Islais Creek Bridge Rehabilitation Project
Federal Aid Project No. BHLO-5934(168)

Revised Natural Environment Study

Caltrans District 4

City and County of San Francisco, CA

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Federal Project No. BHLO-5934 (168)

August 2023

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Natural Environment Study

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STATE OF CALIFORNIA
Department of Transportation
City and County of San Francisco

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Summary

This Natural Environment Study (NES) evaluates the potential impacts of the proposed rehabilitation of Islais Creek Bridge (Bridge No. 34C0024) along Third Street in the City and County of San Francisco (hereafter called the project). San Francisco Public Works (SFPW), in cooperation with the San Francisco Municipal Transportation Agency (SFMTA), proposes to replace the superstructure of the Islais Creek Bridge (hereafter called the bridge), in accordance with California Department of Transportation District 4 (Caltrans) procedures. The project may also include coordination with other stakeholders such as the United States Coast Guard, the San Francisco Bay Conservation and Development Commission (BCDC), the Port of San Francisco (Port), the Federal Highway Administration, and San Francisco Public Utilities Commission (SFPUC).

Project Location

The Islais Creek Bridge crosses the Islais Creek Channel (hereafter called the channel), and is located along Third Street, a major arterial along an industrial area of the southern San Francisco waterfront. The bridge is approximately 1,700 feet east of Interstate 280 and approximately 3,300 feet west of the San Francisco Bay (the Bay).

Project Purpose

The purposes of the project are to:

- Maintain current geometric, construction, and structural standards required for the types and volume of projected traffic on the bridge over its design life.
- Increase the serviceability of the bridge to improve safety and increase operational utility to Muni light-rail operations.
- Address the existing bridge's seismic deficiencies.
- Increase bridge freeboard to the maximum extent practicable to extend the useful life of the bridge by improving the bridge's resilience to the impacts of sea-level rise and avoid the current recurring submersion of the bridge underdeck and flooding of the machine rooms. Additionally, reduce impacts to the bridge from exposure to seawater and sustained moisture.

The need for the project results from the structural and seismic deficiencies in the existing Islais Creek Bridge. The existing bridge is 76 years old, in poor condition, and is increasingly structurally deficient and functionally obsolete. As noted in the latest Caltrans Bridge Inspection Report, the Islais Creek Bridge is currently considered Structurally Deficient with a Sufficiency

Rating of 20 (Caltrans 2011). The Sufficiency Rating formula considers the structural adequacy, functional obsolescence and level of service, and essentiality for public use. The bridge's low rating is due largely to significant load carrying elements having been found to be in poor, deteriorated, and/or damaged condition.

Species with Potential to Occur in the Biological Study Area

AECOM biologists developed a list of special-status species in the biological study area (BSA) by comparing localized species occurrences, reported in the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB), and the US Fish and Wildlife Information for Planning and Conservation (iPaC) database, and utilizing resources made available by the National Marine Fisheries Service (NMFS). Site information was gathered during field visits in 2014 and 2015. Table S-1 lists the special-status wildlife species determined to have potential to occur in the BSA. There are no special-status plant species with potential to occur in the BSA.

Table S1 Special-Status Wildlife Species With Potential to Occur in the BSA

Animals					
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**Potential to Occur**	**ESA Effects Determination**
Pacific herring	*Clupea pallasii*	—	State-Managed Fishery	low	NE
Green sturgeon Southern DPS	*Acipenser medirostris*	FT and DCH	—	low	NLAA
Longfin smelt	*Spirinchus thaleichthys*	FP	ST	low	NE
Steelhead – Central California Coast DPS	*Oncorhynchus mykiss*	FT and DCH	—	low	NLAA
California sea lion	*Zalophus californianus*	MMPA	—	low	NE
Pacific harbor seal	*Phoca vitulina*	MMPA	—	low	NE
California brown pelican	*Pelecanus occidentalis californicus*	MBTA, FD	FP	moderate	NE
Double-crested cormorant	*Phalacrocorax auritus*	MBTA	WL	high	NE
American peregrine falcon	*Falco peregrinus anatum*	MBTA	FP	low	NE
Townsend big-eared bat	*Corynorhinus townsendii*	—	SCT, SSC	low	NE
Pallid bat	*Antrozous pallidus*	—-	SSC	low	NE

Notes:
DPS = distinct population segment

State of California Status Designations
FP = Fully protected under California Fish and Game Code

Table S1 Special-Status Wildlife Species With Potential to Occur in the BSA

Animals					
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**Potential to Occur**	**ESA Effects Determination**
Federal Status Designations MBTA = Species protected by the Migratory Bird Treaty Act DCH = Designated Critical Habitat present in BSA FT = Federal threatened FD = Federal delisted FP = Federal proposed MMPA = species protected by the Marine Mammal Protection Act		SCT = State candidate threatened SE = State endangered SSC = State species of concern ST = State threatened WL = Species of Special Concern Watch List **ESA Effects Determination** NE = No Effect NLAA = Not Likely to Adversely Affect			

Land uses surrounding the bridge are largely commercial and industrial; and the area is highly developed with little natural biological habitat. Due to the bridge's proximity to the Bay, there is a chance that the federally listed steelhead, Chinook salmon, and green sturgeon, and the state listed longfin smelt may be present. Longfin smelt is also currently proposed for federal listing. The BSA contains essential fish habitat (EFH) as designated in the Pacific Groundfish Fisheries Management Plan (FMP), the Coastal Pelagic FMP, and the Pacific Coast Salmonid FMP. California sea lions and Pacific harbor seals may also access the channel from the Bay, protected under the Marine Mammal Protection Act (MMPA). Any migratory birds that will potentially be present in the BSA are protected under the Migratory Bird Treaty Act (MBTA).

Waters of the U.S.

A wetland delineation was conducted in accordance with the guidelines defined in the United States Army Corps of Engineers (USACE) Wetlands Delineation Manual, the USACE Arid West Manual (Environmental Laboratory 1987; USACE 2008), relevant regulatory guidance letters, and USACE district-specific minimum reporting requirements. Surveys were conducted on November 25, 2016. A total of 14.55 acres of potential waters of the U.S. were identified in the BSA, of which 0.28 acre is potentially jurisdictional wetlands and 14.27 acres are potentially jurisdictional other waters of the U.S.

Migratory Birds and Nesting Raptors

The channel itself has riprap armoring and relatively sparse vegetation, including landscape trees, which may be used by migratory birds, although no nests were seen during the site review. Nesting migratory birds and raptors are protected under the MBTA and the California Fish and Game Code (CFGC Sections 3513 and 3503.5).

Special-Status and "High Priority" Bat Species

According to the CNDDB search, there are no records of special-status or high-priority bat species in the BSA. Based on information gathered during field visits in 2014 and 2015, surrounding warehouses and buildings are well-sealed, and no evidence of bat roosting under the bridge or other man-made structures in the BSA was detected.

Trees

A total of 39 native and nonnative trees were identified in the BSA during the field review. The trees were associated with landscaped areas to the north and south of the bridge, and on Third Street approaches. One Monterey cypress (*Hesperocyparis macrocarpa*) was documented during 2014 and 2015 site visits. Cypress trees are protected under the Blue-Greenway Open Space Concept design plan.

Potential Impacts

The project footprint consists of paved road surrounded by landscaped and graded roadsides, and portions of channel, which is a heavily developed and dredged waterway. These areas lack high-quality or natural habitat for terrestrial wildlife. The project footprint within the channel provides marginal habitat for marine mammals and special-status fish. The proposed project involves the installation of new permanent fill in the form of dolphin piles and abutment reinforcement. However, due to the planned removal of the old fender system, the proposed project would result in a net decrease in fill of potential jurisdictional waters. Temporary impacts to up to 2.30 acres of potential jurisdictional other waters would occur from the work barges being present onsite during construction.

Up to 1.26 acres of developed area adjacent to the bridge may also be impacted during construction. There are three staging area options within the project footprint. The first staging area option is 2.4 acres, the second staging area option is 19.8 acres, and third staging area option is 22.6 acres. All staging areas options are in areas that are already developed (i.e., paved or gravel lots associated with port infrastructure) and would have no impact to natural resources. No trees would be impacted by the proposed project.

Temporary impacts to natural communities may include noise disturbance from construction equipment, as well as the resuspension of sediment during in-water work. These impacts would result from the use of barges, underwater pile cutting equipment, and placement of a debris catchment system in the channel bed. These activities may also result in a temporary, localized increase in turbidity. The increase in turbidity is unavoidable, but would be short-term, occurring

only during installation and removal of the structures. Lastly, underwater sound produced during project construction could temporarily impact a limited number of special-status species.

Proposed Avoidance, Minimization, and Compensation

Best management practices (BMPs) will be implemented during project construction to avoid and/or minimize potential impacts to special-status species and habitats to the greatest extent practicable. During in-water work, measures will be implemented to prevent construction material or debris from entering the creek channel. Measures will include soil stabilization and sediment control BMPs; waste management and materials pollution control BMPs to prevent sediment and other pollutants from entering the Bay during project construction; and Occupational Safety and Health Administration (OSHA)-required training and protective equipment to further prevent water and soil contamination from hazardous materials that have been identified in the BSA.

Additional resource-specific avoidance and minimization measures (AMMs) may be implemented to protect special-status species and waters of the U.S. These measures include preconstruction surveys, biological monitoring, buffers around environmentally sensitive areas, and worker trainings on sensitive resources, as summarized in Table S-2.

Table S-2 Avoidance and Minimization Measures

Title	Measure
Permits	All relevant permits will be included in the construction bid package of the proposed project.
Biological Monitor Approval	An approved biologist(s) will provide services for the project. If required by project permits, the names and qualifications of the biological monitor(s) will be submitted to the required agency approval prior to initiating construction activities for the proposed project.
Preconstruction Survey	Prior to project commencement, an approved biologist(s) will conduct preconstruction surveys in and adjacent to the project area. If listed species are identified, regulatory agencies will be notified.
Biological Monitoring	If required by permits, an approved biologist(s) will be on-site during activities. The biologist(s) will keep copies of applicable permits in their possession when on-site. The approved biologist(s) will be given the authority to communicate either verbally or by telephone, email, or hard copy with all project personnel to ensure that permit requirements are fully implemented. The biologist(s) will have the authority to stop project activities to avoid take of listed species or if he/she determines that any permit requirements are not fully implemented.
Worker Environmental Awareness Training	All construction personnel will attend a mandatory environmental education program delivered by an approved biologist prior to working on the project. At a minimum, the training will include a description of protected biological resources, including fish, marine mammals, bats, and migratory birds. The training will discuss the potential occurrence of these species in the project construction area; provide an explanation of the status of these species and their protection under the federal Endangered Species Act (FESA) and other laws; list the measures to be implemented to conserve listed species and their habitats as they relate to the work site; and describe the boundaries within which construction may occur.
Pile-Driving Restrictions	All piles will be installed and removed using a crane-mounted vibratory driver. Vibratory pile driving is beneficial to use in the marine environment because the method is more efficient (reduces ground vibrations) than impact hammers into wet, particulate sediment; and because it creates a lower level of underwater noise (GDG 2014). If, during pile installation, an obstruction is

