging on the Sacramento DWSC, and would include the newly proposed DMPS for both the Sacramento and Stockton DWSC. With implementation of the BMPs described in Sections 3.2.2.3 and 3.2.4.3, there would be no additional effects to vegetation and wildlife beyond those described in the No Action Alternative. Therefore, the effects to vegetation and wildlife from the Proposed Action Alternative would be **less than significant**.

3.2.2.3 Avoidance and Minimization Measures

1. The effluent pipe would be placed through the near shore areas where it would least affect riparian vegetation, including emergent or submerged vegetation that serves as EFH or critical habitat. Specifically, this vegetation acts as a refuge to juvenile special status fish species and their prey base. Preferable locations would be away from areas that contain large woody debris, or wetland and riparian vegetation; have angular revetment slopes of 3:1 or greater; and maintain constant water velocities with little or no eddies occurring in the area. A qualified biologist (monitor) would be onsite prior to all maintenance dredging activities to determine appropriate pipe placement.
2. USACE, through the dredging contractors, would minimize adverse effects associated with any loss of riparian habitat by mitigation with no net loss of quantity or quality. This would be coordinated with NMFS.

3.2.3. Fisheries

3.2.3.1 Affected Environment

The project area in the engineered DWSCs and lower delta region includes native fish present which can be separated into anadromous species and resident species. Native and nonnative fish species potentially present or encountered in previous years dredging operations in the project area are listed in Table 9 (USACE 2013). Native anadromous species include two Evolutionary Significant Units (ESUs) of Chinook salmon, Central Valley Distinct Population Segment (DPS) of steelhead trout, and the southern DPS (sDPS) of green sturgeon. These species are also listed under the ESA (refer to Table 10). All of these anadromous species are expected to use habitat in parts of the project area. Additionally, the project area is within the Designated Critical Habitat for Central Valley spring-run and winter-run Chinook salmon, Central Valley steelhead and the green sturgeon sDPS. Native resident species include but are not limited to Delta smelt, longfin smelt, Sacramento pikeminnow, Sacramento splittail, Sacramento sucker, hardhead, California roach, and rainbow trout and can be found throughout the project area in various aquatic habitats. Both Delta smelt and longfin smelt are listed under the ESA (Table 10)

The Magnuson-Stevens Fishery Conservation and Management Act requires consultation with the National Marine Fisheries Service (NMFS) if a project action would potentially affect Essential Fish Habitat (EFH), defined as "…those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." The project area overlaps EFH for three fishery management plans (FMPs); the Pacific Salmon FMP (Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central valley fall-/late fall-run Chinook salmon), the Pacific Groundfish FMP (starry flounder) and the Coastal Pelagic species FMP (northern anchovy).

Special status fishes, their critical habitats, and EFH are addressed in Section 3.2.4. The remainder of this section will cover fisheries not protected under Federal law.

Table 9. Project area native and nonnative fish species encountered or potentially present.

Common Name	Scientific Name	Origin
White Catfish	*Ameiurus catus*	nonnative
Threadfin Shad	*Dorosoma petenense*	nonnative
Striped Bass	*Morone saxatilis*	nonnative
American Shad	*Alosa sapidissima*	nonnative
Channel Catfish	*Ictalurus punctatus*	nonnative
Longfin Smelt	*Spirinchus thaleichthys*	native
Wakasagi	*Hypomesus nipponensis*	nonnative
Yellowfin Goby	*Acanthogobius flavimanus*	nonnative
Shimofuri Goby	*Tridentiger bifasciatus*	nonnative
Sacramento Splittail	*Pogonichthys macrolepidotus*	native

Common Name	Scientific Name	Origin
White Sturgeon	*Acipenser transmontanus*	native
Redear Sunfish	*Lepomis microlophus*	nonnative
Starry Flounder	*Platichthys stellatus*	native
Shokihaze Goby	*Tridentiger barbatus*	nonnative
Tule Perch	*Hysterocarpus traski*	native
Bluegill	*Lepomis macrochirus*	nonnative
Brown Bullhead	*Ameiurus nebulosus*	nonnative
Common Carp	*Cyprinus carpio*	nonnative
Delta Smelt	*Hypomesus transpacificus*	native
Prickly Sculpin	*Cottus asper*	native
Warmouth	*Lepomis gulosus*	nonnative
Blue Catfish	*Ictalurus furcatus*	nonnative
Sacramento Blackfish	*Orthodon microlepidotus*	native
Black Crappie	*Pomoxis nigromaculatus*	nonnative
Bigscale Logperch	*Percina macrolepida*	nonnative
Pacific Staghorn Sculpin	*Leptocottus armatus*	native
sDPS Green Sturgeon	*Acipenser medirostris*	native
Sacramento Pikeminnow	*Ptychocheilus grandis*	native
White Crappie	*Pomoxis annularis*	nonnative
Golden Shiner	*Notemigonus crysoleucas*	nonnative
Chinook Salmon	*Oncorhynchus tshawytscha*	Native
Steelhead	*Oncorhynchus mykiss*	native
Rainbow Trout	*Oncorhynchus mykiss*	native
Largemouth Bass	*Micropterus salmoides*	nonnative
Mississippi Silverside	*Menidia beryllina subspecies*	nonnative
River Lamprey	*Lampetra ayersi*	native
Sacramento Sucker	*Catostomus occidentalis*	native
Hardhead	*Mylopharodon conocephalus*	native
Speckled Dace	*Rhinichthys osculus*	native
California Roach	*Lavinia symmetricus*	native

Common Name	Scientific Name	Origin
Hitch	*Lavinia exilicauda*	native
Fathead Minnow	*Pimephales promelas*	nonnative
Goldfish	*Carassius auratus*	nonnative
Black Bullhead	*Ameiurus melas*	nonnative
Mosquitofish	*Gambusia affinis*	nonnative
Inland Silverside	*Menidia beryllina*	nonnative
Threespine Stickleback	*Gasterosteus aculeatus williamsoni*	native
Green Sunfish	*Lepomis cyanellus*	nonnative
Redeye Bass	*Micropterus coosae*	nonnative
Spotted Bass	*Micropterus punctulatus*	nonnative
Smallmouth Bass	*Micropterus dolomieu*	nonnative

3.2.3.2 Environmental Consequences

Basis of Significance. An alternative would be considered to have a significant effect on fisheries resources if it would: (1) substantially interfere with the movement of any resident or migratory fish; or (2) involve discharges of material into waterways that would pose a hazard to fish.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue maintenance dredging practices for the projects it maintains in the Sacramento and Stockton DWSC as described in Section 2.2. Under this alternative, dredging within the Stockton DWSC would be done with either a hydraulic cutterhead or mechanical clamshell dredger, while dredging within the Sacramento DWSC would use a hydraulic cutterhead dredger.

Vibration and noise caused by dredging and bank protection activities may displace resident or migratory fish. The extent of this potential take cannot be quantified (Reine and Dickerson 2014). Noise and vibration are expected in and around the areas where maintenance dredging and rock placement are occurring and may displace native species in the vicinity of the activity but not substantially interfere with the movement of any resident or migratory fish.

Most fish would be expected to move away from the approaching clamshell bucket and thus escape direct injury during dredging. It is generally accepted that clamshell buckets have a low potential to entrain fish in comparison to other dredging methods. Clamshell dredging operations would proceed slowly and would present reasonable opportunity for fish, including adult and juvenile salmonids, to escape from a dredge area prior to commencement of the actual dredging operation. Most fish would be expected to move away from the approaching cutterhead and thus escape direct injury during dredging.

Fish that are displaced by the approaching dredge could forego foraging in the project area for a short time, but could return to the dredged area as soon as the vessel moved away and turbidity decreased to a level tolerable to the fish. Fish that prey on benthic invertebrates may

benefit from enhanced foraging opportunities after the dredge passed, as injured or uncovered invertebrates could be more easily captured in the turbid waters. In the dredged area, overall benthic invertebrate density would likely decrease following dredging, and remain low until, invertebrates recolonized the dredged area.

Dredged material and water removed from the Stockton and Sacramento DWSC would be placed on the authorized DMPS. Then most of the solids would settle out of the slurry mix. The resulting liquid would eventually pool and fill the designated areas on the DMPS (as determined by boundaries such as banks, dikes, and berms). After the estimated retention time of 14.5 to 280 hours, most of the solids would have been removed via gravity. A minimal amount may remain in suspension. During this time, some of the water would be lost by evaporation and some of the water would permeate the ground. Depending on the size of the DMPS, the remaining water could either remain on site to percolate into the ground or be discharged into the river. All water would meet standards as required by the CVRWQCB before discharge.

Benthic fish that remained in the area adjacent to the drag arm, or pelagic fish in areas adjacent to the bucket dredge could experience increased turbidity and sedimentation if the dredge raised a cloud of fine silts. Any appreciable turbidity increase may also clogging the gills of fish.

In accordance with the MOU with the CVRWQCB, decant water would be tested during discharge. In addition, although some adverse effects may occur as a result of short-term exposure, native fish are not expected to remain in the project area long enough to experience long-term detrimental effects. Juveniles entering the dredged reaches may find reduced benthic prey species and would subsequently feed on prey available in the water column or would relocate to other areas with better feeding opportunities (USACE 2004). There is usually a 2-year recovery period for the invertebrate prey (USACE and EPA 2003). Thus, this effect would be relatively short term.

Since the No Action Alternative is not likely to substantially interfere with the movement of any resident or migratory fish or discharge materials into the waterways that would pose a hazard to fish, the effects of Alternative 1 to fisheries would be **less than significant**. Additional avoidance and minimization measures would help to further reduce effects.

Alternative 2 - Proposed Action. Under the Proposed Action, the dredge equipment type, frequency of dredging, and volumes dredged would be the same as under the No Action Alternative. In addition, mechanical dredging would be an option for the Sacramento DWSC and the in-water work windows would be extended to November 15 and December 15 for the Sacramento and Stockton DWSC, respectively. Placement of dredged materials would be conducted in accordance with the conditions described under the No Action to protect fisheries including the conservation measures and avoidance minimization, and mitigation measures. As a result, there would not be additional effects beyond those described in the No Action Alternative to fisheries and therefore, the effects would be **less than significant** with the implementation of the Avoidance and Minimization Measures.

3.2.3.3 Avoidance and Minimization Measures

The following measures are applicable to and would be implemented under both Alternative 1 and Alternative 2:

1. Consistent with policy, USACE could participate in a program for BU of dredged material (WRDA 2020 Section 125(a)(1), United States Congress 2022, Dept. of the Army 2022). Because USACE does not own the material that is placed onto most of the DMPS (USACE only owns Rio Vista and Grand Island), any actions involving reuse of dredged material must be cost-shared as a joint effort with the owners of the sites and/or other local sponsors (i.e. local governments, other agencies). The material would be used to create riparian habitat and shallow-water fish habitat. The material would be shaped to provide depths and slopes conducive to invertebrate and fish rearing. These additional EFH areas could benefit aquatic resources via shoreline vegetation and nutrients See Section 6.4.9 in the NMFS Biological Assessment (Appendix B).
2. If unavoidable adverse effects to wetlands or shallow water habitats occur, USACE would mitigate for any such losses by seeking locations where existing shallow waters/wetlands exist waterside in the project area and expanding those areas by adding materials. If any EFH or critical habitat becomes damaged, it would be restored with appropriate native vegetation. USACE would maximize the placement of these materials during slack and ebbing tides, and a silt fence/curtain would be employed to reduce the effects of turbidity.
3. The effects to water quality would further be minimized by not allowing the release of oils, grease, waxes, or other materials that could form a visible film or coating on the water surface or on the stream bottom or creating a nuisance or adversely affecting BU. Any spills of hazardous materials would be cleaned up immediately and reported in compliance reports.

The measures below would either be written into the dredging contract as a requirement, or would be taken into account at the time of issuing task orders under the contract, as appropriate during each proposed dredging season.

1. Dredging at depths less than 25 feet will be avoided to the fullest extent possible.
2. Dredge operator will not operate cutter heads more than 3 feet above the channel bottom.
3. Dredging operations will avoid peak migration timing of juvenile and adult anadromous species presence in the project area.
4. Suction dredging will not be operated as the dredge head is deployed and retrieved through the water column.
5. The suction head would be maintained at a constant elevation near the channel bed when dredging, to reduce the field of influence where fish may be entrained into the dredge pipe. Rather than dredging the entirety of the channel and swinging the suction through a “water hole” mid-channel, dredging will occur just along the channel edges where there is adequate material, thus minimizing exposure to open water areas where entrainment would be more likely.
6. A drag beam or similar device will not be used to “knock down” ridges or high spots in the channel bottom.
7. Bank stabilization work in shallow water habitat will be avoided to the maximum extent possible.

3.2.4. Federal Special Status Species

3.2.4.1 Affected Environment

Federally listed species and their habitats are protected by Federal laws and agency regulations. The ESA of 1973 (16 U.S.C. 1531 *et seq*.) provides legal protection for plant and animal species in danger of extinction (50 CFR. Part 17). This act is administered by USFWS and NMFS. For the purposes of this NEPA document, Federal special status species also include candidate or proposed listed species under the ESA, nesting bird species and active nests of birds listed under the Migratory Bird Treaty Act (MBTA), species listed in the Bald and Golden Eagle Protection Act, and Essential Fish Habitat (EFH) listed under Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 *et seq*.). The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations (USFWS 2013). The Magnuson-Stevens Fishery Conservation and Management Act requires the identification of EFH for Federally managed fishery species and the implementation of measures to conserve and enhance this habitat (50 CFR § 402.14(j)). Under the act, Federal agencies are required to consult with NMFS if a project action would potentially affect EFH.

USACE and NMFS have developed a 10-year programmatic approach for maintaining both DWSCs to their authorized depths via maintenance dredging and levee stabilization, as described in the BOs and supplemental documents for the shipping channels (NMFS 2006a, 2006b, 2016). These BOs also covered EFH consultation. The latest NMFS BO (file no. WCR-2016-4548) covers both the Sacramento and Stockton DWSCs for the period from 2016 through 2025. An updated Biological Assessment (BA) has been prepared and formal consultation with NMFS was reinitiated on January 30, 2023 (Appendix B). Re-initiation is being pursued because of modifications to the Proposed Action since the consultation in 2016 and changes regarding listed species referenced in the BO (NMFS 2016). The USFWS issued five-year programmatic BOs for the Sacramento DWSC (USFWS 2017a, file no. 08FBDT00-2017-F-0098) and the Stockton DWSC (USFWS 2017b, file no. 08FBDT00-2017-F-0099) covering the period from 2017 to 2021. USFWS granted an extension for the 2022 season on both BOs on March 14, 2022 An updated BA has been prepared and formal consultation with USFWS was reinitiated on January 30, 2023 to cover the 2023 through 2027 dredging seasons (Appendix B). The Biological Opinions from both agencies are expected in June 2023 and will be incorporated into the Final SEA and FONSI.

USACE received a species list (Project Code 2023-0018865; Appendix C) for the Sacramento DWSC project area from the USFWS's Information for Planning and Consultation (IPaC) online system on November 26, 2022, and a list (Project Code 2022-0023239; Appendix A) for the Stockton DWSC project area on November 26, 2022 (Project Code 2022-0023239; Appendix A). In addition, a list for NMFS species was obtained through a geospatial database. A total of 31 Federally listed species were identified as occurring within the project area; however, 17 of these species are not known to occur near the project areas or are unlikely to be affected by the project activities. Table 10 summarizes the status of the species protected under the ESA; those unaffected by the proposed action are not discussed further in this document. Further details on each affected species–including detailed status, abundance, life history, and occurrence in the project area–are discussed in Section 4 of each of the BAs (see Appendix B).

Table 10. Summary of effects from the proposed action to Federally endangered and threatened species.