Title	Measure
	encountered below the mudline, the pile will be vibrated out and placed in a new location. If the pile cannot be relocated (especially during the replacement of the existing pile fenders), buried timber piles and other abandoned piles that may be encountered will be removed using a barge equipped with a crane-mounted vibratory hammer. This work may be supported by divers who would clear material at the bottom of the channel to the extent necessary to expose the top of abandoned or broken timber piles, allowing for their removal.
Protection of Marine Mammals	SFPW will consult with the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) to determine the potential for project activities to impact marine mammals, including California sea lions, harbor seals, and harbor porpoise. Through the consultation process, AMMs specific to marine mammals will be identified. These may include measures such as limiting the number of piles installed or removed in a 24-hour period; and providing biological monitoring for marine mammals to enforce a marine mammal safety zone, where no pile driving can occur if a marine mammal is observed.
Monitoring of Underwater Noise	Monitoring will be done during pile driving and extraction to ensure that underwater noise levels do not exceed predicted levels.
Protection of Herring Spawn	SFPW will consult with the California Department of Fish and Wildlife (CDFW) to determine the potential for project activities to impact Pacific herring. Through the consultation process, AMMs specific to Pacific herring will be identified. These may include measures such as providing biological monitoring to identify spawn events during the herring spawning season, from December 1 through February 28. If herring spawning is observed, in-water work will be suspended within 500 meters of spawning activity, and the work will not resume until spawning has ended and eggs have hatched (up to 21 days).
Debris Containment	Debris containment systems will be implemented for work over water to prevent airborne or falling debris from entering the waters below. Appropriate containment systems will be used to contain debris for rust, lead paint, and asbestos.
Preconstruction Surveys for Nesting Birds and Roosting Bats	Preconstruction surveys for nesting birds and roosting bats will be conducted by a qualified biologist no more than 72 hours prior to the start of construction for activities occurring during the breeding season (February 15 through August 31).
Non-Disturbance Buffer for Nesting Birds and Roosting Bats	If work must occur within 300 feet of active raptor nests or 50 feet of active passerine nests or roosting bats, a non-disturbance buffer will be established, with agency approval, at a distance sufficient to minimize disturbance based on the nest/roost location, topography, cover, the species' sensitivity to disturbance, and the intensity/type of potential disturbance.
Night Lighting	Artificial lighting of the proposed construction area during nighttime hours will be minimized to the maximum extent practicable. All lighting will be directed away from the marine environment and natural areas.
Project Staging	Project vehicle, laydown, and equipment staging will be restricted to barges or the potential areas shown on Figure 7. Staging will not occur in vegetated areas.
Trash Control	All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed at least once a day from the work area.
Firearms	No firearms will be allowed in the active construction area except for those carried by authorized security personnel, or local, state, or federal law enforcement officials.
Pets	To prevent harassment, injury, or mortality of sensitive species, no pets of project personnel will be permitted on the project site.
Caltrans Standard Best Management Practices (BMPs)	The potential for adverse effects to water quality will be avoided by implementing the temporary and permanent BMPs outlined in Section 7 1.01G of the Caltrans Standard Specifications. The Caltrans Construction Site BMPs Manual includes many protective measures and guidance to prevent and minimize pollutant discharges, and can be found at the following website: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

Title	Measure
Concrete Waste and Stockpiles.	All grindings and asphaltic-concrete waste will be stored in previously disturbed areas absent of habitat and at a minimum of 150 feet from any aquatic habitat, culvert, or drainage feature.
Water Quality	Protection measures will be implemented to protect all waters of the U.S. The project has been designed to avoid increased turbidity by cutting existing fenders at the mudline. In-water work can be supported by divers to clear material at the bottom of the channel and gather abandoned or broken fender piles. Silt curtains and turbidity curtains may be used to minimize turbidity if necessary. Implementation of Caltrans standard BMPs (Measure #17) and proper storage of concrete waste and stockpiles (Measure #18) will further reduce impacts on water features. When piles or other debris from the existing fender system are removed from the channel, they will be promptly removed from the water and placed on a barge. The barge will be configured to contain all sediment that may be adhering so that it does not fall into the water.

All construction-related materials would be removed after completion of construction activities. Temporary staging areas would be cleaned up, and any remaining concrete or asphalt would be removed and hauled to an appropriate waste disposal facility.

Implementation of the project would result in an overall decrease of permanent fill in the waters of the U.S., no mitigation is required for the project's permanent impacts. The USACE may require mitigation for temporary fill if that fill would be in place for two or more years. The potential need of compensatory mitigation for temporary impacts would be clarified during project permitting. If compensatory mitigation is required, potential options include mitigation banks, in-lieu fee arrangements, or separate project-specific activities such as on-site restoration.

Cumulative Impacts

The Port's Blue-Greenway Improvement includes the channel for long-term improvements drafted to take place over the next 10 to 15 years. Improvements include public access to the waterway, open-space parks, a boat launch, and habitat restoration at the Pier 94 tidal marsh (Office of the Mayor 2006). A new stadium for the NBA Golden State Warriors opened in 2019 in the same southeastern district as the project footprint. This would increase activity and traffic in the area. This project's Bid date is currently set for spring 2025; however, a construction schedule is not yet set. The channel is also part of the SFPUC's Wastewater Enterprise ongoing plan to make structural, seismic, capital, and environmental improvements to the City's sewer systems. It is currently listed for better stormwater management, wastewater treatment system additions, and seismic improvements (SFPUC 2010). Project construction points may include the 66-inch channel force main, which runs between the channel and Mission Creek to the north, and the Southeast Treatment Plant on Phelps Street near Third and Evans streets in the Bayview District.

The proposed project would incorporate AMMs, including standard Caltrans BMPs, which would protect surrounding habitat and water quality. Other known projects in the area are

expected to largely take place in areas that are already developed. Therefore, the proposed project would not generate substantial, unavoidable cumulative impact to natural resources.

Regulatory Agencies and Required Permits

The permits and approvals required for project construction are summarized in Table S-3.

Table S-3 Required Permits and Approvals

Agency	Permit/Approval	Status
National Marine Fisheries Service	Informal Consultation pursuant to Section 7 of the Endangered Species Act and Section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act	Concurrence received in July of 2017.
National Marine Fisheries Service	Authorization to incidentally harass marine mammals pursuant to the Marine Mammal Protection Act	If needed, the authorization will be obtained before the project is approved for construction.
United States Coast Guard	Rivers and Harbors Act Section 9 Approval	The approval will be obtained before the project is approved for construction.
United States Army Corps of Engineers	Clean Water Act Section 404 permit for filling or dredging of waters of the United States	The permit will be obtained before the project is approved for construction.
San Francisco Bay Conservation and Development Commission	BCDC Permit for work within San Francisco Bay waters and along the 100-foot shoreline band	The permit will be obtained before the project is approved for construction.
San Francisco Bay Regional Water Quality Control Board	Clean Water Act Section 401 water quality certification	The certification will be obtained before the project is approved for construction.
SFMTA	Encroachment Permit or Memorandum of Understanding	The permit will be obtained before the project is approved for construction.
Port of San Francisco	Encroachment Permit or Memorandum of Understanding	The permit will be obtained before the project is approved for construction.
San Francisco Public Utilities Commission	Facility permit for new stormwater tie-in	The permit will be obtained before the project is approved for construction.

Informal Consultation with the National Marine Fisheries Service

In July of 2017, Caltrans completed a Section 7 consultation for a prior iteration of the project, receiving a letter of concurrence from NMFS. This letter of concurrence affirmed that the project is not likely to adversely affect steelhead Central California Coast (CCC) distinct population segment (DPS) or green sturgeon Southern DPS. NMFS also found that the earlier version of the

project would adversely affect EFH for species managed under the Pacific Groundfish and Coastal Pelagic Fisheries Management Plans, but the project contains sufficient measures to avoid, minimize, mitigate, or otherwise offset those adverse effects. Following the issuance of that concurrence letter, SFPW has made changes to the project design. Due to these changes, the Standard Project Alternative would require far less in-water work, and there would be much less impact to subtidal and intertidal areas in the BSA than in the earlier project design.

Although the Standard Project Alternative has been altered, it has not been substantially revised in a way that would have any effects to federal Endangered Species Act (FESA)-listed species or EFH that were not considered in the prior consultation. Therefore, Caltrans has determined that it will not be necessary to reinitiate consultation with NMFS for potential effects to FESA-listed species or EFH.

No take of listed species is anticipated. Hydroacoustic impacts have been minimized by using cast-in-drilled-hole (CIDH) piles for abutment reinforcement, and the use of vibratory pile driving methods. There is no potential for fish entrapment, and water quality degradation has been minimized due to proposed project design and implementation AMMs. Nominal disturbances include the underwater noise during installation of CIDH piles and removal of the old wooden fender piles, artificial lighting, localized turbidity, and the presence of construction divers and personnel on barges and rafts. These impacts are short in duration and temporary in nature. Long-term benefits include a net decrease in Bay fill and the removal of creosote-treated piles.

The BSA contains EFH for Pacific groundfish, Pacific salmon, and coastal pelagic species. Temporary changes to EFH in the project area can occur during construction. Potential temporary adverse effects to estuarine EFH for these species may include changes to local water quality due to turbidity, the lack of access to habitat during removal of bridge fenders, and disturbance due to the presence of barges and divers. Permanent changes to EFH are not anticipated as a result of this project. Proposed AMMs include the use of drilled-in piles, which avoid the need for pile driving; the use of debris containment systems; restrictions on night lighting; and the implementation of construction BMPs.

In conclusion, the Standard Project Alternative **may affect, but is not likely to adversely affect**, green sturgeon Southern DPS and steelhead CCC DPS.

It is also determined that the Standard Project Alternative **may affect, but is not likely to adversely modify** critical habitat for the green sturgeon Southern DPS and steelhead CCC DPS. This project would therefore not result in any adverse modification of critical habitat.

With regards to EFH, the Standard Project Alternative **may adversely affect EFH; however,** such effects are expected to be minor and **would not substantially alter the value of EFH in the BSA.**

However, the Partial Preservation Alternative would require construction of a cofferdam and dewatering. Therefore, the informal consultation that was conducted for a prior iteration of this project is not expected to be sufficient since dewatering may require capture and relocation of ESA-listed species. Therefore, Caltrans has determined that it would be necessary to reinitiate consultation with NMFS for potential effects to FESA-listed prior to the final NEPA approval.

Permitting Related to Wetlands and Waters

The project would affect wetland and non-wetland waters of the U.S. as defined under Section 404 of the Clean Water Act (CWA). As a result, the project will require one or more permits from the USACE pursuant to Section 404 of the CWA and Section 9 of the Rivers and Harbors Act, and a Water Quality Certification from the San Francisco Bay Regional Water Quality Control Board (RWQCB) pursuant to Section 401 of the CWA. In addition, a BCDC permit will be required because project activities in the channel would take place in the agency's jurisdiction near the Bay and tidally influenced waters.

The definition of "stream" under the CFGC does not include tidal sloughs or other tidally influenced areas. Therefore, the channel, as a tidal water, does not fall under the jurisdiction of CFGC Section 1602.

A BCDC permit is required because the project's activities take place within the agency's jurisdiction near the Bay and tidally influenced waters.