Evolutionarily Significant Unit (ESU) / Distinct Population Segment (DPS) / Other	List Status	Resource Agency Jurisdiction	Critical Habitat Designation/Action Area within Designated Critical Habitat (DHC)	Factors Affecting Determination	ESA Section 7 Effects Determination
Mammals					
Riparian Brush Rabbit (*Sylvilagus bachmani riparius*)	Endangered (February 23, 2000; 65 FR 8881-8890)	USFWS	None designated	Majority of DMPS lack suitable habitat for riparian brush rabbit, while one site (Tule Island) contains marginal habitat in the form of a 6-foot-wide strip of Himalayan blackberry. All sites are more than 7.5 miles from the nearest documented occurrences (CDFW 2022) and the intervening lands lack suitable connectivity of protective cover (USFWS 2020) to enable colonization. Quantity of dense, brushy riparian vegetation would remain consistent with regional baseline conditions.	No effect
Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*)	Endangered (October 13, 1970; 35 FR 16047-16048)	USFWS	None designated	All DMPS lack suitable habitat–saline emergent wetlands–for the salt marsh harvest mouse (CDFW 2022). Regional saline emergent wetland vegetation would remain consistent with baseline conditions.	No effect
San Joaquin Kit Fox (*Vulpes macrotis mutica*)	Endangered (March 11, 1967; 32 FR 4001)	USFWS	None designated	The DMPS only contain marginal foraging habitat for the San Joaquin kit fox, are beyond the historic range for the species (Grinnell et al. 1937; USFWS 2010), and the nearest documented occurrence is more than five miles away (CDFW 2022). Therefore, it is highly improbable that kit fox would be affected by the placement of dredged material. In addition, soils at the sites lack suitable physical properties for dens (NRCS 2022).	May affect, not likely to adversely affect
Birds					
California Clapper Rail (*Rallus longirostris obsoletus*)	Endangered (October 13, 1970; 35 FR 16047)	USFWS	None designated	All DMPS lack suitable habitat–saltwater and brackish marshes traversed by tidal sloughs–for the California clapper rail (CDFW 2022). Species only occurs within the vicinity of San Francisco Bay, which is outside the proposed action area.	No effect
California Condor (*Gymnogyps californianus*)	Endangered (March 11, 1967: 32 FR 4001)	USFWS	Outside DCH	Based on the ecological system classifications for the DMPS (USGS 2011), they do not contain a landcover type used by California condors for foraging or roosting (Hall et al. 2019). In addition, regional shrubland, coniferous forest, and oak savanna vegetation growth will remain consistent with baseline conditions. Therefore, available habitat will not be diminished and there would be no effect on California condors.	No effect
California Least Tern (*Sternula antillarum browni*)	Endangered (June 2, 1970; 35 FR 8495)	USFWS	None designated	All DMPS are outside the documented range of this species, except for the Montezuma Wetlands (CDFW 2022). Species is known to occupy dredge spoil (Whitman 1988; Ehrlich et al. 1992) and used Phase I of Montezuma for nesting in 2005 and 2006. Dredge placement would occur starting in August, which is after the species begins migrating south for the winter (USFWS 2006). Given the lack of suitable foraging habitat near most of the wetlands, it is unlikely that the species would utilize placement sites within the proposed action area, except for Montezuma Wetlands, where placement could have beneficial effects.	May affect, not likely to adversely affect
Least Bell's Vireo (*Vireo bellii pusillus*)	Endangered (May 2, 1986; 51 FR 16474)	USFWS	Outside DCH	The DMPS lack suitable habit for least Bell's vireo. Quantity of regional mid-successional riparian habitat with low, dense, shrubby vegetation would remain consistent with baseline conditions.	No effect
Yellow-billed Cuckoo (*Coccyzus americanus*)	Threatened (Nov 03, 2014: 79 FR 59991)	USFWS	Outside DCH	The DMPS lack suitable habit (patches of riparia forest > 12.5 acres; Halterman et al. 2016) for yellow-billed cuckoo. Quantity of early to mature native or mixed native/exotic riparian forest would remain consistent with baseline conditions.	No effect
Reptiles					
Alameda whipsnake (*Masticophis lateralis euryxanthus*)	Threatened (December 5, 1997: 62 FR 64306)	USFWS	Outside DCH	All DMPS lack suitable habitat– south-facing slopes and ravines, with rock outcrops, deep crevices or abundant rodent burrows–for the Alameda whipsnake (CDFW 2022). Nearest occurrence is more than 5 miles away from Antioch Dunes DMPS and is across dense, urban environment with no suitable intervening habitat. Thus, the proposed action would have no effect on the Alameda whipsnake.	No effect
Giant Garter Snake (*Thamnophis gigas*)	Threatened (October 20, 1993; 58 FR 54053)	USFWS	None designated	There would be no direct loss of GGS habitat since all dredge material would be deposited in uplands within the DMPS. However, proposed action would occur beyond October 1 when snakes are beginning their use of upland brumation sites for the winter. Since snakes use small mammal burrows, soil crevices, and/or rock crevices for shelter for brumation during the winter season and aestivating during extremely hot days during their active period, the proposed project will likely have some adverse effect by harassing snakes away from suitable habitat or by disrupting brumation/aestivation if snakes are occupying a burrow or rock outcropping within a DMPS.	May affect, likely to adversely affect
Amphibians					
California Red-legged Frog (*Rana draytonii*)	Threatened (May 23, 1996; 61 FR 25813-25833)	USFWS	Outside DCH	All DMPS are outside the documented range of this species (CDFW 2022). Local riparian vegetation growth would remain consistent with baseline conditions. Therefore, available habitat would not be diminished.	No effect
California Tiger Salamander (*Ambystoma californiense*), Central California DPS	Threatened (May 4, 2004; 69 FR 24876- 24904	USFWS	Outside DCH	All DMPS are outside the extant documented range of this species (CDFW 2022). Grassland, savannah, open woodland, and vernal pool habitats would remain consistent with regional baseline conditions. Therefore, available habitat would not be diminished.	No effect
Insects					
Delta Green Ground Beetle (*Elaphrus viridis*)	Threatened (August 8, 1980; 45 FR 52807-52810)	USFWS	Outside DCH	All DMPS are outside the documented range of this species, which is restricted to the margins of vernal pools in the grassland area between Jepson Prairie and Travis Air Force Base (CDFW 2022).	No effect
Lange's Metalmark Butterfly (*Apodemia mormo langei*)	Endangered (June 1, 1976; 41 FR 22041-22044)	USFWS	February 08, 1977: 42 FR 7972-7976/Antioch Dunes DMPS is within the DCH	Dredge material has been used to create habitat for this species in coordination with the USFWS at the Antioch Dunes National Wildlife Refuge. These efforts will probably continue and would have beneficial effects on the Lange's metalmark butterfly and its DCH.	May affect, not likely to adversely affect
Monarch Butterfly (*Danaus plexippus*)	Candidate	USFWS	None designated	DMPS are mostly barren and free of milkweed (*Asclepias* spp.); abundance of relevant nectar species (Fallon et al. 2015) would remain consistent with regional baseline conditions.	No effect
Valley Elderberry Longhorn Beetle (VELB) (*Desmocerus californicus dimorphus*)	Threatened (August 8, 1980; 45 FR 52803-52807)	USFWS	Outside DCH	USACE proposes to continue conducting pre-dredging surveys on the existing and proposed DMPS to identify any elderberry shrubs (*Sambucus* spp.), which are the sole host plant for the VELB, and completely avoid them by maintaining a 20-foot or greater buffer from any located shrubs.	May affect, not likely to adversely affect
Fishes					
Central Valley Spring-run Chinook Salmon (*Oncorhynchus tshawytscha*)	Threatened (September 16, 1999; 64 FR 50394).	NMFS	September 2, 2005; 70 FR 52629	Juveniles could be in channels during dredge maintenance work. Pelagic, sufficient swimming ability to avoid dredges. No salmon have been encountered over 16 years of entrainment monitoring in the Sacramento and Stockton DWSC (MGEC and NAS 2017, 2018a, 2018b; ICF 2019, 2020, 2021; Applied Marine Sciences 2022).	Species: may affect, not likely to adversely affect DCH: may affect, not likely to

Evolutionarily Significant Unit (ESU) / Distinct Population Segment (DPS) / Other	List Status	Resource Agency Jurisdiction	Critical Habitat Designation/Action Area within Designated Critical Habitat (DHC)	Factors Affecting Determination	ESA Section 7 Effects Determination
					adversely affect
Sacramento River Winter-run Chinook Salmon (*Oncorhynchus tshawytscha*)	Endangered (January 4, 1994; 59 FR 440)	NMFS	June 16, 1993; 58 FR 33212	Juveniles could be in channels during dredge maintenance work. Pelagic, sufficient swimming ability to avoid dredges. No salmon have been encountered over 16 years of entrainment monitoring in the Sacramento and Stockton DWSC (MGEC and NAS 2017, 2018a, 2018b; ICF 2019, 2020, 2021; Applied Marine Sciences 2022).	Species: may affect, not likely to adversely affect DCH: may affect, not likely to adversely affect
Delta Smelt (*Hypomesus transpacificus*)	Threatened (March 5, 1993; 58 FR 12854-12864)	USFWS	December 19, 1994: 59 FR 65256-65279/ action area is within the DCH	Based on 16 years of entrainment monitoring data from 2006-2021 (including during the 2017 emergency dredging), a total of 14 Delta Smelt were entrained (MGEC and NAS 2017, 2018a, 2018b; ICF 2019, 2020, 2021; Applied Marine Sciences 2022).	Species: may affect, likely to adversely affect DCH: may affect, not likely to adversely affect
Southern DPS of North American Green Sturgeon (*Acipenser medirostris*)	Threatened (April 7, 2006; 71 FR 17757- 17766)	NMFS	October 9, 2009; 74 FR 52299	Benthic feeders; juveniles could be in channels during dredge maintenance work. No green sturgeon have been encountered over 16 years of entrainment monitoring in the Sacramento and Stockton DWSC (MGEC and NAS 2017, 2018a, 2018b; ICF 2019, 2020, 2021; Applied Marine Sciences 2022).	Species: may affect, not likely to adversely affect DCH: may affect, not likely to adversely affect
Longfin Smelt (*Spirinchus thaleichthys*), San Francisco Bay-Delta DPS	Proposed (October 7, 2022: 87 FR 60957)	USFWS	None designated	Based on sixteen years of entrainment monitoring data from 2006-2021 (including during the 2017 emergency dredging), zero Longfin Smelt were entrained (MGEC and NAS 2017, 2018a, 2018b; ICF 2019, 2020, 2021; Applied Marine Sciences 2022).	Will not jeopardize the continued existence of this species
Central Valley Steelhead (*Oncorhynchus mykiss*)	Threatened (December 30, 1999; 64 FR 73479-73506)	NMFS	September 2, 2005; 70 FR 52629	Adults and juveniles could be in channels during dredge maintenance work. Pelagic, sufficient swimming ability to avoid dredges. No salmon have been encountered over 16 years of entrainment monitoring in the Sacramento and Stockton DWSC (MGEC and NAS 2017, 2018a, 2018b; ICF 2019, 2020, 2021; Applied Marine Sciences 2022).	Species: may affect, not likely to adversely affect DCH: may affect, not likely to adversely affect
Crustaceans					
Conservancy Fairy Shrimp (*Branchinecta conservatio*)	Endangered (September 19, 1994; 59 FR 48136)	USFWS	Outside DCH	The proposed action would not alter existing water fluctuations (pond levels) or vegetation dependent on backwater habitat.	No effect
Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)	Threatened (September 19, 1994; 59 FR 48136)	USFWS	Outside DCH	The proposed action would not alter existing water fluctuations (pond levels) or vegetation dependent on backwater habitat.	No effect
Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)	Endangered (September 19, 1994; 59 FR 48136)	USFWS	Outside DCH	The proposed action would not alter existing water fluctuations (pond levels) or vegetation dependent on backwater habitat.	No effect
Flowering Plants					
Antioch Dunes Evening-primrose (*Oenothera deltoides spp. howellii*)	Endangered (April 26, 1978; 43 FR 17910)	USFWS	February 08, 1977: 42 FR 7972-7976 / Antioch Dunes DMPS is within the DCH	Dredged material has been used to create habitat for this species in coordination with the USFWS at the Antioch Dunes National Wildlife Refuge. These efforts will probably continue and would have beneficial effects on the Antioch Dunes evening-primrose and its DCH.	May affect, not likely to adversely affect
Colusa Grass (*Neostapfia colusana*)	Threatened (March 26, 1997; 62 FR 14338)	USFWS	Outside DHC	The proposed action would not alter existing water fluctuations (pond levels) or vegetation dependent on backwater habitat/vernal pools. This species is only found in the bottoms of large or deep vernal pools with adobe clay soils (CDFW 2022), which are not present within the proposed action area.	No effect
Contra Costa Goldfields (*Lasthenia conjugens*)	Endangered (June 18, 1997; 62 FR 33029)	USFWS	Outside DCH	No suitable habitat exists at all dredged material placement sites, except the Antioch Dunes site. Species last recorded in 1895 near the present-day Antioch Dunes National Wildlife Refuge and is presumed to be extirpated from the area (CDFW 2022).	No effect
Contra Costa Wallflower (*Erysimum capitatum var. angustatum*)	Endangered (May 27, 1978; 43 FR 17910)	USFWS	August 31, 1978: 43 FR 39042-39044/ Antioch Dunes DMPS is within the DCH	Dredge material has been used to create habitat for this species in coordination with the USFWS at the Antioch Dunes National Wildlife Refuge. These efforts will probably continue and would have beneficial effects on the Contra Costa wallflower and its DCH.	May affect, not likely to adversely affect
Keck's Checker-mallow (*Sidalcea keckii*)	Endangered (February 16, 2000: 65 FR 7757)	USFWS	Outside DCH	Local blue oak woodland growth would not differ from baseline conditions. All DMPS avoid habitat suitable for this species (CDFW 2022). Only known possible occurrence near the project area is from 1892 up in the Montezuma Hills, about three miles from the Montezuma Wetlands (CDFW 2022).	No Effect
Large-flowered Fiddleneck (*Amsinckia grandiflora*)	Endangered (May 8, 1985; 50 FR 19374)	USFWS	Outside DCH	No suitable habitat exists within proposed action area. Occurs in annual grassland with an elevation of 275-550 m (CDFW 2022), while all of the proposed action area has an elevation less than 30 m. Known only from nine occurrences (most of which are extirpated), with the closest occurrence (a re-introduction) six miles from the proposed action area (CDFW 2022).	No effect
Palmate-bracted Bird's Beak (*Cordylanthus palmatus*)	Endangered (July 1, 1986; 51 FR 23765-23769)	USFWS	None designated	No suitable habitat exists at all dredged material placement sites. Closest occurrence is from 1881 near Stockton and species is presumed to be extirpated from the area (CDFW 2022).	No effect
Soft Bird's-beak (*Cordylanthus mollis spp. mollis*)	Endangered (November 20, 1997; 62 FR 61916-61925)	USFWS	Outside DCH	All dredged material placement sites lack suitable habitat–saline emergent wetlands–for soft bird's-beak (CDFW 2022). Regional saline emergent wetland vegetation would remain consistent with baseline conditions.	No effect
Solano Grass (*Tuctoria mucronate*)	Endangered (September 29, 1978; 43 FR 44810)	USFWS	Outside DCH	All dredged material placement sites lack suitable habitat–saline emergent wetlands–for Solano grass (CDFW 2022). Regional saline emergent wetland vegetation would remain consistent with baseline conditions.	No effect

Protected Birds. A total of three species of birds listed under the MBTA were identified as occurring within the project areas: Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus*), and bank swallows (*Riparia riparia*). Swainson's hawks could be present in the project area between March 1 and September 15. Suitable nesting habitat for the Sacramento DWSC was identified on S-31. Minimal suitable habitat was identified on Grand Island. Minimal nesting habitat within the Stockton DWSC was identified on Roberts Island I and Roberts Island II. White-tailed kites are recorded as occurring in several locations along the Sacramento and San Joaquin Rivers, and the riparian habitat in the vicinity of the project area provides suitable nesting habitat for this species. White-tailed kites were identified in Roberts I and II during pre-dredging surveys conducted in 2013. Bank swallows nest in small burrows that they dig into riverbanks, primarily along the Sacramento and Feather Rivers (Garrison 1999). At nesting colonies, they forage mostly within 200 meters (650 feet) of their nesting burrows, but this range can vary with distances to good foraging areas. Bank swallow colonies may exist along the Sacramento DWSC in eroded or cut banks. Other species protected under the Bald and Golden Eagle Protection Act may occur transiently during the winter months, although suitable nesting habitat is not present within the DMPS.

To maintain compliance with the MBTA, USACE contractors would conduct biological surveys for nesting birds prior to construction work or dredge material placement.

Essential Fish Habitat. EFH is defined in the Magnuson-Stevens Act as "…those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." As required by the Act, NMFS implemented regulations to provide guidance regarding EFH designation. The regulations further clarify EFH by defining "waters" to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrates" to include sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" to mean the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding or growth to maturity" to cover a species' full life cycle. The project area is within the EFH Pacific Salmon Species Fishery Management Plan, Coastal Pelagic Species Fishery Management Plan (northern anchovy), and Pacific Groundfish Fishery Management Plan (starry flounder).

For a detailed description of the EFH in the project area, refer to Section 4.2 of the Biological Assessment submitted to NMFS, included in Appendix B.