Other Permits and Agency Coordination

Because the project area is connected to the Bay where marine mammals are present, an Incidental Harassment Application (IHA) pursuant to the MMPA may be needed if vibratory pile driving noise has the potential to exceed thresholds established by NMFS. Coordination with the CDFW may be necessary if active nests of raptors or migratory birds are found during preconstruction surveys of the BSA. Construction activities would not result in take of a state listed species as defined by the California Endangered Species Act (CESA). As a result, the City and County of San Francisco will not need to consult with CDFW under CESA.

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Abbreviated Terms

ADA	Americans with Disabilities Act
AMM	avoidance and minimization measure
BCDC	Bay Conservation and Development Commission
BMP	best management practices
Bridge	Islais Creek Bridge
BSA	biological study area
CAL-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CCC	Central California Coast
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
channel	Islais Creek Channel
CIDH	cast-in-drilled-hole
CIP	cast-in-place
CCSF	City and County of San Francisco
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CWA	(Federal) Clean Water Act
dB	decibels
DPS	distinct population segment
EFH	essential fish habitat
FESA	(Federal) Endangered Species Act
FHWA	Federal Highway Administration
FHWG	Fisheries Hydroacoustic Working Group
FMP	Fisheries Management Plan
HAPC	Habitat Areas of Particular Concern
HTL	High Tide Line
IHA	Incidental Harassment Application

JRP	JRP Historical Consulting, LLC
LRT	light-rail transit
MBTA	Migratory Bird Treaty Act
MHHW	mean higher high water
MHW	Mean High Water
MMPA	Marina Mammal Protection Act
MSA	Fishery Conservation and Management Act
MSL	mean sea level
NEPA	National Environmental Policy Act
NES	Natural Environment Study
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCS	overhead contact system
OWUS	Other Waters of the U.S.
PC/PS	precast/prestressed
Port	Port of San Francisco
project	Islais Creek Rehabilitation Project
RC	reinforced concrete
RMS	Root Mean Square
RWQCB	Regional Water Quality Control Board
SEL	sound exposure level
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SFPW	San Francisco Public Works
USACE	United States Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WBWG	Western Bat Working Group
WUS	wetlands of the U.S.

Chapter 1 Introduction

The purpose of this Natural Environment Study (NES) is to provide technical information to determine the extent to which the proposed Islais Creek Bridge Rehabilitation Project (project) may affect special-status species, trees, sensitive natural communities, and waters of the U.S. and State including wetlands. This NES presents technical information on which later decisions regarding project impacts will be developed.

San Francisco Public Works (SFPW), in cooperation with the City and County of San Francisco (City), and San Francisco Municipal Transportation Agency (SFMTA) proposes to replace the superstructure of the Islais Creek Bridge (Bridge No. 34C0024) (hereafter called the bridge) in accordance with California Department of Transportation (Caltrans) procedures. The project would improve approaches along Third Street, replace the bridge superstructure to bring the structure up to current seismic standards, reinforce the existing abutments, and upgrade bridge safety features. The goal of the project is to increase the bridge's service life an additional 50 years. The project would additionally improve traffic control between pedestrians, bicyclists, motor vehicles, and railway cars. The project footprint is in San Francisco in the United States Geological Survey (USGS) 7.5-minute quadrangle, San Francisco South, shown in Figure 1.

1.1 Location

The Islais Creek Bridge is located along Third Street, a major arterial along an industrial area of the southern San Francisco waterfront. The bridge is approximately 1,700 feet east of Interstate 280 and approximately 3,300 feet west of the Bay (Figure 2). The biological study area (BSA) consists of a mix of commercial and light industrial uses, with a fire station in the southeastern quadrant. Land uses surrounding the bridge include warehousing and light industry. There is a SFMTA rail yard northwest of the bridge, a concrete batch plant southeast of the bridge, and various Port of San Francisco (Port) uses east of the bridge.

The Port manages four areas for park and recreational use in the vicinity of the BSA: Islais Creek Shoreline Access to the northwest, Tulare Park to the northeast, Rosa Parks Skate Plaza to the southeast, and Islais Creek Park to the southwest. The Port's Southern Waterfront Open Spaces System has one designated area on the southwestern side of the bridge—Islais Landing; and one designated area outside of the BSA but close to a potential staging location—Pier 94 Wetlands. The San Francisco Blue Greenway and San Francisco Bay trail also pass over the Channel along Illinois Street. The San Francisco Bay Water Trail accesses the channel.

Figure 1 Project Location

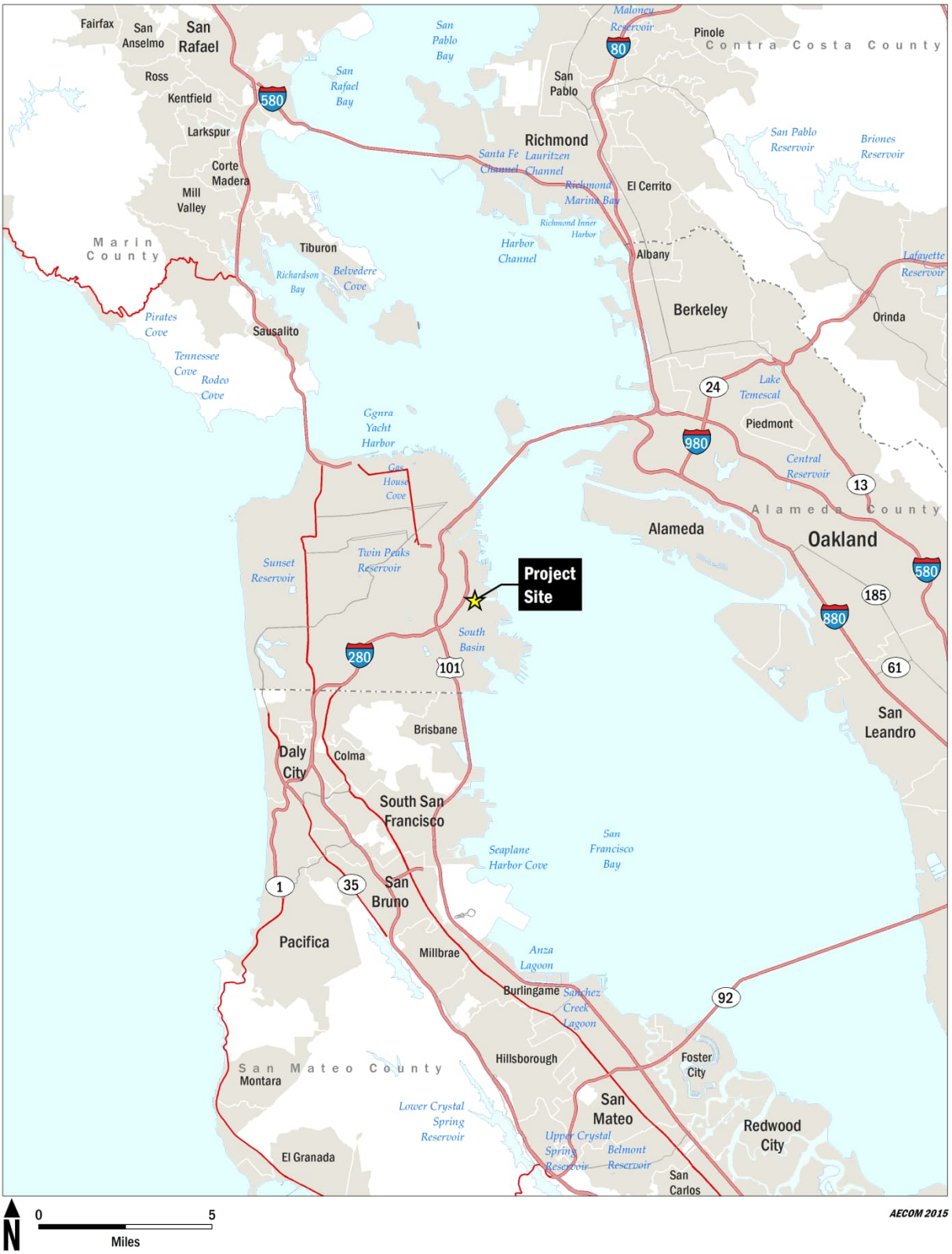
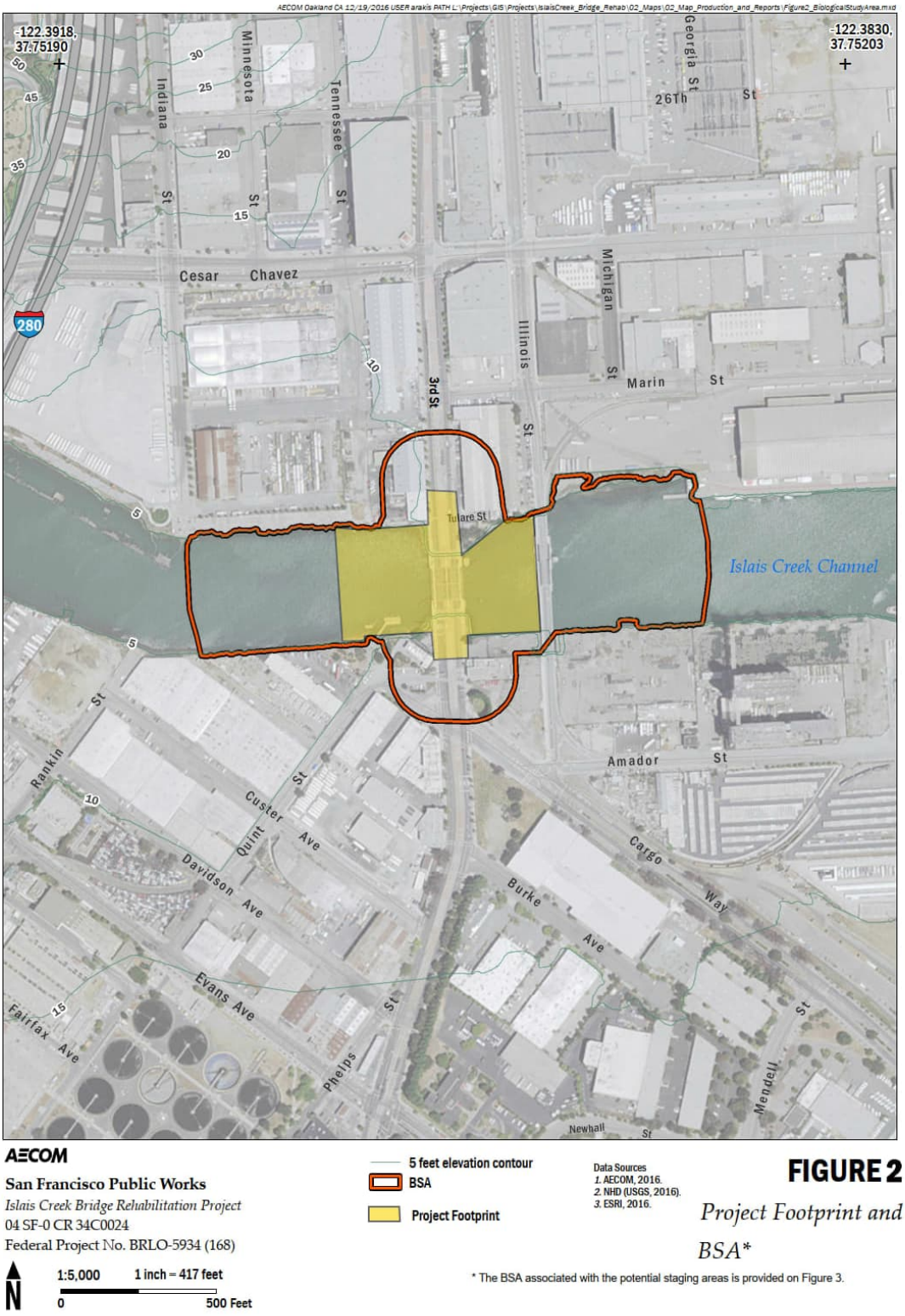


Figure 2 Project Footprint and BSA



1.2 Project History

The Islais Creek Bridge is a Double-Leaf Bascule (Fixed Trunnion) constructed in 1945, finished in 1949. The bascule arms are made of riveted steel girders that support an open, steel-grate roadway. The bridge is approximately 100 feet wide, 105 feet long with four lanes of traffic and two sidewalks. There is a cement control tower with a window-lined control room located at the northeast corner of the bridge.