3.2.4.2 Environmental Consequences

Basis of Significance. Adverse effects on Federal special status species were considered significant if an alternative will result in any of the following:

- adverse effects to designated critical habitat or EFH;
- unauthorized take of a Federally listed species; or
- substantial effects on any other special status species, including degradation of its habitat to the degree of jeopardizing the continued existence of the species, critical habitat, or EFH.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue maintenance dredging practices for the projects it maintains in the Sacramento and Stockton DWSC as described in Section 2.2. Under this alternative, dredging within the Stockton DWSC

would be done with either a hydraulic cutterhead or mechanical clamshell dredger, while dredging within the Sacramento DWSC would use a hydraulic cutterhead dredger. Rock would be placed on eroded levees for bank protection. The existing DMPS would be used and no additional sites would be added. Dredging would only occur within the authorized work windows for special status fish species, unless separate authorization was obtained from the respective regulatory agency (*i.e.*, with USFWS or NMFS). Dredging operations would also need to comply with the water quality MOU.

Effects to San Joaquin kit fox. Potential effects to this species would be less than significant under the No Action alternative since it is exceptionally unlikely that kit fox are forage or den within the DMPS. No records of kit foxes north of the San Joaquin River have ever been documented. In addition, the willingness for kit foxes to swim long distances for forage is unknown. If kit foxes did manage to swim across the San Joaquin River (and additionally the Sacramento River to reach some DMPS), they would simply temporarily avoid areas with active dredging work. Thus, the effects to this species would be **less than significant**.

Effects to California least tern. Under the No Action Alternative, there could be minimal beneficial effects to California least tern if any individuals strayed beyond their usual nest habitat to use freshly deposited dredged material at one of the existing DMPS. This is unlikely and thus the effects this this species would be **less than significant**.

Effects to Giant Garter Snake. The project would not have any direct effects on GGS because a biologist monitor would conduct pre-dredging surveys prior to all maintenance dredging and dredging activities would specifically avoid known GGS habitat areas within or near the DMPS. A potential indirect effect would be displacement of GGS habitat in the future, particularly overnighting or overwintering in burrows on the banks. However, this effect could be prevented by avoidance and minimization measures described below. No incidental take is expected to occur as a result of the proposed maintenance dredging and bank protection activities. If incidental take were to occur, all dredging activities would cease, and USACE would notify USFWS and/or other agencies as appropriate. With the implementation of the mitigation measures listed in Section 3.2.4.3.1, effects from placement of dredged material would be **less than significant** under the No Action Alternative.

Effects to Lange's Metalmark Butterfly. The project would not have any direct effects on the Lange's metalmark butterfly because prior to each proposed dredging season, USACE would coordinate with USFWS to avoid any adverse effects to listed species or habitats. All material placement in the ADNWR would be coordinated with USFWS. If any occurrences of the butterfly are identified prior to dredge material placement, USFWS staff would clear any live caterpillars and cocoons from the area. In addition, a biological monitor would conduct pre-dredging surveys prior to all maintenance dredging. Indirect beneficial effects include dune and habitat restoration due to the beneficial placement of dredged material. Effects from placement of dredged material would be **less than significant** under the No Action Alternative.

Effects to Valley Elderberry Longhorn Beetle. Dredged material placement during O&M dredging activities would potentially result in indirect effects to the elderberry shrubs located along the DMPS, potentially indirectly affecting VELB due to physical vibration and an increase in dust during operation of equipment and trucks during dredging activities. With standard

BMP's intended to avoid, as described in Section 3.2.4.3.2, effects to VELB species resulting from dredging operations would be **less than significant** under the No Action Alternative.

Effects to Contra Costa Wallflower and Antioch Dunes Evening Primrose. The project would not have any direct effects on the Contra Costa wallflower and Antioch Dunes evening primrose because prior to each proposed dredging season, USACE would coordinate with USFWS to avoid any adverse effects to listed species or their designated critical habitats. Due to the sensitive species in this area, the area would be cleared of seeds and/or propagules by USFWS staff prior to dredge material placement. All material placement in the ADNWR would be coordinated with USFWS. In addition, a biological monitor would conduct pre-dredging surveys prior to all maintenance dredging. Indirect beneficial effects would include dune and habitat restoration. Effects from placement of dredged material would be **less than significant** under the No Action Alternative.

Effects to Winter-run Chinook Salmon, CV Spring-run Chinook Salmon, and CV Steelhead, Delta Smelt, and Longfin Smelt. Potential effects on listed fish include physical effects of elevated suspended sediment levels on fish health; effects of turbidity/sediment plumes on migration behavior of juveniles and adults; entrainment of eggs, larvae, and juveniles by the hydraulic cutterhead dredge; effects caused by reduced levels of DO; and benthic habitat disturbance. Potential effects would be minimized by timing the dredge operations to specific "windows" when fish species are less likely to be in the project area and would be minimized to the greatest extent practicable using minimization measures described below. Maintenance bank stabilization in the form of rock replenishment may potentially affect EFH along the Sacramento DWSC. Although all sites to undergo maintenance bank protection work have previously received such rock, some areas where rock has been displaced by erosion may contain bank and shoreline vegetation that has since served as fish cover/habitat. To compensate, USACE would implement appropriate mitigation measures such as planting additional riparian vegetation. With implementation of the Avoidance and Minimization Measures described below and other standard practices intended to reduce the potential for entrainment, effects to salmon, steelhead, and Delta smelt resulting from entrainment would be **less than significant** under the No Action Alternative.

Effects to sDPS Green Sturgeon. There is currently no work window approved for green sturgeon; this species is presumed present throughout the action area year-round. Green sturgeon spawn in the upper Sacramento River, which is outside the study area. Although juvenile and adult green sturgeon are expected to be present in the project area during dredging, it is generally believed they would be motile enough to avoid entrainment. With implementation of the specific work windows described below and other standard practices intended to reduce the potential for entrainment, effects to special-status and commercially important fish species resulting from entrainment would be **less than significant** under the No Action Alternative.

Effects to Northern Anchovy EFH. Pelagic fish species (*e.g.*, Northern Anchovy), which live and feed in the upper and mid-water column, have a lower potential to be entrained with the sediment. Although some of these fish may be entrained, these are not special-status species. The minimum mortality to these mid-water species, if any, would result in **less than significant** effects on their population numbers or species survival.

Effects to Starry Flounder EFH. Demersal fish species (*e.g.*, Starry Flounder), which live and feed on and near the bottom, have a higher potential to be entrained with the sediment.

Although some of these fish may be entrained, these are not special-status species. The minimum mortality to these bottom species, if any, would have no significant effect on their population numbers or species survival. With implementation of the specific work windows described below and other standard practices intended to reduce the potential for entrainment, effects to special-status and commercially important fish species resulting from entrainment would be **less than significant** under the No Action Alternative.

Effects to Migratory Birds. The project would not have any direct effects on migratory birds—such as Swainson's hawk, white-tailed kites, burrowing owls, or bank swallows—because a biologist monitor would conduct pre-dredging surveys prior to all dredging activities. In addition, areas containing potential nesting trees would be avoided. Potential indirect effects could include the displacement of nesting or foraging habitat in the future. However, this effect would be prevented by avoidance and minimization measures described below. Effects from O&M dredging operations would be **less than significant** under the No Action Alternative.

Alternative 2 - Proposed Action. Under the Proposed Action , the dredge equipment type, frequency of dredging, and volumes dredged would be the same as under the No Action Alternative. In addition, mechanical dredging would be an option for the Sacramento DWSC.Placement of dredged materials would be conducted in accordance with the conditions described under the No Action to protect special status species including the conservation measures, BMPs, and avoidance and minimization measures. Except for beneficial effects to California least tern from dredged material placement at the Montezuma Wetlands, there would be no additional effects beyond those described in the No Action Alternative to special status species, their critical habitat, or EFH and, therefore, the effects would be **less than significant** with the implementation of the avoidance and minimization measures detailed in the Biological Assessments for the project (Appendix B).

3.2.4.3 Avoidance and Minimization Measures

All avoidance and minimization measures detailed in the Biological Assessments submitted to USFWS and NMFS would be implemented. See Section 3.5 in each of the Biological Assessments, included in Appendix B.

3.2.5. Air Quality

3.2.5.1 Affected Environment

The Federal Clean Air Act (CAA) establishes National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide, ozone, particle pollution (PM_{10} with diameters of less than 10 micrometers and $PM_{2.5}$ with diameters less than 2.5 micrometers), and sulfur dioxide (SO_2). The Act delegates enforcement to the states, with direct oversight by the U.S. Environmental Protection Agency (EPA). States develop State Implementation Plans (SIP) to implement, maintain, and enforce the NAAQS and to fulfill other requirements of the CAA. Areas that do not meet the NAAQS for any of the criteria pollutants are said to be in non-attainment, and states with non-attainment areas (NAA) must include additional requirements in their SIP to reduce air pollution in these areas.

On November 3, 1993, the EPA issued the General Conformity Rule to ensure that actions taken by Federal agencies do not interfere with a state's plan to attain and maintain the

NAAQS. A conformity determination is required for each pollutant where the total of direct and indirect emissions caused by a Federal action in a nonattainment area exceeds *de minimis* threshold levels listed in 40 CFR 93.153(b). Attainment status for each county in the project area is summarized in Table 11. Criteria pollutants for which all counties are in attainment are not included in the table. The associated *de minimis* thresholds are shown in Table 12.

Table 11. County NAAQS non-attainment and maintenance statuses for criteria pollutants

	Contra Costa County	**Sacramento County**	**San Joaquin County**	**Solano County**	**Yolo County**
$PM_{2.5}$ (2006)	Moderate	Moderate	Serious	Moderate (Sacramento, SF Bay Area)	Moderate (Sacramento)
PM_{10} (1987)	-	Maintenance	Maintenance	-	-
Ozone (2015)	Marginal	Serious	Extreme	Serious (Sac Metro)/ Marginal (SF Bay Area)	Serious
CO (1971)	Maintenance (partial)	Maintenance (partial)	Maintenance (partial)	Maintenance (partial)	Maintenance (partial)

Table 12. Applicable Federal *de minimis* emission levels for non-attainment and maintenance areas

Criteria Pollutant	**Tons/year**	**Applicable Counties**
$PM_{2.5}$ (direct emissions, SO_2, NOx, VOC, ammonia)		
Moderate NAAs	100	Contra Costa, Sacramento, Solano, Yolo
Serious NAAs	70	San Joaquin
PM_{10} (all maintenance areas)	100	Sacramento, San Joaquin
Ozone (VOCs or NOx)		
Serious NAAs	50	Sacramento, Solano, Yolo
Extreme NAAs	10	San Joaquin
Other NAAs	100	Contra Costa
CO (all maintenance areas)	100	All

In California, the Air Resources Board (CARB) is the responsible agency for air quality regulation. The California Clean Air Act established California Ambient Air Quality Standards (CAAQS). These standards are more stringent than Federal standards. All Federal projects in California must comply with the stricter State air quality standards.

The Sacramento and Stockton DWSC are located within four air districts: the SMAQMD, the Yolo-Solano Air Quality Management District (YSAQMD), the Bay Area Air Quality Management District (BAAQMD), and the San Joaquin Valley Air Pollution Control District (SJVAPCD). Sacramento DWSC is within two counties, Yolo and Solano County, and will be governed by YSAQMD for this project air quality needs. Stockton DWSC is within three counties, Contra Costa, San Joaquin, and Sacramento County, and emissions will be split among those three air districts according to the amount of work conducted within each county's boundaries. Each air district establishes its own California Environmental Quality Act (CEQA) threshold significance for air emissions. These thresholds are presented in Table 13.

Table 13. Local management districts' CEQA significance thresholds for air emissions

Criteria Pollutant	YSAQMD[1]	SMAQMD[2]	BAAQMD[3]	SJVAPCD[4]
PM_{10}	80 lbs/day or 14.6 tons/year*	80 lbs/day or 14.6 tons/year*	82 lbs/day or 15 tons/year	15 tons per/year
$PM_{2.5}$	NA	82 lbs/day or 15 tons/year*	54 lbs/day or 10 tons/year	15 tons/year
NOx	10 tons/year	65 lbs/day	54 lbs/day or 10 tons/year	10 tons/year
ROG	10 tons/year	65 lbs/day	10 tons/year	10 tons/year
CO	Violation of state ambient air quality standard	20 ppm 1-hour standard (23 mg/m3); 9 ppm 8-hour standard (10 mg/m3)	9.0 ppm (8-hour average); 20.0 ppm (1-hour average)	100 tons/year
SOx	NA	NA	NA	27 tons/year

References: [1]YSAQMD 2007; [2]SMAQMD 2020; [3]BAAQMD 2017; [4]SJVAPCD 2015
* Emission thresholds are not either or, exceedance is achieved if emissions are over for either metric.

Sources of Pollutants. There are many sources of air pollutants within the region. To estimate the sources and quantities of pollution, CARB, in cooperation with local air districts and industry, maintains an inventory of California emission sources. For example, Table 14 shows the 2017 Estimated Annual Average Emissions for the SMAQMD (CARB 2017).

Toxic Air Contaminants. Under the Clean Air Act, toxic air contaminants (TACs) are airborne pollutants that may be expected to result in an increase in mortality or serious illness or which may pose a present a potential hazard to human health. A chemical becomes a regulated TAC after it is identified by CARB's California Air Toxics Program or the EPA's National Air Toxics Assessments, assessed for its potential for human exposure, and evaluated for its health effects on humans. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, or genetic damage; or short-term acute effects such as eye watering, respiratory irritation (a cough), running nose, throat pain, and headaches. Regulating TACs is important not only because of the severity of their health effects, but also because the health

effects can occur with exposure to even small amounts of TACs. TACs are not classified as criteria air pollutants (CAPs) and no ambient air quality standards have been established for them. The effects of various TACs are very diverse and their health impacts tend to be local rather than regional; consequently, uniform standards for these pollutants have not been established.

Table 14. 2017 estimated annual average emissions within SMAQMD (tons per year)

Stationary Sources	**ROG**	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Fuel Combustion	0.27	1.50	0.54	0.04	0.12	0.11
Waste Disposal	0.79	0.04	0.07	0.01	0.01	0.00
Cleaning and Surface Coatings	3.39	-	-	-	-	-
Petroleum Production and Marketing	2.65	0.01	0.00	-	-	-
Industrial Processes	1.10	0.61	0.26	0.32	1.27	0.40
TOTAL Stationary Sources	**8.20**	**3.43**	**2.16**	**0.38**	**1.54**	**0.66**
Area wide Sources						
Solvent Evaporation	13.44	-	-	-	0.01	0.01
Miscellaneous Processes	8.53	37.40	2.50	0.13	27.80	8.47
TOTAL Area wide Sources	**21.98**	**37.40**	**2.50**	**0.13**	**27.81**	**8.48**
Mobile Sources						
On-road Motor Vehicles	9.95	78.27	20.37	0.16	2.24	1.07
Other Mobile Vehicles	11.54	88.83	9.71	0.18	0.70	0.60
TOTAL Mobile Sources	**21.49**	**167.10**	**30.07**	**0.35**	**2.94**	**1.66**
Natural (non-anthropogenic) sources	**11.24**	**6.18**	**0.81**	**0.06**	**0.65**	**0.55**
GRAND TOTAL for SMAQMD	**62.90**	**214.11**	**35.54**	**0.91**	**32.94**	**11.35**

The California Almanac of Emissions and Air Quality, which is published annually by CARB, presents the trends of various TAC emissions in California. Currently, the estimated risk from particulate matter emissions from diesel exhaust (diesel PM) is higher than the risk from all other TACs combined, and this TAC poses the most significant risk to California's population. In fact, CARB estimates that 79% of the known statewide cancer risk from the top 10 outdoor air toxins is attributable to diesel PM. In September 2000, CARB adopted the Diesel Risk Reduction Plan, which recommends many control measures to reduce the risks associated with diesel PM and achieve a goal of 75% PM reduction by 2010 and 85% by 2020. The key elements of the Diesel Risk Reduction Plan are to clean up existing engines through engine retrofit emission control devices, to adopt stringent standards for new diesel engines, to lower the sulfur content of diesel fuel, and implement advanced technology emission control devices on diesel engines.

Dredging activities can result in emissions of diesel PM. The use of off-road heavy-duty diesel equipment for site grading and excavation and other dredging activities results in the generation of diesel PM emissions, which was identified as a TAC by CARB in 1998. SMAQMD has not established a quantitative threshold of significance for dredge-related TAC emissions; however, SMAQMD recommends that lead agencies address this issue on a case-by-case basis, taking into consideration the specific dredge-related characteristics of each project and its proximity to off-site receptors.

Implementation of SMAQMD's Basic Construction Emission Control Practices would result in the reduction of diesel PM exhaust emissions in addition to CAP emissions, particularly the measures to minimize engine idling time and maintain dredge equipment in proper working condition and according to manufacturer's specifications.