The bridge was evaluated for historic significance by Caltrans in 2004. The evaluation determined that the bridge was significant as an example of Art Moderne style applied to a bridge. The detailing on the approaches (including the quarter-circle gear housing), sidewalk railings, and control tower all contribute to the bridge's Art Moderne appearance. These features make it eligible for the National Register of Historic Places under National Register Criterion C at the local level of significance for its distinctive design qualities. The bridge is also considered to be an historic resource for the purpose of compliance with the California Environmental Quality Act (CEQA).

The bridge was repaired in 1973 after a ship collision, but has otherwise remained unaltered. It currently requires extensive repairs and upgrades to meet seismic safety standards and to provide an additional 50 years of service. Multiple deficiencies have been identified, including many structural components in poor condition (Appendix A); electrical, water, and train communication utilities are all out of date. The current bridge walkway configurations are not compliant with Americans with Disabilities Act (ADA) standards, or City requirements. There is not sufficient space for motor traffic to pass bicycle traffic in the roadway, and there are no traffic signals.

1.2.1 Purpose and Need

Based on the most recent Caltrans bridge inspection report, the bridge has a sufficiency rating of 20.0 out of 100 and is programmed for seismic upgrades and rehabilitation or replacement. The Islais Creek Bridge had at least three previous seismic assessments in 1984, 2002, and 2008. The most recent analysis identified many items as being vulnerable in a seismic event. Without preventative replacement, repair, and seismic compliance, existing bridge wear and damage would worsen and ultimately compromise the structural integrity of the bridge. The project would include repairing and replacing various components of the bridge to bring them up to current seismic and service standards; replacement and upgrades to bridge safety features; all of which would serve to increase the bridge's service life an additional 50 years.

1.3 Project Description

1.3.1 Bridge

San Francisco Public Works (SFPW) is proposing to replace the superstructure of the Islais Creek Bridge (Bridge No. 34C0024) (officially named the Levon Hagop Nishkian Bridge) along Third Street in the City and County of San Francisco (CCSF). The bridge is approximately 1,700 feet east of Interstate 280, and approximately 3,300 feet west of San Francisco Bay (the Bay). The bridge spans the Islais Creek Channel, a dredged, channelized, tidal embayment with predominantly armored shorelines that extends from the Bay to the site of the former outfall of the now culverted and buried Islais Creek.

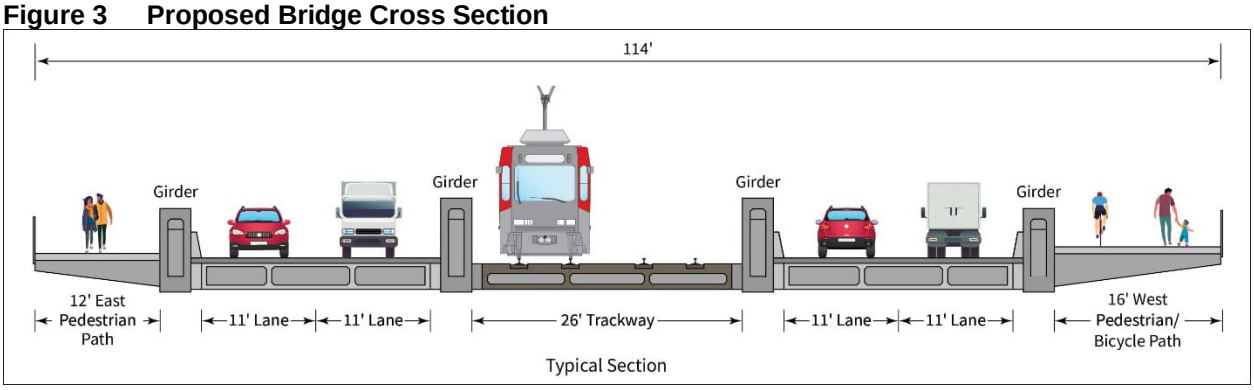
The existing bridge is a double-leaf bascule structure (drawbridge) constructed in 1949 with an open steel-grate roadway draining to the bay, and concrete abutments. It is approximately 114 feet long and 100 feet wide. A California Department of Transportation evaluation in 2004 determined that the bridge was significant as an example of Art Moderne style applied to a bridge.

The project area is very susceptible to seismic liquefaction and the condition of the bridge's structural system is poor. The bridge originally carried only vehicular traffic, but now additionally carries MUNI light-rail tracks. The deteriorated condition of the bridge makes the bridge deck susceptible to vibration induced by heavy vehicles, trucks, and light-rail vehicles crossing the span.

The areas surrounding Islais Creek are at risk of flooding from heavy rainfall events, coastal storm surge, and wave hazards, which will be exacerbated by sea-levels rise and rising groundwater. The steel sections of the bridge are increasingly subject to the deleterious effects of corrosion and saltwater intrusion.

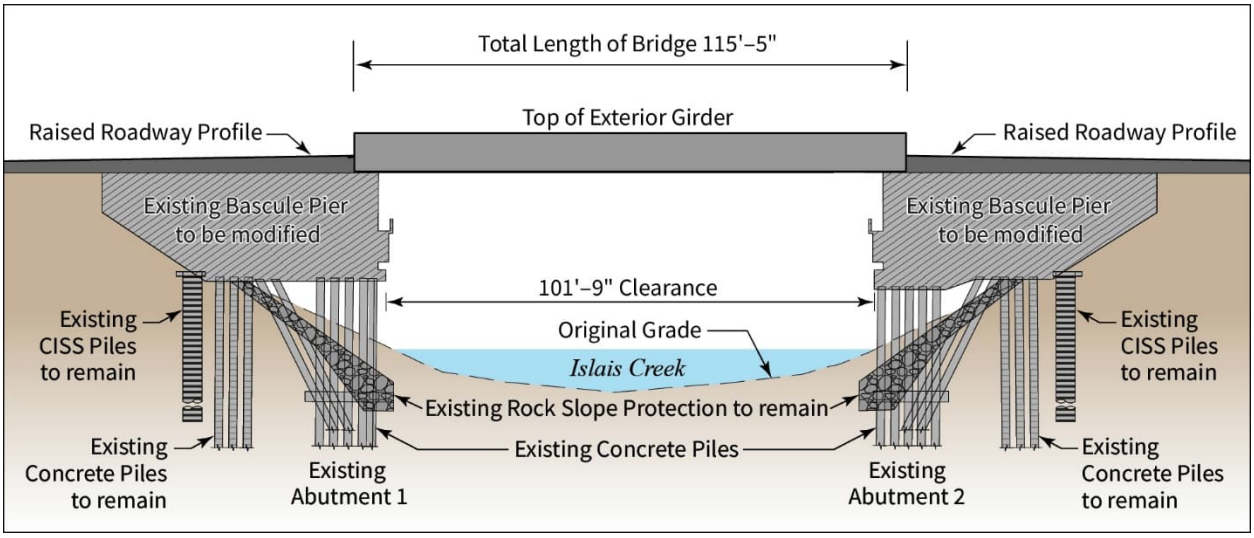
The Standard Project Alternative will remove the existing drawbridge leaves, which have not been opened for navigation for over ten years, and all other drawbridge features. These will be replaced by a single-span concrete through-girder bridge with a concrete deck at a higher elevation to improve freeboard for flood flows and to accommodate sea-level rise.

Figure 3 Proposed Bridge Cross Section



In addition to dedicated light-rail-vehicle trackways and two 11-foot travel lanes in each direction, the bridge will support a 12 foot-wide pedestrian path on its eastern side and a 16 foot-wide Class I shared pedestrian/bicycle path on its western side. The reconstructed trackway and roadway will be designed to convey surface runoff to the existing combined sewer/stormwater system. The control tower will be demolished down to the sidewalk level and the remaining portion will be used to create a public observation platform.

Figure 4 Proposed Bridge Longitudinal Section



The project's accommodation of a shared bicycle/pedestrian facility (Class I or Class IV) is based on advanced planning between the San Francisco Public Utilities Commission, Port of San Francisco, and the San Francisco Municipal Transportation Agency in response to opportunities presented by the removal of the bridge's drawbridge function per the City's *Islais Creek Southeast Mobility Adaptation Strategy*). Although not yet officially designated a bicycle facility, the Islais Creek Bridge and portion of Third Street connecting to Cargo Way will be adopted as part of the updated San Francisco Bicycle Network and citywide active transportation plan that is currently under way and expected to be completed in 2024.

Besides the **Standard** project alternative described above, there are two other alternatives under consideration.

Under the project's No Build Alternative, no modifications will be made to the Islais Creek Bridge; only routine maintenance will be performed. Deterioration will continue to be addressed through short-term remedies but existing bridge structural and seismic deficiencies will remain and worsen. There will be no increase in bridge freeboard, so flood risks to the bridge and light-rail operations will remain and will increase with sea-level rise.

The Partial Preservation Alternative includes the project features described above for the Proposed Project, but will include salvage, rehabilitation, and reinstallation of as many of the historic character-defining features of the original bridge as feasible. If it is determined that for reasons of safety, construction standards, or sound engineering practice any of the character-defining features are not salvageable for reinstallation, these elements will be replicated with substitute materials to recreate the historic appearance. The Control Tower will be retained, its foundation and window system retrofitted, and its damaged concrete repaired.

A more extensive description of the project and its alternatives is available in the project's Environmental Assessment.

Construction will last 24 months and is assumed to begin no sooner than spring 2025. Bridge closure is expected to last the duration of construction. Detours that will route traffic to arterials that have capacity for the additional vehicles will be established to re-route traffic around the construction site. Detour routes will be developed during final design. The City of San Francisco will develop plans for substitute forms of transit to provide a comparable level of service during construction. The most probable replacement for disrupted light-rail service is a temporary bus service. Construction is anticipated to use typical eight-hour work shifts during daylight hours; nighttime and weekend construction is not anticipated. In addition to staging areas on the bridge approaches and on anchored barges, three potential off-site construction staging area options owned by the Port of San Francisco that are currently used for Port-related industrial purposes have been identified.

1.3.2 Avoidance and Minimization Measures

To avoid and minimize effects to special-status species and their habitats in the BSA, the following general avoidance and minimization measures (AMMs) may be implemented:

1. **Permits.** All relevant permits will be included in the construction bid package of the proposed project.