3.2.5.2 Environmental Consequences

Basis of Significance. A project would significantly affect air quality if it would: (1) violate any ambient air quality standard; (2) contribute on a long-term basis to existing or projected air quality violation; (3) expose sensitive receptors (such as schools, residents, or hospitals) to substantial pollutant concentrations; or (4) not conform to applicable Federal, State, or local thresholds on a long-term basis.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue maintenance dredging practices for the projects it maintains in the Sacramento and Stockton DWSC, as described in Section 2.2 and covered under previous NEPA documentation.

Sacramento DWSC lies nearly entirely within and effects are estimated for the YSAQMD. Table 15 shows the estimated emissions from the Sacramento DWSC dredging and maintenance activities. Stockton DWSC lies within four counties and three air districts: the SJVAPCD, SMAQMD, and BAAQMD. Emissions from Stockton DWSC were divided based on channel mileage within each of the air districts. The district with the largest portion of the Stockton DWSC within its boundary is SJVAPCD with 46.39% (approximate 19 miles) of dredging activity. BAAQMD contains 30.49% (approximately 12.5 miles) of the dredging activities, SMAQMD contains the remaining 23.17% (approximately 9.5 miles) of the Stockton DWSC. Table 16 shows the total tons per year estimated for the Stockton DWSC and total estimated to occur within each air quality district.

Table 15. Air quality analysis for the No Action Alternative, Sacramento DWSC

No Action Alternative Sacramento	ROG (tons/year)	CO (tons/year)	NOx (tons/year)	PM10 (tons/year)	PM2.5 (tons/year)
Land Emissions	0.00	0.07	0.01	0.03	0.01
Estimated Annual Emissions No Action	0.33	2.67	10.77	0.34	0.31
Total (tons/year)	**0.33**	**2.74**	**10.78**	**0.37**	**0.32**
Yolo-Solano Air Quality Management District	10.00	N/A	10.00	13.24*	N/A
Exceedance	**No**	**No**	**Yes**	**No**	**No**

*YSAQMD calculates its PM10 emission threshold in lbs/day. 80 lbs/day is their threshold, it is converted here to avoid confusion. If it were in lbs/day this alternative would be 7.42 lbs/day, still under the daily threshold.

Table 16. Air quality analysis for the No Action Alternative, Stockton DWSC

No Action Alternative Stockton	ROG (tons/year)	CO (tons/year)	NOx (tons/year)	PM10 (tons/year)	PM2.5 (tons/year)
Land Emissions	0.00	0.07	0.01	0.03	0.01
Estimated Annual Emissions No Action	0.44	3.54	14.28	0.45	0.41
Total (tons/year)	**0.44**	**3.61**	**14.29**	**0.48**	**0.42**
Total (tons/year) within SJVAPCD	.20	1.67	6.6	.22	.19
Total (tons/year) within BAAQMD	.13	1.1	4.36*	.07	.13
Total (tons/year) within SMAQMD	.10*	.84	3.31*	.11	.10
Exceedance	**No**	**No**	**No**	**No**	**No**

*SMAQMD calculates its NOx and ROG emission thresholds in lbs/day, it has been converted in the table to avoid confusion. ROG would be 1.81 lbs/day, the threshold is 65 lbs/day. NOx daily emissions would be 59.81 lbs/day, threshold is 65 lbs/day.

Emissions from the Sacramento DWSC would not exceed any *de minimis* levels applicable to Yolo or Solano Counties, and emissions from the Stockton DWSC would not exceed any *de minimis* levels applicable to Contra Costa, Sacramento, or San Joaquin Counties. Therefore, a general conformity determination is not required.

The No Action Alternative in the Stockton DWSC would not exceed conformity limits for any air district as shown in Table 16. With mitigation for exceedance of NOx emissions from the Sacramento DWSC, impacts to air quality would be less than significant.

Alternative 2 - Proposed Project. Under the Proposed Action, the dredge equipment type, frequency of dredging, and volumes dredged would be the same as under the No Action Alternative, with the addition of mechanical dredging on the Sacramento DWSC. The duration of dredging would be increased by two weeks on each channel. Table 17 and Table 18 show air quality analysis of the Proposed Action's estimated emissions. As stated in the No Action Alternative, Stockton DWSC emissions will occur and be accounted for within SJVAPCD, BAAQMD, and SMAQMD; Sacramento DWSC emissions will occur and be accounted for within YSAQMD.

Emissions from the Sacramento DWSC would not exceed any *de minimis* levels applicable to Yolo or Solano Counties, and emissions from the Stockton DWSC would not exceed any *de minimis* levels applicable to Contra Costa, Sacramento, or San Joaquin Counties. Therefore, a general conformity determination is not required.

Emissions from the Proposed Action would exceed NOx emission standards on both Sacramento and Stockton DWSC and would require additional mitigation measures to be coordinated with the YSAQMD and BAAQMD. Coordination with these management districts would occur before construction to appropriately mitigate for the exceedance of emissions

standards for NOx. Therefore, for the Proposed Action, impacts to air quality would be **less than significant with mitigation**.

Table 17. Air quality analysis for the Proposed Action Alternative, Sacramento DWSC

Proposed Action Alternative Sacramento	ROG (tons/year)	CO (tons/year)	NOx (tons/year)	PM10 (tons/year)	PM2.5 (tons/year)
Land Emissions	0.03	0.64	0.11	0.04	0.01
Estimated Annual Emissions No Action	1.54	10.83	14.93	0.54	0.45
Total (tons/year)	**1.57**	**11.47**	**15.04**	**0.58***	**0.46**
Yolo-Solano Air Quality Management District	10.00	N/A	10.00	13.24*	N/A
Exceedance	**No**	**No**	**Yes**	**No**	**No**

*YSAQMD calculates its PM10 emission threshold in lbs/day. 80 lbs/day is their threshold, it is converted here to avoid confusion. Converted to lbs/day this alternative would be 10.8 lbs/day, which is under the daily threshold.

Table 18. Air quality analysis for the Proposed Action Alternative, Stockton DWSC

Proposed Action Alternative Stockton	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	PM10 (tons/phase)	PM2.5 (tons/phase)
Land Emissions	0.03	0.64	0.11	0.04	0.01
Estimated Annual Emissions No Action	0.49	3.98	16.03	0.51	0.45
Total (tons/year)	**0.52**	**4.62**	**16.14**	**0.55**	**0.46**
Total (tons/year) within SJVAPCD	.24	2.14	7.50	.25	.21
Total (tons/year) within BAAQMD	.16	1.41	4.91*	.17	.14
Total (tons/year) within SMAQMD	.12*	1.07	3.73*	.13	.10
Exceedance	**No**	**No**	**Yes***	**No**	**No**

*SMAQMD calculates its NOx and ROG emission thresholds in lbs/day, it has been converted in the table to avoid confusion. ROG would be 1.95 lbs/day, the threshold is 65 lbs/day. NOx daily emissions would be 60.456 lbs/day, threshold is 65 lbs/day.
*BAAQMD has a threshold of 54 lbs/day, this action would exceed this with a total emission of 72.78 lbs/day.

3.2.5.3 Avoidance and Minimization Measures

Emissions would result from the use of the dredge, boats for transportation to and from the dredge, bank protection and maintenance boat and generator operations, and worker vehicle trips to and from the DMPSs. Prior to dredging, the contractor would submit an equipment list to be used for the project for approval by USACE and all involved air districts. Emissions over any of the criteria air pollutants will be reduced via mitigation fee payment.

In order to reduce emissions to the greatest extent practicable in a given dredging year, standard mitigation measures will be implemented:

1. Use diesel-fueled equipment manufactured in 2003 or later, or retrofit equipment manufactured prior to 2003 with diesel oxidation catalysts; use low-emission diesel products, alternative fuels, after-treatment products, and/or other options as they become available.
2. Maintain properly functioning emission control devices on all vehicles and equipment.
3. The contractor would provide a plan, for approval by USACE and all air districts, demonstrating that the heavy-duty (greater than 50 horsepower) self-propelled off-road vehicles to be used in the dredging project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20% NO_X reduction and 45% particulate reduction compared to the most recent CARB fleet average at time of construction.
4. The contractor shall submit to USACE and all involved air districts a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that will be used an aggregate of 40 or more hours during any portion of the construction project. The inventory shall include the horsepower rating, engine production year, and projected hours of use for each piece of equipment. The inventory shall be updated and submitted monthly throughout the duration of the project, except that an inventory shall not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty off-road equipment, the project representative shall provide corresponding air districts with the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman.
5. The project shall ensure that emissions from all off-road diesel-powered equipment used on the project site do not exceed 40% opacity for more than three minutes in any one hour. Any equipment found to exceed 40% opacity (or Ringelmann 2.0) shall be repaired immediately. A visual survey of all in-operation equipment shall be made at least weekly, and a monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey. Local air districts and/or other officials may conduct periodic site inspections to determine compliance.
6. If at the time of construction, the local air districts have adopted a regulation applicable to construction emissions, compliance with the regulation may completely or partially replace this mitigation. Consultation with all involved air districts prior to construction will be necessary to make this determination.

The following BMPs would reduce air quality degradation caused by dust and other contaminants and would be used as applicable during earth-moving activities in the DMPS:

1. During construction, implement all appropriate dust control measures, such as tarps or covers on dirt piles, in a timely and effective manner.

2. Periodically water all construction areas having vehicle traffic, including unpaved areas, to reduce generation of dust. Application of water would not be excessive or result in runoff into storm drains.
3. Suspend all grading, earth moving, or excavation activities when winds exceed 20 miles per hour.
4. Water or cover all material transported offsite to prevent generation of dust.
5. Sweep paved streets adjacent to construction sites, as necessary, at the end of each day to remove excessive accumulations of soil or dust.
6. Cover all trucks hauling dirt, sand, soil, or other loose material, or maintain at least 2 feet of freeboard (minimum vertical distance between top of the load and top of the trailer) in accordance with the requirements of California Vehicle Code Section 23114. This provision would be enforced by local law enforcement agencies.
7. Revegetate or pave areas cleared by construction in a timely manner to control fugitive dust.

Impacts to air quality would be temporary, short-term, and localized. Sensitive receptors such as schools, residences, or hospitals would not be exposed to substantial pollutant concentrations based on the distances from the dredging activities and these sensitive receptors. The Operations and Maintenance Dredging in the Sacramento and Stockton DWSCs are part of the existing conditions. Title 40 of the CFR 93.153(c)(2)(ix) states that "Maintenance dredging and debris disposal where no new depths are required, applicable permits are secured, and disposal will be at an approved disposal site" is exempt from conformity analyses.

3.2.6. Hydrology and Water Quality

3.2.6.1 Affected Environment

Lower San Joaquin River. Precipitation in the project region occurs primarily during the months of November through March with the normal annual precipitation ranging from about 13 inches near Tracy to approximately 19 inches near Lodi (WRCC 2014). At Stockton, the normal annual precipitation is approximately 14 inches (WRCC 2014). Winter storms are associated with frontal systems from the Pacific Ocean moving against the Sierra Nevada. As the moist air rises over the mountain range it loses its ability to retain moisture resulting in intense precipitation. The resulting floods are usually characterized by high peak flows of short duration, but when antecedent rainfall has resulted in saturated ground conditions or when the ground is frozen, the volume of runoff is much greater and flooding is more severe. Thunderstorms lasting up to three hours can occur over small areas at higher elevations from late spring through early fall. Within the smaller catchments thunderstorms can result in runoff with high peak flows of short duration and low volumes.

The main contributing drainage areas include the Sacramento River (25,200 square miles), San Joaquin River (13,500 square miles), and the Mokelumne River (1,200 square miles). Runoff within the area is highly influenced by reservoir regulation. The area is susceptible to flooding from the combination of six principle sources including the Sacramento-San Joaquin Delta, San Joaquin River, Calaveras River and Mormon Slough system, Bear Creek, French Camp Slough system, and Mosher Slough.

Lower Sacramento River. The project area is located in the drainage basin of the Sacramento River system. The Sacramento River drainage area covers approximately 27,000 square miles, including the Feather River drainage basin, which totals approximately 5,500 square miles, and the American River drainage basin, which totals approximately 2,100 square miles (USACE 2009).

The Feather River, the largest tributary to the lower Sacramento River, originates in the Sierra Nevada and Cascade Mountains. The combined flows of the Feather River and its tributaries (including Honcut Creek, and Yuba and Bear Rivers) enter the Sacramento River near Verona (approximately 5 miles northwest of the Sacramento International Airport). The three forks of the American River originate in the Sierra Nevada; the lower American River joins the Sacramento River in the city of Sacramento. Deer Creek, in Tehama County, is an eastside tributary to the Sacramento River and drains 134 square miles (Travers 1998). Elder Creek, the northernmost erosion site in the program area, joins the Sacramento River 12 miles south of the town of Red Bluff; the stream is normally dry from July to late fall (Sacramento River Watershed Program 2012). Cache Creek flows from Clear Lake across Yolo County into a settling basin in the Yolo Bypass west of the Sacramento River. The Yolo Bypass and Sutter Bypass are part of an engineered flood management system. The Yolo Bypass also receives water from the Sacramento River, the Knight's Landing Ridge Cut, Willow Slough, and Putah Creek; the Sacramento Bypass receives water from the Butte Creek drainage system and from the Sacramento River at flood stage via the Tisdale Weir (USACE 2009). The Delta sloughs, Threemile, Steamboat, Sutter, Miner, Georgiana, and Cache, are located at the southernmost boundary of the program area in the Sacramento-San Joaquin Delta.

3.2.6.2 Environmental Consequences

Basis of Significance. A project would significantly affect water resources if it would: (1) result in the loss of a surface or groundwater source; or (2) interfere with existing BUs or water rights.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue maintenance dredging practices for the projects it maintains in the Sacramento and Stockton DWSCs, as described in Section 2.2 under the 1980 and 1986 NEPA documentation.

Dredged material and water removed from the Stockton and Sacramento DWSC would be placed on the previously authorized DMPS. Most of the solids would settle out of the slurry mix. The resulting liquid would eventually pool and fill the designated areas on the DMPS (as determined by boundaries such as banks, dikes, and berms). After the estimated retention time of 14.5 to 280 hours, most of the solids would have been removed via gravity. A minimal amount may remain in suspension. During this time, some of the water would be lost by evaporation and most of the water would permeate back into the groundwater. Depending on the size of the DMPS, the remaining water could either remain on site to percolate into the groundwater or be discharged back into the river. Dredging of the channels, placement of the dredge materials, and other maintenance actions would not interfere with existing BUs or water rights. Under this Alternative, impacts to water quality and hydrology would be **less than significant**.

Alternative 2 - Proposed Action. Under the Proposed Action, the dredge equipment type, frequency of dredging, and volumes dredged would be the same as under the No Action Alternative, with the possible addition of mechanical dredging in the Sacramento DWSC.

Placement would occur at existing DMPS as well as at nine proposed sites. Dredging, bank protection, and placement of dredged materials would be conducted in accordance with the conditions described under the Proposed Action to reduce water quality impacts including the avoidance and minimization measures described below.

Placement activities would occur in existing DMPS as well as the new DMPS. In general, effects to water quality will be largely the same as described under Alternative 1. BMPs would be implemented during the construction of new DMPS to minimize impacts to surrounding water quality. Additionally, placement at the Montezuma Wetlands restoration site would conform to the BMPs for that site. Under Alternative 2, impacts to hydrology and water quality would be **less than significant.**

More detailed descriptions of effects to water quality are described in the Biological Assessments (See Appendix B).

3.2.6.3 Avoidance and Minimization Measures

1. All decant water would be monitored for CVRWQCB constituents of concern and physical parameters. Management practices would include placing flash boards at the spillway of the DMPS to increase the retention time, using interior dikes within the DMPS to increase the hydraulic efficiency of the DMPS, and varying the dredge production rates (USACE 2003a). Decant water would only be discharged to the river if it meets all of the water quality standards stated in the CVRWQCB WDR General Order R5-2022-0052 (see Appendix A). If the water does not meet the standards, then it would be retained on the relevant DMPS until further analyses reveal such compliance.
2. The effects to water quality would further be minimized by not allowing the release of oils, grease, waxes, or other materials that could form a visible film or coating on the water surface or on the stream bottom or creating a nuisance or adversely affecting BUs. Any spills of hazardous materials would be cleaned up immediately and reported in compliance reports.
3. All terms and conditions of the MOU and the General Order would be followed to protect water quality.

3.2.7. Recreation

3.2.7.1 Affected Environment

The California delta is highly valued by residents and visitors for its abundant recreational opportunities. The Sacramento-San Joaquin Delta Reform Act of 2009 declares that a fundamental goal of managing land use in the delta is to "maximize public access to Delta resources and maximize public recreational opportunities in the Delta consistent with sound resource conservation principles…" (California Water Code §85022(d)(3)). Projects undertaken within the Primary Zone of the delta must be consistent with the Delta Protection Commission's Land Use and Resource Management Plan, which includes policies created to promote continued recreational use of the land and waters of the delta (DPC 2010).

There are approximately 12 million visitor days of use each year in the delta, with a large majority of users coming primarily from Northern California (DPC 2012). Approximately two-thirds of recreation is resource based (e.g., boating and fishing), while the rest is urban parks-

related (e.g., golfing, picnicking, and turf sports) and right-of-way-related (e.g., bicycling and driving) (DPC 2012). The most popularly-cited recreation activities within the delta include motorized boating, hiking or walking, wine tasting, historical sightseeing, driving for pleasure, attending festivals and events, scenery and wildlife viewing, fishing, and dining (Mickel et al. 2019). Visitors engage in recreation around the delta all year long, though winter (December through February) is the least busy season.

Events and festivals occur across the delta, one of the most popular being the Rio Vista Bass Derby & Festival. The event is held over a three-day weekend in October and features a fishing derby, live music, vendors, and other entertainment. The event attracts upwards of 20,000 visitors.

Boating is a very common activity along the DWSCs. Motorized boat use, water skiing, use of personal watercraft, and cruising along the river are especially popular in various locations. In 2018, over 100,000 boats were registered for the purpose of pleasure in the five Delta counties, creating a large pool of potential recreationists (CA DMV 2019). Kayaking and canoeing are occasionally favored in portions of the project area. The DWSCs also provide opportunities for sailing and windsurfing. Under favorable weather conditions, the river between Rio Vista and the tip of Sherman Island is typically crowded with large numbers of windsurfers. Multiple facilities provide sales and rental of equipment, physical access to the water, and camping sites for windsurfers and other recreationists.

Recreation-based facilities within the delta include marinas, restaurants, hunting clubs, and natural resources-based areas. Private nonprofit organizations such as the Yolo Basin Foundation provide recreation areas (DPC 2012). Publicly-owned lands cover almost 40,000 acres, or about 10 percent of the delta. A portion of these lands is open to public recreation access, including hiking, day use, fishing, hunting, and wildlife viewing. Parks, wildlife areas and refuges, ecological preserves, and other public lands provide important sites for relaxing outdoors, a family picnic, camping, and other outdoor recreation in the delta. California State Parks owns two properties adjacent to the DWSCs in the delta: Franks Tract State Recreation Area (SRA), a fully submerged area popular with anglers and waterfowl hunters, and Brannan Island SRA, a maze a waterways, islands, and marshes through the delta with a ten-lane launch ramp, over 140 campsites, and areas for picnicking and swimming. As of June 2022, Brannan Island SRA is partially open for day use only.

The California Department of Fish and Wildlife (CDFW) also owns and manages several Wildlife Areas near the DWSCs, including Lower Sherman Island, Decker Island, Miner Slough, and Yolo Bypass, as well as Liberty Island Ecological Reserve. These facilities provide for a variety of activities, from bird watching tours to hunting, fishing, wildlife viewing, and education. California Department of Water Resources (DWR) owns large portions of Sherman and Twitchell Islands, which are available seasonally for hunting.

A number of public access trails exist or are in development, including the American Discovery Trail, Mokelumne Coast-to-Crest Trail, and the Great Delta Trail. These trails currently support or will provide public access for a variety of recreation activities, including hiking and biking. Additionally, State Highway 160 is a designated State Scenic Highway. Some Delta roadways have existing bike facilities, such as protected and unprotected bike lanes, and pedestrian facilities, such as sidewalks. Some bridges provide some pedestrian space, but few

provide dedicated bike facilities. Both bike lanes and sidewalks are primarily located within the more densely developed and populated areas of the Delta (DPC 2022).

3.2.7.2 Environmental Consequences

Basis of Significance. Effects to recreational resources are considered significant if an Alternative would: (1) eliminate, severely restrict access to, or result in a long-term disruption of recreational facilities and resources; or (2) result in an unacceptable safety hazard to recreationists.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue its maintenance dredging practices and rock placement for bank protection, and all DMPS used would be those that are currently in use. Approximately 13 miles of levee maintenance road S-31 would be repaired, along with other maintenance roads as needed. All activities would be conducted in accordance with the conditions described under the No Action Alternative to reduce effects to recreational resources which includes the avoidance and minimization measures described below.

Ongoing routine maintenance of the Sacramento and Stockton DWSCs would continue to result in temporary impacts to boating, fishing, windsurfing, and other water-based recreation due to the presence of dredge equipment and placement of dredged material. Temporary impacts to recreational use of shoreline areas due to the placement of a slurry pipe, installation of revetment, and repairs of road S-31 would also occur. Even during maintenance activities, recreationists would be able to utilize surrounding resources. Because the work under this alternative is temporary and transient in nature, no single area would experience long-term disruption and ample area for all recreational activities would continue to be available. Additionally, this alternative would not affect recreation associated with local marinas, boat launches, or other facilities because access to these facilities would not be restricted.

Dredging would occur in the channel adjacent to Brannan Island SRA, Lower Sherman Island, Decker Island, Miner Slough, and Yolo Bypass wildlife areas, and Liberty Island Ecological Reserve. It would not occur within the submerged Franks Tract SRA. Access to these areas and associated facilities would not be impinged.

The Rio Vista Bass Derby and Festival takes place in Rio Vista during the dredging work window, approximately 1 mile north of the Rio Vista DPMS. During the fishing derby, there would likely be increased use of the river and the Rio Vista public boat launch. In order to avoid disrupting the event or impacting the recreational fishers, dredging operations will avoid Rio Vista and the Rio Vista DMPS during the derby and festival.

Portions of the DWSCs may be used by in-water recreationists, who would be temporarily affected during annual dredging operations. Hydraulic cutterhead dredging in particular could present a hazard to in-water recreationists if passersby are not aware of the transport pipeline at the water's surface. Dredging operations would continue to be managed for safety to the public, including the utilization of appropriate signage and/or buoys warning boaters about the presence of pipelines or other hazards.

The implementation of Alternative 1 would not severely risk access to or result in a long-term disruption of the use of recreational resources or facilities in the project area. With the use

of signage and buoys, the hazard to recreationist would be minimal. Therefore, the overall effect of Alternative 1 on recreation would be **less than significant**.

Alternative 2 - Proposed Action. Under the Proposed Action, effects to recreation would include all effects discussed under Alternative 1, in addition to effects related to construction and utilization of new DMPS, implementation of clamshell dredging on the Sacramento DWSC, and the extended work window. Dredging and placement of dredged materials would be conducted in accordance with the conditions described under the Proposed Action to reduce effects to recreational resources which includes the avoidance and minimization measures described below.

Effects of Alternative 2 to recreation would include all those described under Alternative 1. In addition, the usage of the proposed DMPS would not reduce recreational opportunities, since all property on each of the islands containing proposed DMPS is privately owned by individuals or agencies, and access to unauthorized individuals for recreation is not permitted. Access by members to private recreational facilities in the area, such as hunting clubs or yacht clubs, would not be precluded by the utilization of the proposed DMPS. The proposed placement of dredge materials at the Montezuma Wetlands Restoration Project would be BU, consistent with the project design, and would not impact recreation beyond what may be experienced under the existing restoration.

The extension of the dredging work window would slightly increase the duration of the temporary effects from dredging and material placement, but as in Alternative 1, ample recreation area would continue to be available even during the dredging operations, and impact of the extended work window would be negligible.

Portions of the DWSC may be used by in-water recreationists, who may be impacted during the annual dredging operations. Like Alternative 1, in-water dredging operations would continue to be managed for safety to the public, to include signage and/or buoys, minimizing the hazard to nearby recreationists.

Under Alternative 2, maintenance dredging operations would not restrict access to or cause a long-term disruption of use of recreational facilities; nor would it cause a substantial safety hazard to recreationists in the project area. Therefore, the effects of this alternative on recreation would be **less than significant**.

3.2.7.3 Avoidance and Minimization Measures

The following measures are applicable to and would be implemented under both Alternative 1 and Alternative 2:

1. Avoid all dredging operations near or around the Rio Vista DMPS during the Rio Vista Bass Derby and Festival in early October.
2. Dredge contractor shall operate the appropriate amount of notification “Sign Barges”, near the perimeter of the active dredge location to warn in-water recreationists of the operation, specifically at slough openings and river crossings. The sign barges along the pipeline route, at a minimum of every 1000’ shall state “Danger Submerged Pipeline”.
3. All discharge pipeline anchor buoys will be painted high-visibility white and lighted during nighttime or low visibility hours per U.S. Coast Guard regulations. At slough crossings or other locations where the interval between Marking Buoys warrants their

use, Polyform A-3 type orange PVC inflatable buoys will be attached directly to the dredge pipeline at intervals not to exceed 200 linear feet along the pipeline route. In dredge areas where a pipeline crossing will exceed more than 3,000 feet (such as the lower San Joaquin River) the dredge contractor will also employ a minimum of two barge mounted "Arrow Boards" commonly seen on highway construction projects, to direct recreationists to the safe and proper side of passage.

4. A safety patrol vessel equipped with a high intensity LED light bar, similar to those used on law enforcement vessels, sized and powered such that it could be used to "intercept" high-speed bass boats during periods of pipeline mobilization and demobilization.

3.2.8. Noise

Noise is a subjective classification of a sound and is often defined as an "unwanted sound" that is intrusive or disruptive to daily life. The intensity of sound is measured in decibels (dB). The decibel scale is logarithmic, so a 10 dB increase is a 100-fold increase in sound intensity, or loudness. A sound's frequency is also measured, in Hertz (Hz). Frequency measures the number of sound vibrations per second. The higher the number, the higher pitched the sound.

Noise associated with the continued maintenance of Sacramento and Stockton DWSC may include noise and vibration from dredges, barges, construction vehicles, haul trucks, and other equipment during the construction and O&M actions.

3.2.8.1 Affected Environment

Existing noise sources within the study area include ship and boat engines, whistles, and horns; dredging and sand-mining activities; vehicle traffic on adjacent roadways and bridges; truck and rail operations at the Port; aircraft, including agriculture crop dusters; and other agricultural equipment, including tractors. In some areas, particularly through the northern terminus of the Sacramento DWSC and the eastern terminus of the Stockton DWSC, urban and industrial noise dominates. Noise-sensitive receptors in the project area include residences, assisted living facilities, lodging, schools, libraries, churches, amphitheaters, playgrounds, and parks.

At the westernmost end of the project area, some of the closest sensitive receptors are located in Collinsville, which includes a water-oriented residential area with docks extending into the channel. The cities of Pittsburg, Antioch, and Oakley lie south of the Stockton DWSC, and include residential areas and a number of parks and preserves along the waterfront.

Further up the Sacramento is the city of Rio Vista, which sits directly on the west bank of the channel. Rio Vista residences, parks, schools, and churches are located within the project area. Sherman Island, east of the ship channel, includes Lelia Drive residences, which are located approximately 500 feet from the Augusto Pit DMPS and about 2,000 feet from the Sacramento DWSC. Rio Viento RV Park is located between the Sacramento River and the Augusto Pit site. Sandy Beach County Park, which includes a campground, lies adjacent to the north edge of the Rio Vista DMPS. The project area also includes River Road residences, which are located within 1,000 feet of the Decker Island DMPS.

Heading north, parks, residences, and businesses are scattered east of the Sacramento DWSC along State Route 84. In places, less than 500 feet separate such sensitive receptors from

the Sacramento DWSC and the Grand Island DMPS, including a water-oriented residential area and marina.

The project area along the Sacramento DWSC between Rio Vista and West Sacramento is primarily rural and agricultural, with sensitive receptors including a marina and a few scattered residences along the banks, some within 500 feet of the DWSC. The project area includes the Yolo Bypass Wildlife Area to the west and predominately open space and agricultural fields to the east of the Sacramento DWSC. In West Sacramento, sensitive receptors in the project area include a residential neighborhood, a community park with an amphitheater, and assisted living facilities.

Adjacent to the Stockton DWSC, residences are scattered along Sherman Island East Levee Rd., along with Eddo's Harbor and RV Park. Several of the residences on Sherman Island are located close to the McCormack Pit DMPS. Across the channel are multiple residences along the northwest edge of Bradford Island. Brannan Island Rd., just north of the Stockton DWSC, is lined with residences and lodging. Between Brannan Island and Stockton, residences, yacht clubs, areas sparsely scattered across the islands adjacent to the Stockton DWSC; some of these are also in close vicinity to the DMPS. In Stockton, sensitive receptors in the project area include residential neighborhoods, parks, and lodging.

Underwater ambient noise in the project area includes wind- and wave-driven turbulence, precipitation, and traffic noise generated from commercial shipping and recreational boating.

The Yolo County General Plan (2009) Health and Safety Element utilizes the California state recommended standards: within low-density residential areas, a Day/Night Average Sound Level (L_{dn}) of 60-70 dB is conditionally acceptable; above 70 dB is normally unacceptable. In industrial and agricultural areas, a L_{dn} of 75-80 dB is conditionally acceptable, and above 80 dB is normally unacceptable. The Yolo County Municipal Code and General Plan do not specify regulations on construction noise or times of operation. Title 9 – Parks and Recreation of the Yolo County Municipal Code contains a regulation that prohibits the operation or maintenance of motor vehicles in any manner that causes excessive noise or threatens the public peace, health, and safety (Section 9-3.513(f) – Motor vehicles). This regulation does not set parameters regarding noise levels.

The City of West Sacramento General Plan 2035 Policy Document (2016) contain noise policies intended to protect city residents from the harmful effects of excessive noise and vibration. Policy S-7.1 Exterior Noise Standards states that new developments must mitigation noise impacts if the projected exterior environment noise levels exceed a L_{dn} of 60 dB in low-density residential areas, or 75 dB in industrial or agricultural areas. Policy S-7.6 Vibration Standards states that construction projects anticipated to generate a significant amount of vibration levels must ensure acceptable interior vibration levels at nearby noise-sensitive uses. The City of West Sacramento Municipal Code does not specify regulations regarding construction noise, and neither the General Plan nor the Municipal Code place restriction on construction operation times. Much of the project area within the West Sacramento city limits is zoned as heavy industrial, water related industrial, public open space, or agricultural, all of which are expected to be subjected to higher levels of noise.

Land use within the project area in Sacramento County is entirely agricultural and open space, and therefore is not typically subject to stringent noise requirements. The Sacramento County General Plan Noise Element (2017) contains policies intended to control environmental

noise and protect residents from excessive noise exposure. Policies NO-5 through NO-7 cover non-transportation noise source standards for sensitive receptors, though there are no standards listed for agricultural or open space areas. Policy NO-8 is specific to construction noise and states that "noise associated with construction activities shall adhere to the County Code requirements." The Sacramento County Municipal Code states that construction noise is exempt from noise regulations during weekdays between 6 a.m. and 8 p.m. and during the weekend between 7 a.m. and 8 p.m. (Section 6.68.090(e)). Per the Municipal Code, exterior noise standards are 55 dBA during evening and 50 dBA during nighttime for sensitive receptors (Section 6.68.70).

The Solano County General Plan (2008) Public Health and Safety Element also utilizes the California state recommended standards. The noise element and the Solano County Municipal Code do not currently contain regulations regarding construction noise. However, the General Plan Implementation Program includes a plan to develop, adopt, and implement a Solano County noise ordinance. The Solano County Noise Ordinance (2017) is currently in its draft final form The noise ordinance states the maximum permissible exterior sound levels are 55 dBA in agricultural and residential zones between 7 a.m. and 7 p.m., and 50 dBA in the same zones between 7 p.m. and 7 a.m. According to the ordinance, noise created by construction is subject to additional regulations, including restricting the time of allowable construction when in the vicinity of a residential district.

The City of Rio Vista General Plan (2002) Safety and Noise Element contains noise policies intended to limit noise levels received by residential and other sensitive receptors. Goal 11.15 of the General Plan is "to minimize the nuisance of noise generated by construction activities." Associated policies outlined in this section include:

- Policy 11.15.A requires consistency with the City of Rio Vista Municipal Code Section 17.030 – Construction Equipment Noise, which states that construction noise is unlawful within residential zones or within a radius of 500 feet between 7 p.m. and 7 a.m. on weekdays and anytime on Sundays.
- Policy 11.15.B states that construction noise is exempt from the non-transportation noise guidelines specified in the General Plan.
- Policy 11.15.C requires the City to limit construction activities to between 7 a.m. and 5 p.m. unless an exemption is obtained from the City.
- Policy 11.15.D requires mufflers on construction equipment that is powered by internal combustion engines.