2. **Biological Monitor Approval.** An approved biologist(s) will provide services for the project. If required by project permits, the names and qualifications of the biological monitor(s) will be submitted to the required agency approval prior to initiating construction activities for the proposed project.

3. **Preconstruction Surveys.** Prior to project commencement, an approved biologist(s) will conduct preconstruction surveys in and adjacent to the project area. If listed species are identified, regulatory agencies will be notified.

4. **Biological Monitoring.** If required by permits, an approved biologist(s) will be on-site during activities. The biologist(s) will keep copies of applicable permits in their possession when on-site. The approved biologist(s) will be given the authority to communicate either verbally or by telephone, email, or hard copy with all project personnel to ensure that permit requirements are fully implemented. The biologist(s) will have the authority to stop project activities to avoid take of listed species or if he/she determines that any permit requirements are not fully implemented.

5. **Worker Environmental Awareness Training.** All construction personnel will attend a mandatory environmental education program delivered by an approved biologist prior to working on the project. At a minimum, the training will include a description of protected biological resources, including fish, marine mammals, bats, and migratory birds. The training will discuss the potential occurrence of these species in the project construction area; provide an explanation of the status of these species and their protection under the federal Endangered Species Act (FESA) and other laws; list the measures to be implemented to conserve listed species and their habitats as they relate to the work site; and describe the boundaries within which construction may occur.

6. **Pile-Driving Restrictions.** All piles will be installed and removed using a crane-mounted vibratory driver, or by using CIDH methods. Vibratory pile driving is beneficial to use in the marine environment because the method is more efficient (reduces ground vibrations) than impact hammers into wet, particulate sediment; and because it creates a lower level of underwater noise (GDG 2014). If, during pile installation, an obstruction is encountered below the mudline, the pile will be vibrated out and placed in a new location. If the pile cannot be relocated (especially during the replacement of the existing pile fenders), buried timber piles and other abandoned piles that may be encountered will be removed using a barge equipped with a crane-mounted vibratory hammer. This work may be supported by divers who would clear material at the bottom of the channel to the extent necessary to expose the top of abandoned or broken timber piles, allowing for their removal.

7. **Protection of Marine Mammals.** SFPW will consult with the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) to determine the potential for project activities to impact marine mammals, including California sea lions, harbor seals, and harbor porpoise. Through the consultation process, AMMs specific to marine mammals will be identified. These may include measures such as limiting the number of piles installed or removed in a 24-hour period; and providing biological monitoring for marine mammals to enforce a marine mammal safety zone, where no pile driving can occur if a marine mammal is observed.

8. **Monitoring for Underwater Noise.** Monitoring will be done during pile driving and extraction to ensure that underwater noise levels do not exceed predicted levels.

9. **Protection of Herring Spawn.** SFPW will consult with the California Department of Fish and Wildlife (CDFW) to determine the potential for project activities to impact Pacific herring. Through the consultation process, AMMs specific to Pacific herring will be identified. These may include measures such as providing biological monitoring to identify spawn events during the herring spawning season, from December 1 through February 28. If herring spawning is observed, in-water work will be suspended within 500 meters of spawning activity, and the work will not resume until spawning has ended and eggs have hatched (up to 21 days).

10. **Debris Containment.** Debris containment systems will be implemented for work over water to prevent airborne or falling debris from entering the waters below. An encapsulation containment system will be used to contain debris for rust, lead paint, and asbestos. Additional containment systems will be constructed to hang off the deck for additional deck repair work and counterweight replacement.

11. **Preconstruction Surveys for Nesting Birds and Roosting Bats.** Preconstruction surveys for nesting birds and roosting bats will be conducted by a qualified biologist no more than 72 hours prior to the start of construction for activities occurring during the breeding season (February 15 through August 31).

12. **Non-Disturbance Buffer for Nesting Birds and Roosting Bats.** If work must occur within 300 feet of active raptor nests or 50 feet of active passerine nests or roosting bats, a non-disturbance buffer will be established, with agency approval, at a distance sufficient to minimize disturbance based on the nest/roost location, topography, cover, the species' sensitivity to disturbance, and the intensity/type of potential disturbance.

13. **Night Lighting.** Artificial lighting of the proposed construction area during nighttime hours will be minimized to the maximum extent practicable. All lighting will be directed away from the marine environment and natural areas.

14. **Project Staging.** Project vehicle, laydown, and equipment staging will be restricted to barges or the potential areas. Staging will not occur in vegetated areas.

15. **Trash Control.** All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed at least once a day from the work area.

16. **Firearms.** No firearms will be allowed in the active construction area except for those carried by authorized security personnel, or local, state, or federal law enforcement officials.

17. **Pets.** To prevent harassment, injury, or mortality of sensitive species, no pets of project personnel will be permitted on the project site.

18. **Caltrans Standard Best Management Practices (BMPs).** The potential for adverse effects to water quality will be avoided by implementing the temporary and permanent BMPs outlined in Section 7-1.01G of the Caltrans Standard Specifications. The Caltrans Construction Site BMPs Manual includes many protective measures and guidance to prevent and minimize pollutant discharges, and can be found at the following website:

    http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

19. **Concrete Waste and Stockpiles.** All grindings and asphaltic-concrete waste will be stored in previously disturbed areas absent of habitat and at a minimum of 150 feet from any aquatic habitat, culvert, or drainage feature.

20. **Water Quality** Protection measures will be implemented to protect all waters of the U.S. The project has been designed to avoid increased turbidity by cutting existing fenders at the mudline. In-water work can be supported by divers to clear material at the bottom of the channel and gather abandoned or broken fender piles. Silt curtains and turbidity curtains may be used to minimize turbidity if necessary. Implementation of Caltrans standard BMPs (Measure #17) and proper storage of concrete waste and stockpiles (Measure #18) will further reduce impacts on water features.

    When piles or other debris from the existing fender system are removed from the channel, they will be promptly removed from the water and placed on a barge. The barge will be configured to contain all sediment that may be adhering so that it does not fall into the water.

Chapter 2 Study Methods

This section presents the survey methods used to evaluate the potential presence of special-status wildlife and plant species, jurisdictional wetlands and other waters of the U.S. and state, and other sensitive biological resources relevant to the proposed project.

2.1 Regulatory Requirements

Both National Environmental Policy Act (NEPA) and CEQA are applicable to the proposed project. The bridge project is anticipated to qualify for a NEPA Finding of No Significant Impact under Federal Highway Administration (FHWA) regulation 23 Code of Federal Regulations (CFR) 771.121, and will require a CEQA Environmental Impact Report in compliance with the CEQA Guidelines. AECOM will work closely with Caltrans, SFPW, and regulatory agencies to ensure that all potential adverse effects will be avoided and/or minimized; including the bridge attributes that qualify it for protection under Section 106 and Section 4(f).

The following federal and state agencies hold jurisdiction over natural resources and/or structures that occur in the area that may be affected by the proposed project:

- United States Fish and Wildlife Service (USFWS) (Sacramento Office)
- NMFS (West Coast Region and Office of Protected Resources)
- USACE (San Francisco District)
- USCG (Eleventh District)
- CDFW (Bay-Delta Region Office)
- RWQCB
- BCDC

The following federal laws and regulations may apply to the proposed project:

- NEPA
- FESA, Sections 7 and 9
- Migratory Bird Treaty Act (MBTA)
- CWA (Sections 404 and 401)
- Section 9 Rivers and Harbors Act of 1899
- U.S. Fish and Wildlife Coordination Act
- Magnuson-Stevens Fishery Conservation and Management Act (MSA)
- Marine Mammal Protection Act (MMPA)
- Executive Order 13112 – Invasive Species
- Executive Order 11990 – Protection of Wetlands

In addition to the federal laws and regulations, the following state laws and regulations may apply to the proposed project:

- CEQA
- California Endangered Species Act (CESA)
- Native Plant Protection Act
- CFGC Section 1602, Lake and Streambed Alteration
- Porter-Cologne Water Quality Control Act
- McAteer-Petris Act
- CFGC Sections 3503–3505, 3513, 3800, and 4150
- California Fully Protected Species CFGC Sections 3511, 4700, 5050, and 5515
- CFGC Sections 8550–8559, Herring
- State Bill 857, Fish Passage

Other regulations that may also be considered:

- Caltrans Policies

A complete summary of the federal and state regulatory requirements is provided in Appendix B.

In July of 2017, Caltrans completed Section 7 consultation for a prior iteration of the project, receiving a letter of concurrence from NMFS. This letter of concurrence affirmed that the project is not likely to adversely affect the steelhead – Central California Coast (CCC) distinct population segment (DPS) or green sturgeon Southern DPS. NMFS also found that the prior version of the project would adversely affect essential fish habitat (EFH) for species managed under the Pacific Groundfish and Coastal Pelagic Fisheries Management Plans, but the project contains sufficient measures to avoid, minimize, mitigate, or otherwise offset those adverse effects. Following the issuance of that concurrence letter, SFPW has made the following changes to the project design:

- Instead of rehabilitating the bascule spans, they will be replaced with a single fixed-span superstructure and removal of existing counterweights;
- raising elevation of approaches above existing counterweight pits;
- partial demolition of the control tower rather than rehabilitation;
- removal of the old bridge fendering without replacement; and
- no installation of a new bridge control cable across the bottom of the channel.

Due to these changes, the proposed project would require far less in-water work, and the impact to subtidal and intertidal areas in the BSA would be much less than under the prior project design.

Although the project design has been altered, it has not been substantially revised in a way that would have any effects to FESA-listed species or EFH that were not considered in the prior consultation. Therefore, Caltrans has determined that it will not be necessary to reinitiate consultation with NMFS for potential effects to FESA-listed species or EFH.

2.2 Studies Required

2.2.1 Literature Search

AECOM biologists reviewed project plans, literature describing biological resources in the project footprint, and special-status species data for the project vicinity. Data sources included the following:

- CNDDB of the San Francisco South USGS 7.5-minute quadrangle (quad) maps (CDFW 2022) (Appendix C);
- CNPS online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2022);
- Western Bat Working Group's (WBWG) Regional Priority Matrix;
- USFWS Sacramento Office's Endangered and Threatened Species letter, generated using the same USGS quads used in the CNDDB search (USFWS 2022; see Appendix D-1); and
- NMFS Official Species list for the San Francisco South USGS quad (NMFS 2022; see Appendix D-2).

The special-status species evaluated in this report are one or more of the following:

- listed as endangered, threatened, proposed, or candidates for listing under FESA;
- species listed as endangered, threatened, high priority, or rare under CESA;
- designated as Fully Protected or species of special concern under CFGC; or
- species included on CNPS lists 1 and 2.

A BSA was delineated to include all areas that could potentially be directly or indirectly impacted by the proposed project. The BSA does not include detour routes proposed in Section 1.3.1, as no impacts to natural resources are expected as a result of their use. The BSA is the area that was reviewed and inventoried for the potential for natural communities and species of concern to occur, and was documented for potential impacts to natural resources from the proposed bridge rehabilitation project. This area includes all terrestrial and aquatic habitats in the project footprint, plus a buffer to capture all areas indirectly affected by construction activities

(Figure 2), and the staging area options. AECOM biologists conducted surveys in the BSA to assess wildlife habitats, plant communities, and potential jurisdictional wetlands and other waters of the U.S. (OWUS) in the BSA. Based on the urban development and lack of known occurrences of special-status species in the project area, protocol-level surveys (such as multiple survey rounds during blooming periods of rare plants) were determined to be unnecessary.