The City of Rio Vista Municipal Code Section 17.52.050 establishes maximum allowable noise levels of 75 dBA during the day and 60 dBA at night in residential and commercial areas, and 85 dBA during the day and 65 dBA at night in industrial areas.

The Contra Costa County General Plan (2005) Noise Element, like the Yolo County and Solano County General Plans, adopts the state-recommended noise standards. Policy 11-8 addresses noise generated from construction activities, and states that these activities shall be concentrated during the hours of the day that are not noise-sensitive for adjacent land uses and should be commissioned to occur during normal work hours. Policy 11-11 specifies that noise impacts on the natural environment, including wildlife, shall be evaluated and considered in review of development projects. The Contra Costa County Code does not contain noise ordinances or standards for the County.

The Pittsburg General Plan 2020 (2001) Noise Element outlines a program of achieving acceptable noise level throughout Pittsburg, and ensures compliance with State noise requirements. Policy 12-P-9 of the General Plan limits the generation of loud noises on construction sites adjacent to existing development to hours between 8 a.m. and 5 p.m. Chapter 9.44 of the Pittsburg Municipal Code contains noise ordinances, but none specifically addressing construction-related noise.

The City of Antioch General Plan (2003) Environmental Hazards Element contains objectives and policies in order to achieve and maintain exterior noise levels appropriate to planned land uses. The Plan sets standards for residential areas, schools, hospitals and libraries, and commercial and industrial areas. Section 11.6.2 contains noise policies; policies i. through n. relate to temporary construction. The Antioch Municipal Code §5-17 contains policies pertaining to construction-generated noise. Typically, such noises are not permitted before 7 a.m. or after 6 p.m. on weekdays, or before 9 a.m. or after 5 p.m. on weekends and holidays.

The San Joaquin County General Plan (2016) Public Health and Safety Element contains goals and policies to reduce or eliminate conflicts between land uses and unhealthy noise. The General Plan specifies that for non-transportation noise sources in noise-sensitive exterior areas, the maximum noise level during the day should be 70 dB, and 65 dB at night. The San Joaquin County Code does not contain regulations pertaining to noise.

The Stockton General Plan (2018) Safety Element includes policies to protect the community from health hazards and annoyance associated with excessive noise. The Plan does not address temporary noise sources due to construction. The Stockton Municipal Code Chapter 8.20 contains noise regulations, but none pertain to construction activities.

3.2.8.2 Environmental Consequences

Basis of Significance. Adverse effects on noise are considered significant if an alternative would: (1) result in exposure of persons or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies; (2) result in substantial (15 dB or greater) long-term increase in ambient noise levels in the project vicinity above levels existing without the project; or (3) generate an increase in underwater noise levels that would be harmful to fish or other aquatic species in the project vicinity.

Alternative 1 - No Action. Under the No Action Alternative, USACE would continue its current maintenance practices in the Sacramento and Stockton DWSCs. All activities would be conducted in accordance with the conditions described under the No Action Alternative (Section 2.2) with implementation of the avoidance and minimization measures described below.

Above-ground sounds generated by hydraulic cutterhead dredges includes pumps and impellers driving the suction of material through the pipes, the movement of sediment through the pipes, and ship and machinery sounds. Fine sediments, such as the substrate present in the DWSCs, is quieter than coarse sand or gravel (Robinson et al. 2011). Clamshell dredges produce a more complex spectrum of sounds than hydraulic dredges, and the intensities are highly depending on the phase of operations.

In general, sound levels from dredgers are similar to that of commercial shipping vessels (McQueen et al. 2018, Reine and Dickerson 2014, Robinson et al. 2011), which are frequently

traveling through the DWSCs. Land use surrounding a majority of DWSCs is agricultural or industrial, thus there are few sensitive receptors along most of the lengths of the DWSCs. In the small residential areas, receptors would be subject to sounds similar to those already present due to commercial shipping traffic. It is possible that noise-generating dredging activities would occur within a 500-foot radius of the city Rio Vista outside of permissible construction hours (see Section 3.2.8.1).

In addition to sound emitted from the dredging activities, Alternative 1 would include noises from placement of the dredged material. However, the dredge material placement sites are largely in remote, rural areas, and people generally would not be within hearing range of these sounds.

Maintenance rock placement and road repair would also emit loud but temporary sounds. These actions may occur anywhere along each of the DWSCs, including near residential areas or other sensitive receptors. However, each action would be brief and infrequent.

All of the noise-generating activities under Alternative 1 are temporary and would not result in any long-term increase in ambient noise levels.

Maintenance dredging activities may produce underwater low-frequency sounds that could block or delay the migration of anadromous fish through navigable waterways, or otherwise affect the communication, foraging or other behaviors of aquatic life (Dickerson et al. 2001, Reine et al. 2014). Fishes also create low-frequency sounds (50–2000 Hz, most often 100–500 Hz), presumably for communication.

Sounds produced by hydraulic cutterhead dredges are continuous in nature and include the rotating cutterhead coming in contact with the sediment bed and intake of sediment-water slurry, pumps and impellers driving the suction of material through the pipes, the movement of sediment through the pipes, and ship and machinery sounds, including lowering and lifting of spuds and moving of anchors (Reine and Dickerson 2014). Most sounds are of relatively low frequency (< 1000 Hz). Sounds emitted from rotation of the cutterhead in the substrate and the movement of the substrate through the pipe are greatly dependent on substrate type; a study conducting acoustic monitoring of dredging operations in the Mississippi Sound found that the rotation of the cutterhead through fine sediment produced very muted sounds, inaudible at approximately 500 meters from the source (Clarke et al. 2003). Generally, cutterhead dredging operations are relatively quiet when compared to other sound sources in aquatic environments (Clarke et al. 2003).

Clamshell dredges produce a complex spectrum of sounds, different that either of the other dredging types. Sounds consist of a repetitive sequence generated by winches and derrick movement, bucket impacts with the substrate, digging into substrate, bucket closing, and emptying the material onto a barge or scow (Dickerson et al. 2001). Sound intensities are highly dependent on the phase of operation and the substrate type. When dredging unconsolidated mud (the substrate present in the Stockton DWSC), Dickerson et al. (2001) found that the loudest sound was emitted from the winch motor as the clamshell bucket was pulled back to the surface.

Evidence suggests that poorly maintained equipment is a major contributor of intense underwater sounds produced by all dredge types (Dickerson et al. 2001, Clarke et al. 2003).

Data on effects of anthropogenic sounds on aquatic life is limited, though research on the subject has increased over the last couple of decades. Several reviews and studies of effects generated from exposures to anthropogenic sound sources indicate that dredging induced sounds do not pose a significant risk to direct injury or mortality to aquatic biota (Popper and Hastings 2009, Reine et al. 2014, McQueen et al. 2018). However, behavioral reactions such as startle or avoidance behaviors cannot be ruled out. Additionally, certain sounds can mask biologically important sounds such as communication calls between fish.

However, in the Sacramento and Stockton DWSC, it is unlikely that fishes will exhibit a strong adverse reaction, since they are frequently subjected and accustomed to the sounds of shipping traffic through the channels. In general, sound pressure levels from dredging activities are similar to levels reported for underwater sound associated with commercial shipping (McQueen et al. 2018). A study of cutterhead dredging operations in the Stockton DWSC found that sounds emitted from a cutterhead dredge in the channel were quieter than those generated by commercial shipping (Reine and Dickerson 2014). Indeed, a 2019 study examining the movement of migrating Atlantic sturgeon through a river during active hydraulic cutterhead dredging suggests that underwater sounds associated with cutterhead dredging did not hinder spawning migrations and had no observable effect on swim behavior (Balazik et al. 2020).

Alternative 1 is unlikely to generate noise or expose people to levels above applicable standards, except potentially within the City of Rio Vista. No long-term increase in noise would occur. Aquatic life in the Sacramento and Stockton DWSC is unlikely to be injured due to dredging operations, and behavioral responses to project activities would likely be minor. With appropriate avoidance and minimization measures in place (see Section 3.2.8.3), the effects to noise from Alternative 1 would be **less than significant**.

Alternative 2 - Proposed Action. Under the Proposed Action, the dredge equipment type would be largely the same as under Alternative 1, with the addition of clamshell dredging in the Sacramento DWSC. The duration of dredging would be extended two weeks in each channel. Volumes dredged would remain the same, with nine new DMPS. Dredging, bank protection, and other maintenance actions would be conducted in accordance with the conditions described under the Proposed Action to reduce adverse effects on noise and vibration.

The effects would be similar to Alternative 1. The addition of clamshell dredging in the Sacramento DWSC would not cause a significant increase in project noise; nor would the use of additional DMPS, as each site is in a remote, rural area.

Under Alternative 2, the dredging work window would be extended an additional two weeks in each channel. Due to the temporary nature of the work, there would be no long-term increases in ambient noise levels in the project vicinity above levels existing without the project.

In addition to the impacts described for Alternative 1, under Alternative 2 generation of sound from clamshell dredging would occur in the Sacramento DWSC. Generally, impacts to underwater noise under Alternative 2 would be the same as those described in Alternative 1. With the extension of the work window, aquatic life would be exposed to dredging-induced sounds for an additional two weeks per year.

Alternative 2 is unlikely to generate noise or expose people to levels above applicable standards. No long-term increase in noise would occur. Aquatic life in the Sacramento and Stockton DWSCs is unlikely to be injured due to dredging operations, and behavioral responses

to project activities would likely be minor. With appropriate avoidance and minimization measures in place (see Section 3.2.8.3), the effects to noise from Alternative 2 would be **less than significant**.

3.2.8.3 Avoidance and Minimization Measures

The following measures are applicable to and would be implemented under both Alternative 1 and Alternative 2:

1. Equip construction engines with sound reducing devices.
2. Turn off machinery when not in use for long periods.
3. Require contractors to maintain all dredging and construction equipment, and train operators to reduce noise levels.

3.2.9. Cultural Resources

Cultural resources are broadly defined as any pre-contact or historic buildings, structures, objects, sites, districts, and traditional cultural properties created through human activity and systems of belief. Cultural resources that are listed on, or eligible for inclusion in, the National Register of Historic Places (NRHP) are referred to as "historic properties." USACE uses effects determinations arrived at through compliance with Title 54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA), to assess effects to cultural resources under NEPA and to mitigate for adverse effects under both laws.

The NHPA (54 U.S.C. § 300101 *et seq*.) is the primary Federal legislation governing the preservation of significant historic property. Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. Undertakings are projects, activities, or programs funded in whole or in part under the direct or indirect jurisdiction of a Federal agency (54 U.S.C. § 300320).

For any Federal action that has the potential to cause effects on historic properties, compliance with Section 106 of the NHPA (36 CFR. § 800) requires a good faith effort by the responsible Federal agency to identify historic properties in the Area of Potential Effects (APE) for the undertaking and to resolve any adverse effects on such properties through a consultative process involving the agency, the State Historic Preservation Officer (SHPO), Indian tribes and Native Hawaiian organizations, and other consulting parties.

3.2.9.1 Affected Environment

The Sacramento-San Joaquin Delta is a region encompassing a span of nearly 24 miles from east to west, and 48 miles from north to south (Thompson 1957, 2). The area known as the Delta encompasses virtually 500,000 acres of agricultural land along with protected lands for wildlife refuge (Delta Narratives 2015, 3). The land has a transformative recent past that saw a manmade conversion from tidal wetlands to a domesticated landscape; one that primarily supports agriculture but simultaneously created a protected habitat that promotes ecosystem conservation. The Sacramento River Deep Water Ship Channel system was constructed through a portion of the Delta in the mid-20th century.

Pre-contact Setting. For the purposes of the following discussion, "pre-contact" refers to the time period prior to the arrival of Spanish and Euro-American explorers and settlers in the region. During the pre-contact period, Native American populations resided throughout what is now the state of California.

Based on archaeological and linguistic evidence, Native Americans ancestral to present-day tribes have lived in California since around 10,000 years before present (BP). Evidence suggests that Native Americans have resided in the Delta region for approximately 6,000 years (Garone 2015, 4). Thompson reported that Schenck estimated the population of Native Americans in the Delta region could have ranged from between 3,000 and 15,000 (Thompson 1957, 110). Conversely, Garone asserts that estimates in the range of 10,000 may be too low, and it is probable that the population of the Sacramento and San Joaquin valleys were more likely 160,000 (Garone 2015, 4-5). It has been estimated by several researchers that at their peak, Native American populations in California may have reached upwards of 150,000.

The Delta was home to several Native American tribes, but the exact territorial boundaries and villages are somewhat less clear. The occupied areas of the Delta in the 19th century included tribal lands of the Nisenan, Plains Miwok, Northern Valley Yokuts, the Bay Miwok, and the Patwin (Garone 2015, 4). Villages were found throughout the Delta region and are said to have been located near natural levees or banks and near rivers on slightly elevated areas. It would have been common to find communities of 200 with nearby villages within five to 10 miles (Thompson 1957, 111). But the overall diversity in village populations varied widely and could be as little as 15 or as many as 500 (Heffner and Prince-Buitenhuys 2020, 19). It is said that the average sized communities may have had approximately 35-40 huts, often low and circular or elliptical, covered with thatch or tule mats and finished with earth or bark.

Subsistence was based on naturally occurring sources native to the Delta region. Gathering and collection, fishing, and hunting were the principal methods to obtain food. Agriculture was not generally practiced by many tribes, but they would harvest a variety of foods such as acorns, grasses and seeds, berries, wetland plants, shellfish and fish, waterfowl, and large game. Many used tools in the procurement of food such as nets for both fishing and waterfowl, hook and line fishing, and two-pronged harpoons. Hunting would have involved a variety of prey including large game such as deer and elk, or smaller ones like rabbits, quails, and squirrel. Land conservation was of great importance amid tribes to ensure future survival for use and consumption. Care was taken to prune plants but leave seeds intact to ensure some fell at the source for future growth and flourishing. Some tribes would reportedly burn freshwater marshes to promote the growth of tules, which were instrumental in the construction of rafts, referred to as tule balsas (Garone 2015, 6). Cattails and tules were used for other things such as baskets, food, clothing, and even housing (Heffner and Prince-Buitenhuys 2020, 21).

Historic Setting. In this section "historic" refers to the time period during and subsequent to the arrival of Spanish and Euro-American explorers and settlers in the region. In general, historic cultural resources refer to buildings, structures, districts, objects, and sites produced by non-Native Americans.

Lower California was first encountered by the Spanish through early explorations in 1533 and 1539, but it was Juan Rodriguez who sailed north along the coast and first landed in San Diego Bay in 1542 (NPS Spanish Exploration 1959, 12-13). At the time, this was unchartered territory and was rather far along the northern coastline considering the territorial boundaries.

Reportedly it was the English that first landed on the shores of northern California near the Delta region. In 1579, English privateer Sir Francis Drake landed on the coast just north of the San Francisco Bay (NPS Spanish Exploration 1959, 16). It is presumed that Drake's Bay, northwest of San Francisco, was named after him. Ultimately, the English never followed up on Drake's claim of land in northern California and their interest waned.

Another Spanish explorer, Sebastian Vizcaino, was ordered to explore the California coast. Vizcaino surveyed portions of the coastline, naming areas such as Santa Catalina Island, Santa Barbara Channel, Point Concepcion, Carmel, and Monterey Bay, and finally he arrived in Drake's Bay in 1602 (NPS Spanish Exploration 1959, 28). In 1603, Vizcaino was commissioned to establish a settlement at Monterey Bay, but the project received opposition from the viceroy and was ultimately abandoned.

Renewed interest in the occupation of northern California by the Spanish was purportedly the result of Russian traders who made their way down from Alaska in search of seal and otter. The Spanish investigated the Russian interests in the mid-18th century by sending small parties of men, which ultimately led to Spanish occupation in California. In June 1770, northern California received its first presidio at Monterey and the mission of San Carlos (NPS Spanish Exploration 1959, 41). After this, more missions were established as they worked to gain a stronghold in the region. Presidios supposedly helped to protect the missions and to maintain control over Native American populations in the area. In the early 19th century, the Spanish government and the Catholic Church began sending missionization expeditions into the southern San Joaquin Valley. Conflicts between the European and Native Americans became more frequent during the subsequent Mexican period of California history (Wallace 1978, 459-460). In 1822, California became a territory of Mexico after obtaining independence from Spain. As a result, citizens began to receive land grants to settle the area. The first was John Sutter in 1841, for 49,000 acres in the Sacramento Valley.

Gold was discovered at John Sutter's Mill in the Sacramento Valley vicinity in 1848. The discovery ultimately led to a large migration of people into California in pursuit of gold. At that time, the Delta was a marsh land and not a desirable location for gold seekers. The Delta became more of a travel route for those making their way to gold mines. Meanwhile, Sacramento and Stockton became shipping centers, supply venders, and provided lodging quarters for many of those enroute (Heffner and Prince-Buitenhuys 2020, 23).

The influx of people into California in the mid- to late-19th century reasonably led to growth, but more importantly it led to the establishment of settlements, which promptly led to the growth and expansion of industry. Many individuals were transitory and merely passing through, but many sought to settle in California. In the Delta, reclamation efforts prompted by the Swamp and Overflowed Lands Act of 1850 transformed the region from tidal wetlands to a cultivated agricultural landscape (Garone 2015, 2). Crops were varied and included potatoes, grains, asparagus, alfalfa, almonds, rice, corn, sugar beets, and orchard fruits. An area once unsuited for agriculture now proved to be an economic engine for such pursuits. And while early efforts to transform the land by establishing flood control efforts proved fruitful for agriculture, the areas origins as an extensive natural ecosystem had been minimized.

The 20th century saw major efforts to establish conservation areas and restoration plans for the Delta with the establishment of the Cosumnes River Preserve, Stone Lakes National Wildlife Refuge, and Yolo Bypass Wildlife Area, among others (Garone 2015, 64). Today the

Delta boasts many land uses, largely agriculture, but also restored and protected lands serving as a refuge for wildlife.

Identification of Cultural Resources

Construction of the Sacramento DWSC was authorized in 1946, was operationally complete by 1963, and all construction work was done by 1969. The 1980 EIS to deepen the channel from 30 to 35 feet involved a cultural resources survey, and the identification of one pre-contact site west of Lake Washington near the Port of Sacramento, which is outside the current APE. The Stockton DWSC was authorized in 1965 and deepening of the natural channel to 35 feet occurred following a 1979 EIS. It included several new DMPS. One previously recorded pre-contact site was identified near the original Bradford Island disposal site; however, the site was not impacted by the project at that time and is not within the current APE. In 2008, a NEPA Categorical Exclusion was completed for the Sacramento River Deep Water Ship Channel Levee Maintenance Road Regrading and Resurfacing project, along with Section 106 and SHPO concurrence on a Finding of No Historic Properties Affected for the levee patrol road under the auspices that it was not yet a historic property. The document confirms that the APE was surveyed in 1976, 1985, 1990, and 1991 and found no historic properties. Section 106 consultation on four new DMPS on Twitchell Island and Mandeville Island occurred in 2016, resulting in a determination of not eligible for a historic road alignment and historic refuse scatter, and a SHPO concurrence of No Historic Properties Affected.

The current proposal involves several areas of the Sacramento and Stockton DWSCs. For the purposes of Section 106 of the NHPA, the APE was established based on the proposed actions. First, for the change in dredging seasons and methods, the APE is defined as the channel for both the Sacramento and Stockton DWSC. Secondly, eight new DMPS are proposed in the Stockton DWSC, and the APE has been delineated to capture all construction activities for each DMPS. The eight new DMPS are located on several islands along the Stockton DWSC including Bradford Island, Venice Island, and McDonald Island. Lastly, the S-31 Levee Road Maintenance and Repair Project would occur along the Western Navigation Levee of the Sacramento DWSC at a depth not to exceed 12 inches. The APE is defined as the width of the patrol road along the levee crown for about 13-miles with a temporary construction easement of roughly 4.5 feet on either side of the gravel patrol road for a total width of approximately 20 feet. The APE includes two proposed staging areas alongside the levee patrol road. Staging area #1 measures about 5.40 acres and is located near the beginning of the patrol road. Staging area #2 is approximately 1.86 acres and located towards the southern end of the patrol road. In total, the entirety of the APE is approximately 38.41 acres.

Consultation and identification efforts for Section 106 of the NHPA for historic properties were reinitiated for the current three proposed action areas. The development of each proposed action presented project elements at different times, thus resulting in survey and inventory efforts being conducted in varying order.

For the McDonald Island DMPS, a Sacred Land Files search was completed October 20, 2021, with negative results. EPG/Terracon conducted a records search in December 2021 and performed a pedestrian survey and subsurface testing January 17-19, 2022. No cultural resources were identified in the APE, or one-mile radius, during the records search, pedestrian survey, or subsurface testing. Consultation did not result in any substantive information. The SHPO

concurred with a finding of No Historic Properties Affected on May 2, 2022, thereby concluding Section 106 compliance for the McDonald Island DMPS.

For the eight other DMPS proposed, identification efforts began with a records search by the consultant that resulted in no cultural resources within the APE. SEARCH, Inc conducted a pedestrian survey, limited subsurface archaeological testing, and a boat-over survey May 16-20, 2022. One cultural resource was identified, H-1, described as a historic-era concentration of glass and ceramic debris likely dating from the early 20th century onward at Placement site 5 on Venice Island. It was a small, heavily disturbed scatter with low artifact density and was recommended not eligible for the NRHP with SHPO concurrence. USACE consulted with the SHPO on the APE and received a response with no substantive comments on May 27, 2022. The vertical extent of the APE is up to 8-feet above ground surface and 2-3 feet below current ground surface. Consultation did not result in any substantive information. However, Wilton Rancheria and Confederated Villages of Lisjan Nation requested copies of the final inventory report once completed, which was provided on August 8, 2022. The SHPO concurred with a finding of No Historic Properties Affected on November 18, 2022, thereby concluding Section 106 compliance for the eight additional DMPS.

For the S-31 Levee Road Maintenance and Repair Project, identification efforts began with a preliminary pedestrian survey on May 9, 2022, by USACE, and a second on September 7, 2022. The preliminary survey identified one historic property in the APE, the Sacramento DWSC Western Navigation Levee. A Sacred Land Files search was completed April 12, 2022, with negative results. A records search was completed in May 2022 and resulted in no additional historic property identified in the APE. USACE consulted with Yocha Dehe Wintun Nation (Yocha Dehe) on the project. A meeting was held July 25, 2022, to discuss project information. USACE received a letter from Yocha Dehe on September 12, 2022, stating that there are no known cultural resources in the APE and no monitor is necessary. USACE hosted a site visit to the project area with Wilton Rancheria on October 17, 2022. No additional information has since been received. USACE consulted with the SHPO on the APE on April 21, 2022, and on a revised APE on September 14, 2022, with a SHPO reply of no comments on either delineation. On February 2, 2023, the SHPO concurred with USACE's finding of No Adverse Effect to Historic Properties, assuming the Western Navigation Levee were eligible for the NRHP as a contributing resource to the potential Sacramento DWSC System Historic District under Criteria A and C at the state level with a period of significance from 1949-1969. The Project activities would not diminish nor alter any character-defining features of the resource that qualifies it for NRHP listing.

3.2.9.2 Environmental Consequence

Basis of Significance. Impacts to cultural resources would be considered significant under NEPA if they were to alter, directly or indirectly, the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Alternative 1 - No Action. Under the No Action Alternative, USACE would provide for the continuation of pre-approved maintenance dredging practices and the use of existing DMPS for the Sacramento and Stockton DWSC. These actions would result in no impacts to cultural resources. The S-31 Levee Road Maintenance and Repair project would continue maintenance;

however, it is now of sufficient age to warrant consideration for the NRHP and to assess any adverse impacts under Section 106.

In 2008, the S-31 Levee Road Project performed levee maintenance, installed riprap, and regraded the gravel patrol road. The current proposal to regrade the Western Navigation Levee patrol road would add no new elements to the 2008 action or to the originally authorized levee design. Based on age, the Western Navigation Levee is now a cultural resource and as such must be evaluated for the NRHP, and any adverse impacts based on the Proposed Action. The Western Navigation Levee is being treated as eligible for the NRHP for this project only as a contributor to the potential Sacramento DWSC System Historic District. Based on the SHPO concurrence with USACE's finding of No Adverse Effect to Historic Properties on February 2, 2023, the No Action as presented would **not adversely affect historic properties**.

Alternative 2 - Proposed Action. Under the Proposed Action, the dredging methods, dredging seasons, and nine new DMPS would be modified from the No Action Alternative.

The change in dredging methods and dredging seasons would not impact cultural resources, since the dredging would not extend below the current authorized depth of 35 feet. Based on the results of Section 106 consultation with the SHPO, the addition of nine new DMPS would **not impact any historic properties**.

3.2.9.3 Avoidance and Minimization Measures

The Proposed Action would have no significant impact to cultural resources and no mitigation measures specific to that action are contemplated.

4 CUMULATIVE EFFECTS

NEPA regulations require that NEPA analyses discuss cumulative effects, which are the impacts on the environment resulting from the incremental effects of the action when added to other past, present, and reasonably foreseeable future actions.

4.1 Local Projects

This section briefly describes other USACE projects in the Sacramento and Stockton areas. The precise construction timing and sequencing of these projects may not be determined yet or may depend on uncertain funding sources. All of these projects are required to evaluate the effects of the proposed project features on environmental resources in the area. In addition, mitigation or mitigation measures must be developed to avoid or reduce any adverse effects to less than significant based on Federal and local agency criteria. Those effects that cannot be avoided or reduced to less than significant are more likely to contribute to cumulative effects in the area.

4.1.1. Folsom Dam Raise Project

USACE Sacramento District is currently constructing the Folsom Dam Raise Project to help further reduce flood risk in the Greater Sacramento area. The project includes the following authorized components: a 3.5-foot raise of the Folsom Facility dikes, Mormon Island Auxiliary Dam (MIAD), Left Wing Dam (LWD), and Right Wing Dam (RWD), along with modifications to the main dam's Tainter gates; construction of automated temperature control shutters at the main dam to benefit American River fisheries, and habitat restoration at two sites along the lower American River.

The Dam Raise Project has prioritized completion of the remaining flood risk reduction elements of the overall project, which include raising the existing crest elevation of Dikes 1 through 8, MIAD, LWD, and RWD by approximately 3.5 feet, plus various structural changes to Folsom Dam. This work is expected to enhance utilization of Folsom Lake's existing surcharge flood storage space and increase the temporary water storage space that can be used during flood events.

The Folsom Dam Raise project is scheduled for completion in 2025. Various components of the project will be under construction at various times.

4.1.2. American River Common Features Project

The American River Common Features Project (ARCF) was authorized by Section 1401(2)(7) of the Water Resources Development Act of 2016 (Pub. L. No. 114-322, §1401(2)(7), 130 Stat. 1708 (2016). In order to reduce flood risk to the Sacramento Metropolitan Area, this project involves the construction of up to 13 miles of cutoff wall and up to 5 miles of levee stabilization measures to address seepage and stability concerns along the Sacramento River, the east side of the Natomas East Main Drainage Canal, and Arcade Creek, up to 21 miles of erosion prevention features along the Sacramento and American Rivers, and up to 5 miles of levee raises to the Sacramento River and Arcade Creek levees, the widening of the Sacramento Weir and Bypass to draw more flood flow away from the metropolitan area, and mitigation for permanent and temporary environmental impacts.

Construction for ARCF began in 2019 and targeted for completion in December 2027. The ARCF project area includes the eastern levees of the Sacramento River from approximately Freeport upstream to the confluence with the Lower American River, as well as levees along the LAR.

4.1.3. Sacramento River Bank Protection Project

The Sacramento River Bank Protection Project (SRBPP) was authorized to protect the existing levees and flood control facilities of the Sacramento River Flood Control Project. The SRBPP is a long-range program of bank protection authorized by the Flood Control Act of 1960. The SRBPP directs USACE to provide bank protection along the Sacramento River and its tributaries, including that portion of the lower American River bordered by Federal flood control project levees. While the original authorization approved the rehabilitation of 430,000 linear feet of levee, the 1974 Water Resources Development Act added 405,000 linear feet to the authorization and a 2007 bill authorized another 80,000 linear feet for a total of 915,000 linear feet of project. In 2020, USACE finalized a Post Authorization Change Report, including an Environmental Impact Statement, to address the effects of the latest authorization.

The last of the repairs under the 405,000 linear feet authorization was completed in 2020. USACE has not yet begun implementation of the next phase of the project, but it is likely to begin in 2024.

4.1.4. West Sacramento Project

The West Sacramento Project was authorized in WRDA 1992, PL102-580 Sec. 101 (4), as amended by the Energy and Water Development Appropriations Act of 1999, PL 105-245. It was reauthorized on October 28, 2009 under WRDA 2010, PL 111-85.

The General Reevaluation Report in 2015 recommended levee improvements to correct seepage/stability and erosion deficiencies in the North and South basins of the city of West Sacramento to protect 54,000 people and 18,000 structures. In 2016, Congress authorized the recommended project in Section 1401 of the WRDA of 2016, P.L. 114-322, also known as the Water Resources Infrastructure Improvements for Nation Act. The project includes 16 miles of cutoff walls, 23.5 miles of bank protection, 4.5 miles of levee stabilization bank protection all on the levees surrounding West Sacramento, as well as a 3.8-mile-long setback levee (constructed in 2018), and 17 miles of levee improvements along the Sacramento DWSC and cutoff wall measures and a set-back levee along the southern portion of the Sacramento River.

Construction is expected to begin on the first increment of the project, the Yolo Bypass East Levees, in 2023. Construction on the various phases of the project is expected to be ongoing through 2035. Currently, construction on the Sacramento DWSC levees, including bank protection and cutoff walls, is scheduled between August 2032 and April 2033.

4.1.5. Lower San Joaquin River Project

The Lower San Joaquin River project area is located along the lower (Northern) portion of the San Joaquin River system in the Central Valley of California. The project was congressionally authorized by America's Water Infrastructure Act of 2018 (P.L. 115-270) and includes North and Central Stockton – Delta Front, Lower Calaveras River, and San Joaquin River Levee Improvements. The structural features of the project include approximately 23 miles

of levee improvements, and two closure structures (Fourteen-mile Slough and Smith Canal). The non-structural measures include Comprehensive Flood Warning, Emergency Evacuation Planning, and Floodplain Management.

The project is slated to begin construction on the first reach in 2024. The final increment is scheduled to complete construction in 2035. The project includes levee reshaping and cutoff walls on the San Joaquin River along the Stockton DWSC, scheduled for construction from April to October 2033.

4.1.6. Lower San Joaquin River, Lathrop and Manteca Feasibility Study

The Lathrop and Manteca Feasibility Study was authorized by the Flood Control Act of 1936, Pub. L 74-738, Sec. 6 as amended by the Flood Control Act of 1938, Pub. L 75-761. Additional studies are undertaken through the Section 905(b) Analysis conducted under the Water Resources Development Act (1986) dated September 23, 2004, and approved by the South Pacific Division Commander on June 10, 2005. The Section 905(b) Analysis was prepared with funds identified in House Report 108-357 (Conference Report to accompany House of Representatives 2745 for the Energy and Water Development Appropriations Act of 2004) for use under the Sacramento-San Joaquin River Basins Comprehensive Study to evaluate ecosystem restoration (ER), flood risk management (FRM), and related purposes for the Lower San Joaquin River. House Report 105-190, which accompanied the Energy and Water Development Appropriations Act of 1998 (PL 105-62), identified initial funding and directed USACE to conduct a Comprehensive Study. The Section 905(b) Analysis determined that there were potential FRM and ER projects in the Lower San Joaquin River (LSJR) area.

This study builds upon the San Joaquin River Basin, Lower San Joaquin River, CA, Final Integrated Interim Feasibility Report/ Environmental Impact Statement/ Environmental Impact Report, authorized for construction in October 2018. Alternative 7A from the report is the recommended plan currently in progress under the LSJR Project. Alternative 7B, which included Alternative 7A and the added increment of approximately 20 miles of levee improvements within the Mossdale Tract area, was not carried forward to the final array of alternatives in the report, however flooding which threatens public health, life safety, and property in and around Mossdale Tract remains a problem.

The objectives of the study are to:

- Reduce risks to life and community safety associated with riverine flooding in the Mossdale Tract area over a 50-year period of economic analysis.
- Reduce the risk of inundation to property and infrastructure associated with riverine flooding in the Mossdale Tract area over a 50-year period of economic analysis.
- Reduce residual risks associated with riverine flooding, as required by USACE policy, to provide additional opportunities for resilience initiatives by State and local entities.
- Restore the floodplain within the study area to a less degraded state over a 50-year period of analysis by creating ecosystem habitat opportunities.

4.2 Cumulative Effects

The NEPA regulations require that a NEPA document discuss cumulative effects of the project, which are the impacts on the environment resulting from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions.