2.2.2 Field Reviews

AECOM biologists conducted a field review, wildlife habitat assessment, and plant survey during high tide on November 25, 2015. Wetland vegetation was observed along the banks of the channel. Three-parameter qualifying tidal marsh wetlands occur on the southwest, northwest, and northeast sides of the BSA.

A habitat assessment of the BSA was conducted by AECOM biologists Saana Deichsel and Laura Duffy. The purpose of the survey was to characterize the BSA for special-status species habitats and identify and map trees in the BSA. The availability of suitable habitat and the potential for a species to occur in the BSA were evaluated by comparing the proximity of verified species occurrences and the habitat characteristics in the BSA with habitat and life history requirements for each species. Habitat descriptions were primarily developed using digital resources available from the CNDDB, and endangered species information from the USFWS Sacramento Field Office online database.

AECOM biologists conducted field surveys for potentially jurisdictional wetlands and other waters of the U.S. in the BSA on November 25, 2015. The high tide line was delineated using a combination of field surveys (using shoreline indicators, which included drift lines, water marks observable on rock riprap, and in some cases, the upper limit of the tidal marsh plant community in areas with wetland vegetation) and desktop survey elevations using data from the NOAA San Francisco Pier 22 ½ gage (Station ID Number 9414317) for the 1983 to 2001 tidal epoch. Other tidal heights, such as mean high water, mean low water, and mean sea level (MSL) were determined using only published tidal data from the NOAA station. The mean high water was used to delineate the current Section 10 waters of the U.S. and waters under BCDC jurisdiction. Areas suspected of being wetlands were delineated in accordance with the routine on-site methodology described in the USACE Wetlands Delineation Manual and Arid West Supplement (Environmental Laboratory 1987; USACE 2008).

No state, federal, or CNPS-listed plants were observed in the BSA. No special-status tree species were observed in the BSA. One Monterey Cypress was observed, and is protected under the Port's Blue-Greenway Open Space Concept design plan. Pickleweed mats are considered a sensitive vegetative community, and grow in sparse areas along the channel banks.

2.3 Agency Coordination and Professional Contacts

The Caltrans District 4 Office of Local Assistance will act as the NEPA Lead Agency for the project. All the environmental technical reports and studies pertaining to the proposed project will be prepared in accordance with Chapter 6 of the Local Assistance Procedures Manual, the Caltrans Standard Environmental Reference, the CEQA Guidelines included in Chapter 31 of the San Francisco Administrative Code, and the San Francisco Planning Department Environmental Review Guidelines. AECOM will work closely with Caltrans, SFPW, and CDFW to ensure that all potential adverse effects will be avoided and/or minimized.

In July of 2017, Caltrans completed Section 7 consultation for a prior iteration of the project, receiving a letter of concurrence from NMFS. This letter of concurrence affirmed that the project is not likely to adversely affect steelhead CCC DPS or green sturgeon Southern DPS. NMFS also found that the prior version of the project would adversely affect EFH for species managed under the Pacific Groundfish and Coastal Pelagic Fisheries Management Plans, but the project contains sufficient measures to avoid, minimize, mitigate, or otherwise offset those adverse effects. The project, as described above, has not been substantially revised in a way that would have any effects to FESA-listed species or EFH that were not considered in the prior consultation. Therefore, Caltrans has determined that it will not be necessary to reinitiate consultation with NMFS for potential effects to FESA-listed species or EFH.

However, the Partial Preservation Alternative would require construction of a cofferdam and dewatering. Therefore, the informal consultation that was conducted for a prior iteration of this project is not expected to be sufficient since dewatering may require capture and relocation of ESA-listed species. Therefore, Caltrans has determined that it would be necessary to reinitiate consultation with NMFS for potential effects to FESA-listed prior to the final NEPA approval.

Background reviews conducted during preparation of the NES have found records of contaminated sediments within the channel. Coordination with the USACE and RWQCB will be needed during permitting to address concerns related to resuspension of contaminated sediments. The bridge and control tower contains hazardous materials such as lead paint, polychlorinated biphenyl compounds (PCBs), and asbestos. An environmental risk data radius report was performed by Environmental Data Resources, Inc. on October 7, 2015. It was determined that dust control procedures and demolition techniques would require OSHA training. In addition, AECOM will review agency files as necessary, including San Francisco RWQCB electronically via the GeoTracker website and the Department of Toxic Substances Control via the EnviroStor website.

2.4 Limitations that May Influence Results

No USFWS, CDFW, or CNPS protocol-level surveys were conducted for any of the federally or state-listed species. The presence of several terrestrial species was inferred through historical occurrences of species and availability of suitable habitat. No aquatic surveys were conducted. Instead, after a review of historical and contemporary occurrence records, the presence of some species was inferred during certain periods of known residence in, or migration through, the BSA.

AECOM biologists did not have full access to all private property frontages in the BSA. Potentially jurisdictional features that were not accessible were visually assessed to identify the extent of the wetland vegetation, and this information was marked on the field maps. The features in these areas were delineated using the visual assessment information, coupled with an assessment of time-sequence aerial mapping. The survey team took advantage of vantage points (locations for viewing) of features whenever possible.

Chapter 3 Results: Environmental Setting

3.1 Description of the Existing Physical and Biological Conditions

The project location in southeastern San Francisco is characterized by a high level of urban development. The project site is a mixed-use of industrial and commercial area. The Islais Creek Bridge crosses Islais Creek approximately 0.63 mile (3,300 feet) upstream from the Bay. This chapter provides the context in which the proposed bridge rehabilitation occurs. The ecological and biological characteristics of the BSA include climate, topography, hydrology, vegetative communities, and wildlife habitats.

3.1.1 Physical Conditions

This section describes the conditions that determine the ecological and biological characteristics of the project area. These conditions include climate, topography, and hydrology. Together, these provide the context for the biological and species descriptions considered in this document.

3.1.1.1 Climate

The San Francisco Bay Area sub-region has a Mediterranean climate, with approximately 90 percent of annual precipitation occurring between November and April. Cool, coastal fog alternates with clear skies and warm weather during the months of May through October. The most recent and complete climate data for this area were recorded at the San Francisco International Airport, California; covering years from 1996-2015 (Western Region Climate Center 2016). The mean annual temperature is 58.3 degrees Fahrenheit. The mean annual precipitation for San Francisco is 22.28 inches, with most rainfall occurring between December and February. The elevation and position of this station relative to the Bay are similar to the project area.

3.1.1.2 Hydrology

The BSA is in the 343-square-mile San Mateo Creek-Frontal San Francisco Bay Estuaries Hydrologic Unit Code (HUC) 10 watershed (USGS HUC 1805000409), in the larger 4,470-square-mile San Francisco Bay HUC 8 watershed (USGS HUC 18050004) (USGS 2016).

Surface water in the BSA consists of Islais Creek, a waterway considered a Traditional Navigable Water by USACE and by the USCG. The creek flows from Twin Peaks, and historically ran 3.5 miles across 3,000 acres of urbanized land from the hills of San Francisco into the San Francisco Bay. It was fed by numerous tributaries, springs, and small creeks (WRECO 2016). The creek has largely been culverted and flows underground through pipes beneath the City streets. Almost the entirety of the watershed is now diverted to the nearby water

treatment plant, so the channel no longer functions as a creek due to limited freshwater discharges into the channel.

The area now called Islais Creek channel is an inlet of the Bay in the Central Waterfront area between the Potrero Hill and Bayview/Hunters Point neighborhoods. The channel is exposed to tidal fluctuations from San Francisco Bay, and exhibits estuarine (brackish) hydrology. The width of the lower tidal portion of the channel is approximately 200 to 450 feet between banks at the low water mark. Water depth ranges from 3 to 9 feet at high tide, and parts of the channel can be empty with a strong ebb tide. Although the channel has connectivity to the Bay and is considered a permanent tidal waterway, it also receives a large amount of precipitation and urban stormwater runoff, especially during the wet season.

3.1.1.3 Topography

Islais Creek was naturally a tidal basin surrounded by saltmarsh. Development has modified the original topography. The elevation in the BSA is approximately 0 to 15 feet above MSL. The tidal basin was largely filled in the 1920s to become what are now Port property and the channel. The channel was dredged to meet shipping needs, and surrounding marshlands were filled in the 1950s and 1960s, during shoreline development of what is now the southeastern waterfront of Hunters Point and Bayview. The entire area is extensively altered landscape.

3.1.1.4 Soils

Online soil surveys for San Francisco County (NRCS 2016) were used to identify the soil series in the BSA. Four soil series and/or complexes occur in the BSA: Urban land-Orthents (65 percent), reclaimed complex (30 percent), Novato (2 percent), and Reyes (1 percent), other minor components (2 percent). Most of the sediment in the channel bed was artificially placed there by dredging and construction activity. Rocks from Point Richmond were set in the channel bed to settle the trench and support a seawall for Yerba Buena Cove to the north. Minor components of hydric soils and clay are consistent with the historic presence of salt marsh in the area.

3.1.2 Biological Conditions in the Biological Study Area

This section describes the general biological conditions in and around the BSA. Overall, the BSA has been highly altered from its natural state. It is highly disturbed and fragmented due to urban development.

3.1.2.1 Urban Development

The presence of people in high densities and the infrastructure needed to support human populations characterizes urban development. The community of San Francisco is typical of the

landscape modifications needed to support development. Land converted to urban development is often highly disturbed. Underlying soils may be native or imported, but modified by excavation, fill, and grading. Additionally, development requires altering local hydrology to prevent flooding, collect and transport stormwater, and protect property.

The BSA is predominantly developed land, which includes roads, parking areas, and industrial and commercial buildings. Local wildlife habitat and plant communities are often lost during development. Where original habitat and communities remain in urban developments, the biodiversity is often lower than undisturbed areas because it is isolated, or does not provide sufficient area to support populations. A majority of the BSA contains pavement, urban development, and landscaping; and the entire length of the waterway in the BSA has been channelized. The sidewalks near the bridge are landscaped with ornamental trees (Appendix A). Appendix E provides a complete list of plant species that were observed in the BSA, and their California Invasive Plant Council (Cal-IPC) listing status.

3.1.2.2 San Francisco Bay

San Francisco Bay is an estuary system. Waters of the San Joaquin and Sacramento rivers, as well as smaller tributaries of the north, south and central Bay, create high variation in salinities throughout the year as they mix with waters entering from the Pacific Ocean. Bay water just off the channel is also tidally influenced, creating variation in turbidity and temperature throughout the day. The mixing of fresh and saltwater can create haloclines, with water stratified by salinity. Temperature differences between the source and receiving waters can contribute to the formation of thermoclines, with water stratified by temperature. Tides moderate some of this stratification, but it can persist for hours to days. These events influence biological conditions in San Francisco Bay.