4.2.1. Geology and Soils

Implementation of the proposed project would not result in the loss of topsoil in the project area, and it would reduce erosion on the banks of the DWSCs and not contribute to erosion elsewhere. Additionally, according to results from required sediment testing in the project area, the project is not anticipated to degrade sediment quality. Therefore, even when considered in conjunction with other projects in the area, the effects to geology and soil resources would be **less than significant**.

4.2.2. Vegetation and Wildlife

The project would result in short-term disturbances of wildlife habitat, but would not substantially reduce the connectivity or extent of natural vegetation and wildlife habitat along the Sacramento and Stockton DWSC. The Proposed Action's contribution to cumulative vegetation and wildlife effects would be further reduced by the use of the avoidance and minimization measures described in Section 3.2.2. With implementation of these measures, cumulative effects to vegetation and wildlife would be **less than significant**.

4.2.3. Fisheries

Historical modifications to the project areas have created a highly altered riverine system; however, current dredging operations are not expected to create new adverse effects on fisheries. The potential impacts of the Proposed Action on fisheries are addressed in Section 3.2.3. Since the Proposed Action would implement avoidance and minimization measures, the effects on fishers would not be considered significant. Therefore, the incremental effect of the Proposed Action on non-special-status fish species is not cumulatively considerable and is therefore **less than significant**.

4.2.4. Special Status Species

Special-Status Plants

The potential impacts of the Proposed Action on special-status plants are addressed in Section 3.2.4. Pre-dredge special status plant surveys are performed at each DMPS scheduled for use in that season. Special-status plants identified would not be directly affected by the Proposed Action, and avoidance and minimization measures described in Section 3.2.4 to avoid the potential for indirect impacts.

The Proposed Action incorporates avoidance and minimization measures to avoid the potential for significant impacts to special-status plants if present. With incorporation of the these measures identified in Section 3.2.4, the incremental effect of the Proposed Action on special-status plants is not cumulatively considerable and is therefore **less than significant**.

Special-Status Fish Species

The potential impacts of the Proposed Action on special-status fish are addressed in the Biological Assessments (Appendix B). Potential impacts include both temporary and long-term effects on aquatic habitat for special-status fish species.

Temporary impacts include displacement of fish from the erosion sites during dredging activities and dredge-related increases in turbidity and noise. Mitigation measures identified in the Biological Assessments would minimize the potential for these temporary impacts. It is anticipated that most fish using the dredge reaches would relocate to surrounding areas until the dredging is complete. Because the dredge reaches are spread throughout the Sacramento and Stockton DWSC, it is anticipated that the newly dredged reaches between the sites will have the necessary capacity to absorb any displaced species until such a time as the sites can be recolonized.

Avoidance and minimization measures and BMPs would be implemented during the construction of all projects to reduce the cumulative effects to fisheries and EFH to **less than significant**.

Special-Status Wildlife Species

The potential impacts of the Proposed Action on special-status wildlife are addressed in the Biological Assessments (Appendix B). Pre-dredge special status wildlife surveys are performed at each DMPS scheduled for use in that season. The action area contains suitable habitat for nine special-status wildlife species: valley elderberry longhorn beetle, Lange's metalmark butterfly, giant garter snake, bank swallow, white-tailed kite, Swainson's hawk, burrowing owl, Western Yellow-billed cuckoo, and Least Bell's Vireo. Implementation of the Proposed Action has a potential to result in direct and indirect impacts to these species.

Potential direct impacts include injury or mortality of individuals, disruption of breeding activities, loss of suitable habitat, and displacement of individuals from the DMPS.

Potential indirect impacts include degradation of water quality and disruption of individuals (e.g., breeding activities) outside of the dredging areas from noise, vibration, and other dredging-related disturbance.

The Proposed Action incorporates avoidance and minimization measures to avoid or reduce the potential for direct and indirect impacts on special status wildlife species. With implementation of the measures identified in Section 3.2.4, the incremental effect of the Proposed Action on special-status wildlife species is not cumulatively considerable and therefore **less than significant**.

4.2.5. Air Quality

The Proposed Action will temporarily result in direct effects to air quality emissions from construction-generated criteria air pollutants and precursor compounds. These effects would be mitigated for with mitigation fee payments made to the local air districts. Specifically, NOx emissions will exceed *de minimus* thresholds for two air districts within project limits, YSAQMD and BAAQMD. Coordination between all four districts that the Proposed Action is within, YSAQMD, SMAQMD, BAAQMD, and SJVAPCD, would commence before construction is to begin. Any projects anticipated within the vicinity would implement BMPs and minimization measures to reduce those effects to the best extent practicable. Cumulative impacts to air quality would be **less than significant with mitigation**.

4.2.6. Hydrology and Water Quality

Dredging activities have the potential to temporarily degrade water quality through increased turbidity at the cutterhead during operations or the indirect release of contaminants into water bodies through placement activities. Related projects could be under construction during the same timeframe as this project. If construction occurs during the same timeframe water quality could be diminished primarily due to increased turbidity.

Further urban development could increase runoff as the amount of impervious surfaces is increased. The new housing developments may cause more stormwater runoff laden with contaminants common in urban/suburban areas (i.e. pesticides, lawn fertilizers, hydrocarbons). The increased volume of municipal sewage from the new developments could also introduce more pollutants to Delta waters. The method by which treated wastewater is discharged would determine the severity of the impact to water quality from new and proposed residential subdivisions near the project area. All projects would be required to coordinate with the RWQCB and overall water quality will be required to meet the Basin Plan objectives. The proposed 10-year programmatic maintenance dredging and bank protection activities associated with the DWSC's would result in less-than-significant effects to water quality. Degradation of water quality from the dredging operations and bank protection would be short term and limited to the August-November work window. The dredging and bank protection would not cumulatively contribute to long-term adverse effects that may result from development projects and the overall cumulative effect would be **less than significant**.

4.2.7. Recreation

The proposed dredging and bank protection may result in short-term restrictions on recreation access during operations, depending on where the dredging and bank protection are occurring within the project area. However, recreationists could typically detour around the area and the operations would not severely restrict recreational access. This project and other similar past, present, and reasonably foreseeable future projects, when considered together, are not expected to result in permanent changes to recreation opportunities or to significantly reduce access to recreational areas on the DWSCs; therefore, cumulative effects to recreation resources would be **less than significant**.

4.2.8. Noise

The noise effects in the project area resulting from the proposed project are less than significant. In general, the proposed project is physically separated from most other projects in the area by a large enough distance so that noise generated by this project would not result in cumulatively significant impacts to any particular area.

The West Sacramento project has planned work along the Sacramento DWSC, and the Lower San Joaquin project includes work on the Stockton DWSCs. Since the anticipated construction timeframes of both projects overlap the maintenance dredging work windows, it is possible that dredging and construction could briefly occur simultaneously along the DWSC, causing a cumulative increase in ambient noise greater than the increase that would be experienced under each project alone. However, because the dredge is constantly moving along the channel, it would only be in the vicinity of the levee repair construction for a short time, and the effect would be **less than significant**.

4.2.9. Cultural Resources

Section 106 of the NHPA found that the proposed actions would have no adverse impacts to historic properties. There were no historic properties identified in the APE for the proposed actions to change dredging methods and seasons, nor for the nine new DMPS (*No Historic Properties Affected*). The proposed Western Navigation Levee patrol road regrading is a No Action Alternative however, the resource is now of historic age to warrant consideration under Section 106. After review, the Western Navigation Levee is being treated as eligible for the NRHP as a contributing resource to the potential Sacramento DWSC System Historic District. On February 2, 2023, the SHPO concurred with USACE's finding of *No Adverse Effect to Historic Properties*. The regrading work would not introduce any new elements outside the originally authorized design; therefore, it would not diminish nor alter any character-defining features of the resource. Thus, the cumulative impacts to cultural resources would be **less than significant**.

5 COMPLIANCE WITH FEDERAL ENVIRONMENTAL LAWS AND REGULATIONS

5.1 33 CFR pt. 335-338

Implementation of USACE maintenance dredging program is governed by 33 CFR pt. 335-338. Part 335 describes the applicable laws and definitions, including the Federal standard. Part 336 outlines factors to be considered in the evaluation of USACE dredging projects involving the discharge of dredged material into waters of the United States and ocean waters, including compliance with Section 404(b)(1) of the CWA. Part 337 outlines the procedures to be followed in implementing state requirements, emergency actions, and identification and use of disposal sites. Procedures applicable to other USACE activities (e.g., erosion protection along the banks of navigation channels) are addressed in Part 338.

5.2 Clean Water Act of 1972, as amended, 33 U.S.C. 1251, *et seq*.

The Federal Clean Water Act (CWA) requires states to set standards to protect water quality. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Specific sections of the CWA control discharge of pollutants and wastes into Waters of the U.S. USACE has written all of the terms and conditions of the MOU into the plans and specifications. Full compliance with the CWA will occur, once the Contractor fulfills all the terms and conditions and USACE submits any required reports.

5.3 Clean Air Act of 1972, as amended, 42 U.S.C. 7401, *et seq*.

Air quality regulations were first communicated with the Clean Air Act (CAA). The CAA is intended to protect the Nation's air quality by regulating emissions of air pollutants. The CAA established the NAAQS and delegated enforcement of air pollution control to the states. CARB has been designated as the state agency responsible for regulating air pollution sources at the state level. CARB, in turn, has delegated the responsibility of regulating stationary emission sources to local air pollution control or management districts which, for the proposed project is within four; YSAQMD, SMAQMD, BAAQMD, and SJVAPCD.

The CAA states that all applicable Federal and state ambient air quality standards must be maintained during the operation of any emission source. The USEPA, in conjunction with the U.S. Department of Transportation, established the General Conformity Rule on 30 November 1993. The rule implements the CAA conformity provision, which requires Federal agencies to identify, analyze, and quantify emission impacts of an action and mandates that the Federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to an approved CAA implementation plan.

Emissions of criteria pollutants within the non-attainment and maintenance areas surrounding the Sacramento and Stockton DWSC would not exceed the Federal *de minimis* levels, and therefore, a general conformity determination is not required for the Proposed Action (40 CFR 93.153(c)(1)). Emissions of NOx would exceed the thresholds established by YSAQMD and BAAQMD. Coordination with the air districts, best management practices, and mitigation measures would be incorporated to lessen impacts to air quality. This EA evaluates air

emissions resulting from all alternatives proposed and concludes that with mitigation there will less than significant impacts to air quality.

5.4 Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, et seq.

Under the Federal ESA (16 U.S.C. §§ 1531-1544), all Federal agencies shall, in consultation with the Secretary of the Interior or Secretary of Commerce, use their authorities to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of habitat determined under the ESA to be critical. The ESA provides a program for conserving threatened and endangered plants and animals, and the habitats in which they are found. It is designed to protect critically imperiled species from extinction. The ESA is administered by the USFWS and NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fishes, while other species are under USFWS jurisdiction. Under the ESA, USFWS and NMFS must authorize the take of listed species, and the Federal action agency must implement all reasonable and prudent measures necessary to minimize the impacts of take.

USACE initiated formal consultation with NMFS and USFWS on January 30, 2023. NMFS is currently reviewing the Sacramento and Stockton Deep Water Ship Channel Maintenance Dredging and Bank Protection Project, California 10-Year Programmatic Biological Assessment; the updated BO, expected in June 2023, will supersede the 2016 BO. USFWS is reviewing both Sacramento and Stockton Deep Water Ship Channel Maintenance Dredging and Bank Protection Project, California, Biological Assessments and is expected to issue a five-year programmatic BO in June 2023. USACE will comply with the terms and conditions of the updated biological opinions.

5.5 Executive Order 11988, Floodplain Management

This EO addresses concerns over the potential loss of the natural and beneficial functions of the nation's floodplains as well as the increased cost to Federal, state and local governments from flooding disasters caused or worsened by unwise development of the floodplain. When funding or carrying out actions, Federal agencies are required to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative

Maintenance dredging and associated project activities would not induce development in the areas surrounding the Sacramento and Stockton DWSCs, nor would they increase flood risk in the surrounding areas.

5.6 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

This EO directs all Federal agencies to identify and address adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Any impacts caused by maintenance dredging or other project activities would not disproportionately affect minority or low-income populations (see Section 3.1.7).

5.7 Fish and Wildlife Coordination Act of 1958, as amended, 16 U.S.C. 661, *et seq*.

The Fish and Wildlife Coordination Act (FWCA), as amended, provides the basic authority for the involvement of the USFWS in evaluating impacts to fish and wildlife from proposed water resource development projects. The FWCA requires Federal agencies involved with such projects to first consult with the USFWS and the respective state fish and wildlife agencies regarding the potential impacts of the project on fish and wildlife resources. While the results of the consultation are not binding, the Federal agency must strongly consider input received during consultation to prevent loss or damage to wildlife resources and provide for any measures taken to mitigate such impacts. FWCA consultation for the proposed project is has been coordinated with the USFWS and is complete. This project is in full compliance with the FWCA.

5.8 Migratory Bird Treaty Act, 15 U.S.C. 701-18h.

The Migratory Bird Treaty Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. Migratory birds would be minimally affected by dredging within the Sacramento and Stockton DWSC. Migratory songbirds may also be impacted during the construction of containment berms/dikes and placement of dredged material in the upland placement areas. USACE will include its standard migratory bird protection measures in the project plans and specifications and will require the Contractor to abide by those requirements. Pre-construction surveys would be conducted before dredged material placement. In addition, almost all placement would occur outside the majority of the nesting season for migratory birds. If nesting activities occur within or near the DMPS, appropriate buffers will be placed around nests to ensure their protection.

5.9 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) establishes a management system for national marine and estuarine fishery resources. This legislation mandates the identification, conservation, and enhancement of EFH, which is defined as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity,” for all managed species. Federal agencies are mandated to consult with NMFS regarding any action authorized, funded, or undertaken that may adversely affect any EFH designated under the Magnuson-Stevens Act. The project area is within the EFH Pacific Salmon Species Fishery Management Plan, Coastal Pelagic Species Fishery Management Plan (northern anchovy), and Pacific Groundfish Fishery Management Plan (starry flounder). The ESA Section 7 consultation with NMFS also incorporated an EFH assessment. It was determined that the project effects to EFH would be less than significant. See Section 3.2.4 for further discussion.

5.10 National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, *et seq*.

Under NEPA, Federal agencies must consider the environmental consequences of proposed major Federal actions. The spirit and intent of NEPA is to protect and enhance the environment through well-informed Federal decisions, based on sound science. NEPA is premised on the assumption that providing timely information to the decision maker and the

public about the potential environmental consequences of proposed actions would improve the quality of Federal decisions. Thus, the NEPA process includes the systematic interdisciplinary evaluation of potential environmental consequences expected to result from implementing a proposed action.

Following a public review period of this Draft SEA, comments received will be incorporated into the document and a Final SEA will be drafted. An accompanying FONSI will be signed by the USACE Sacramento District Commander, and NEPA compliance will be complete.

5.11 National Historic Preservation Act of 1966, as amended, 54 U.S.C. 300101, *et seq*.

The National Historic Preservation Act (NHPA) (54 U.S.C. § 300101 *et seq*.) is the primary Federal legislation governing the preservation of significant historic property. Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties. Undertakings are projects, activities, or programs funded in whole or in part under the direct or indirect jurisdiction of a Federal agency. USACE uses effects determinations arrived at through compliance with Title 54 U.S.C. § 306108, commonly known as Section 106, to assess effects to cultural resources under NEPA and to mitigate for adverse effects under both laws.

Section 106 has been completed for this project in compliance with the provisions of the Act. USACE received concurrence on a finding of No Historic Properties Affected for the Proposed Action, and No Adverse Effect to Historic Properties for the No Action Alternative. See Section 3.2.9 for further discussion and documentation.

6 FINDINGS

This Final SEA evaluated the environmental effects of the Proposed Action. Potential adverse effects to the following resources were evaluated in detail: geology and soils, vegetation and wildlife, fisheries, special status species, air quality, hydrology and water quality, recreation, noise, and cultural resources.

Evaluation of the Draft SEA and coordination with other agencies indicate that the Proposed Action would have no significant long-term effects on environmental resources. Short-term effects during construction and operations would either be less than significant or mitigated to less than significant using Avoidance and Minimization Measures. Thus, the preparation of an Environmental Impact Statement is not required.

7 LIST OF PREPARERS

This Supplemental Environmental Assessment was prepared by USACE. The following is a list of individuals who prepared sections of the SEA and/or provided significant background materials (Table 19).

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Name	Title	Professional Experience
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Yari Johnson	Biological Sciences Environmental Manager, Environmental Planning Section	10 years
Ashley Lopez	Environmental Manager, Environmental Planning Section	4 years
Steven Mclemore	Student Trainee, Environmental Planning Section	3 years
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