3.1.2.3 Islais Creek

Islais Creek begins in Glen Canyon and stretches approximately 3.5 miles (5.6 km) to the Bay, and drains approximately 3,000 acres of the San Francisco Peninsula (SFPUC 2007). The Islais Creek drainage no longer functions naturally, with most of the watershed catchment diverted to a nearby water treatment plant. In the channel, water surface elevation is instead tidally controlled, and not influenced by any upstream freshwater flows. Based on the North American Vertical Datum of 1988 or NAVD 88 (where the NAVD 88 datum is set at 0 feet at San Francisco), the tidal elevations of the nearest tide gauge are: HTL = 7.63 feet; mean higher high water = 6.26 feet; MHW (mean high water) = 5.63 feet; mean tide level = 3.38 feet; MSL = 3.26 feet; mean low water= 1.12 feet; MLLW (mean lower low water) = 0.02 foot.

The Islais Creek waterway, from what is now Mississippi Street to the west of the project area, to the confluence with San Francisco Bay west of the project area, has been channelized and is disturbed by dredging and marine facility development. The channel was dredged from the pierhead lines to the west of the project area to what used to be the Southern Pacific Railroad right-of-way at Mississippi Street (Hupman & Chavez 1995). Rocks from Point Richmond and nearby hills were set at the edge of the channel bed to settle the trench and support a seawall along the northern shore of the channel from Third Street, running west. The channel walls are reinforced in some areas with concrete, rip rap, and bulkheads (SFPUC 2009, California Coastal Conservancy 2015). Land cover adjacent to the channel is predominantly urban development, with about 60 percent impermeable surfaces—roadways, parking lots, and roofs—covering the underlying soils and geology. Small patches of ruderal and landscaped plant communities exist.

The channel is listed as a (303)d water impaired with high levels of ammonia and hydrogen sulfide in the water; and chlordane, dieldrin, and polycyclic aromatic hydrocarbons (PAHs) in the sediment (SWRCB 2003). A sediment investigation of the channel conducted from 1998 to 2000 found levels of such contaminants potentially toxic to benthic organisms in sediments west of the bridge; and past biological sampling in the creek show few to no benthic organisms occur in the channel west of Islais Creek Bridge (Battelle Memorial Institute 2002, SWRCB 2003). In that portion of the BSA, pollutants could be disturbed during rehabilitation of the bridge and in-water work.

3.1.2.4 San Francisco Parks and Designated Open Space

Bayview Gateway (which includes Rosa Parks Skate Plaza) on Illinois Street north of Cargo Way is a Port of San Francisco facility that is actively in use as a recreation area, Tulare Park is a Port of San Francisco open-space area on the north side of the channel between Third Street and Illinois Street constructed in the early 1970s that has not been maintained and is without any currently funded projects to address its current state of disrepair, and Islais Creek Park at the corner of Third Street and Arthur Avenue is a Port of San Francisco, open space and recreational area maintained by a non-profit paddling club who act as park stewards in exchange for space for a boat-storage area. Islais Creek Park also includes a high-freeboard dock and adjoining gravel beach which constitute “Water Trail Backbone Site” SF4 of the San Francisco Bay Area Water Trail Plan administered principally by the State Coastal Conservancy.

3.1.3 Plant Communities and Aquatic Habitats

A CNDDB query indicated no rare or sensitive plants have been reported in the BSA (CDFG 2016). The CNPS online Inventory of Rare and Endangered Plants (CNPS 2016) and the USFWS species letter and NMFS species list (Appendix D-1 and D-2) were also consulted.

A list of vascular plant species encountered during the field survey is provided in Appendix E. A total of 54 species were recorded. Approximately half of those is planted in the area as landscaping; there are naturally growing ruderal or wetland species consisting of native and non-native plants. None of these species are federal and/or state-listed plant species. No special-status plant species were identified during the survey.

The vegetation in the BSA is dominated by urban landscaping and invasive non-native species. Tidal marsh occurs in an intermittent narrow band along the edge of the channel. Native plants dominate vegetation in the tidal marsh, according to Golden Gate Audubon Society plant surveys conducted since 2006 (Port 2010). No other special habitats such as limestone outcrops, riparian forests, oak woodlands, or serpentine soils were observed.

Aquatic habitats in the BSA include open waters of San Francisco Bay and of the channel. Water depth ranges from 3 to 9 feet at high tide, and parts of the channel may be dry during lower-low tides. The channel provides soft-bottom benthic habitat and hard-substrate habitat formed by placed fill and in-water structures. No sensitive or critical aquatic habitat is predicted to occur in the BSA or project footprint.

3.1.3.1 Ruderal and Landscaped

Landscaped and ruderal areas have been impacted by grading, mowing, filling, and commercial/ industrial use. Ruderal habitats are made up of highly disturbed upland vegetation, characterized by opportunistic species. Ruderal plant communities typically support non-native, invasive species. A total of 1.26 acres of ruderal habitat is located along roadsides and the channel throughout the BSA, including along Third Street. Five landscaped areas are present in the BSA: on the northern and southern approaches to the bridge, at the northeast and southwest corners of the bridge along the channel, and in the park at the southwest area of the BSA. Planted native species in nearby parks included California buckeye (*Aesculus californica*), coyote brush (*Baccharis pilularis*), deerbrush (*Ceanothus* sp.), and blue bunchgrass (*Festuca idahoensis*). Trees planted along Third Street are mainly non-native pittosporum (*Pittosporum* sp.).

3.1.3.2 Monterey Cypress Stands

A small stand of Monterey cypress (*Hesperocyparis macrocarpa*) was observed on the northeast edge of the bridge in Tulare Park. These trees are likely planted. Monterey cypress is widely planted as an ornamental and has invasive tendencies outside of its limited native range. The understory of Monterey cypress stands is bare or sparse with non-native grasses.

3.1.3.3 Pickleweed Marsh

Patches of pickleweed marsh occur in the BSA in narrow bands and patches along the channel on the southwestern and northwestern sides of the bridge, and to the northeast of Illinois Street (Figure 5). Pickleweed grows on the higher edges of the channel, sometimes through riprap, where soils are saturated during high tides. Pacific pickleweed (*Sarcocornia pacifica*) forms a groundcover with several other species, including alkali Russian thistle (*Salsola soda*), saltgrass (*Distichlis spicata*), and marsh gumplant (*Grindelia stricta*).

3.1.3.4 Benthic Communities

In San Francisco Bay, many benthic invertebrates and fish live in or on sedimentary or soft-bottom habitats, usually in the top 2 to 10 centimeters of the sediment. The benthic community inhabiting the nearshore area of this portion of the Central Bay is identified as Marine Muddy (Thompson et al., 2000), which is characterized by species such as polychaetes (*Euchone liminicola* and *Mediomastus* spp.); and by amphipods, including *Ampelisca abdita* and several species of the genus *Corophium*.

Some benthic invertebrates also live on hard substrates, which are much less common in San Francisco Bay compared to sedimentary habitats. Structures such as piers, breakwaters, riprap, and other hard substrates function as habitat for colonization of benthic invertebrates. These artificial intertidal habitats are populated by algae, barnacles (*Balanus glandula* and *Chthamalus fissus*), mussels (*Mytilus* spp.), tunicates, bryozoans, cnidarians, and crabs. Additionally, these structures can serve as habitat for invasive species such as the alga *Undaria pinnatifida* (CCC 2010).Several of the more common benthic species in San Francisco Bay today were accidentally or intentionally introduced species (SFEP 1992). Some of these non-indigenous species serve ecological functions similar to those of the native species that they have displaced. Examples of these include the eastern oyster (*Crassostrea virginica*), the Japanese littleneck clam (*Tapes philippinarum*), and the soft-shelled clam (*Mya arenaria*), all of which have supported commercial or sport fisheries. However, other species, such as *Corbula amurensis*, have a negative effect on phytoplankton and zooplankton populations, and the organisms that depend on them.

Figure 5 Wetlands and Waters within the BSA

FIGURE 5
Wetlands and Other Waters of the U.S.
Page 1 of 3

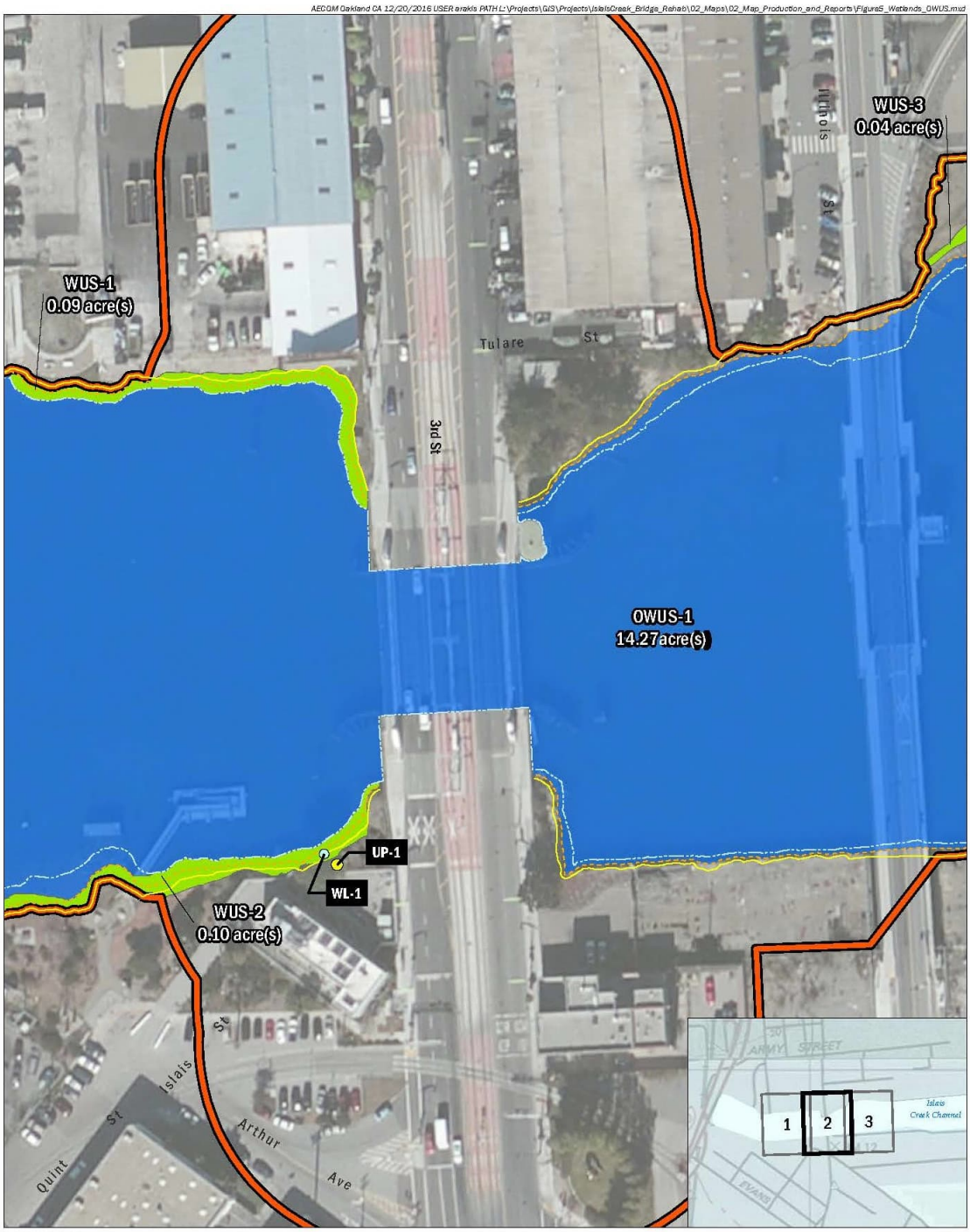
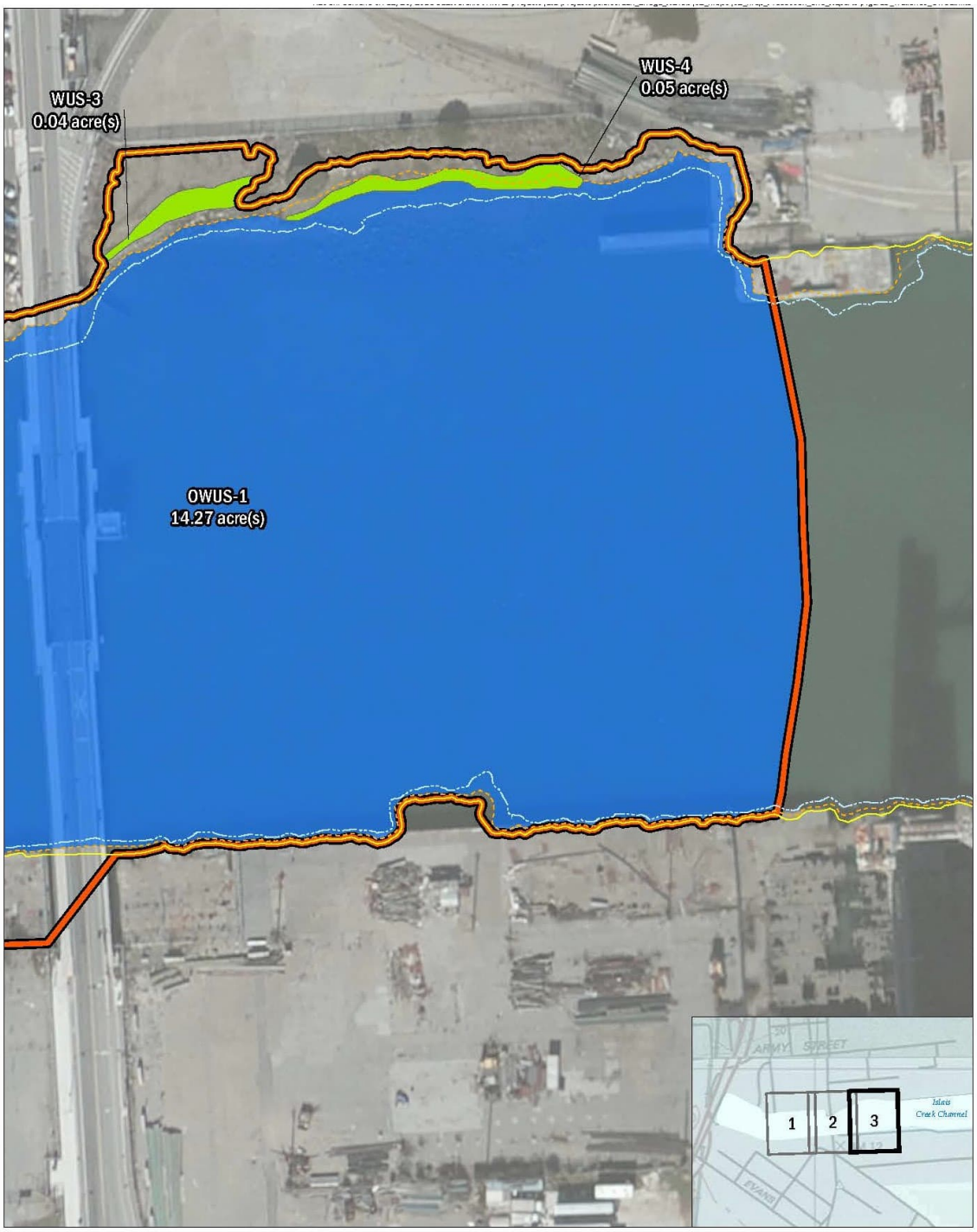


FIGURE 5
Wetlands and Other Waters of the U.S.
Page 2 of 3



AECOM
San Francisco Department of Public Works
Islais Creek Bridge Rehabilitation Project

Data Sources
1. NOAA, USGS, 2010.
2. ESRI, 2016.

N
1:1,200 1 inch = 100 feet
0 100 Feet

Wetlands and Other Waters of the U.S. (14.55 acres)
- Pickleweed Marsh (0.27 acres)
- Open Water (14.27 acres)

Tidal Boundaries
- Mean Sea Level (MSL), 3.26 ft.
- Mean High Water (MHW), 5.63 ft.
- High Tide Line (HTL), 7.63 ft.

FIGURE 5
Wetlands and Other Waters of the U.S.
Page 3 of 3

The channel is routinely dredged and heavily developed. As described in Section 3.1.2.3, the channel west of the bridge is impacted by contaminants in the sediment. A benthic community analysis of the western segment of Islais Creek (west of Islais Creek Bridge) shows a Relative Benthic Index value of 0.22 (SWRCB 2003). Values less than or equal to 0.3 are an indicator that pollutants or other factors are negatively impacting the benthic community (SWRCB 2003) Past biological sampling studies from the 1970s to present have found few to no benthic organisms, and low larval survival in the channel west of the Islais Creek Bridge (SWRCB 2003). There is no eelgrass is present in the channel; and no EFH issues were documented during the last dredging in September 2014 (DMMO 2014).

3.1.3.5 Non-native Plant Species

The BSA supports a number of non-native plant species. Species in the BSA with designated high risk by the Cal-IPC include brome (*Bromus* sp.) and fennel (*Foeniculum vulgare*). Caltrans BMPs along with the AMMs listed in Section 1.3.2 will be utilized to prevent the spread of invasive species.

3.1.4 Wildlife Species

The BSA consists mostly of urban habitat, which may support a number of bird and mammal species that are generally tolerant of disturbance created by human activities. Common, human-tolerant native species of birds include American crow (*Corvus brachyrhynchos*) and western gull (*Larus occidentalis*). Common, human-tolerant mammals can include raccoon (*Procyon lotor*), Virginia possum (*Didelphis virginiana*), fox squirrel (*Sciurus niger*), and other rodents. Many other species of migratory birds and raptors may occur in the BSA during their breeding seasons.

Various migratory and resident species of shorebirds and waterfowl use aquatic resources in and adjacent to the BSA. Wildlife observed during field surveys were primarily shorebirds and waterfowl, and included gulls (*Laurus sp.*), American coot (*Fulica americana*), great blue heron (*Ardea albus*), double-crested cormorant (*Phalacrocorax auritus*), and horned grebe (*Podiceps auritus*). Shorebirds and waterfowl may forage over open water, or along the banks of the channel.

Many insectivores (birds and bats) also forage over open water. Bat species are sometimes associated with open waters of freshwater lakes, as well as brackish sloughs and tidal marsh, where they hunt nocturnal insects that congregate over water (Johnston 2002, Johnston 2007, Mack 2012). The area above the channel may potentially provide foraging habitat for bats; however, the only existing CNDDB record of bat species within 5 miles of the BSA is from Twin Peaks in 2005. Surrounding

warehouses and buildings are well-sealed, and no bats were seen roosting under the bridge or other man-made structures during site visits in 2014 and 2015.

Common fish species in San Francisco Bay, which may be present in the BSA, include the Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), topsmelt (*Atherinops affinis*), jacksmelt (*A. californiensis*), striped bass (*Morone saxatilis*), white croaker (*Genyonemus lineatus*), Pacific herring (*Clupea pallasii*), and English sole (*Parophrys vetulus*; NMFS 2009a). Special-status fish species that may occur in BSA include green sturgeon Southern DPS (*Acipenser medirostris*), longfin smelt (*Spirinchus thaleichthys*), and steelhead CCC DPS (*Oncorhynchus mykiss irideus*). There is also some potential for Pacific herring, a commercially important fish species managed by CDFW, to spawn in the BSA. Marine mammals that may enter the channel are California sea lion (*Zalophus californianus*) and harbor seal (*Phoca vitulina*). Pacific harbor porpoise (*Phocoena phocoena*) have been observed in south San Francisco Bay in the waters adjacent to the BSA.

3.1.5 Essential Fish Habitat

Section 305(b)(2) of the MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with NMFS on activities that may adversely affect EFH for federally managed fish species. These species include commercial fishes with established Fisheries Management Plans (FMPs), as managed by regional fisheries management councils. EFH includes those waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity. In the definition of EFH: "waters" 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; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means 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" covers a species' full life-cycle (NMFS 2016).

San Francisco Bay, including the BSA, is classified as EFH under the MSA. The Bay serves as habitat for at least 15 species of commercially important fish and sharks that are federally managed under three FMPs: the Pacific Groundfish FMP, Pacific Salmon FMP, and the Coastal Pelagic FMP. Other species managed under these plans may occasionally occur in the Bay. The BSA is designated as EFH under these FMPs, and is designated as an estuary habitat area of particular concern. However, the channel itself is dredged and heavily developed, and no eelgrass is present in the channel. No EFH issues were documented in association with the last dredging episode of the channel in September 2014 (DMMO 2014).

Chapter 4 Results: Biological Resources, Discussion of Impacts and Mitigation

This chapter describes the sensitive natural communities, special-status plants, and special-status animals that have potential to occur in the BSA. It also describes the potential impacts to these resources, proposed AMMs, and anticipated cumulative impacts. Waters of the U.S. is the only natural community of special concern present in the BSA.

4.1 Habitats and Natural Communities of Concern

The BSA contains landscaped and naturally occurring (non-landscaped) vegetation communities, aquatic habitat, and tidal marsh. Impacts are only anticipated to affect aquatic habitat. These impacts would result from the removal of the fender system, installation of any scaffolding, and temporary encapsulation system to contain harmful materials (i.e., turbidity curtains).

Habitats are considered to be of special concern based on (1) federal, state, or local laws regulating their development; (2) limited distributions; and/or (3) the habitat requirements of special-status plants or animals occurring on site (Caltrans 2016). The subtidal and intertidal areas in the BSA provide EFH as designated in three FMPs: Pacific Salmon FMP, Pacific Groundfish FMP, and Coastal Pelagic FMP. Section 4.2 discusses EFH in more detail. Wetlands and waters of the U.S. are also considered sensitive by both federal and state agencies, and are discussed in more detail in Section 4.1.2 and within the Wetland Delineation Report. The AMMs described in Section 1.3.2 will be implemented as part of construction to minimize and/or avoid impacts to sensitive species and habitat, as well as to common biological resources.

4.1.1 Natural and Landscaped Vegetation Communities

Survey Results

The project corridor is in the San Francisco Bay Area, a floristic sub-region of the California Floristic Province's Central Western California region. The sub-region occupies the northern one-third of the Central Western California region, and contains a diverse assemblage of plant communities and wildlife habitat types.

Appendix E is a complete list of plants that were observed in the BSA. No special-status species of plants were observed or are considered to have potential to occur in the BSA. The BSA is dominated by developed areas and the open waters of the channel. Table 4-1 summarizes the estimated acreage of lands by cover type and the amount of anticipated permanent and temporary proposed impacts in the BSA.

Table 4-1 Land Cover and Impact Areas in the BSA

Land Cover Type	Acreage within BSA	Approx. Permanent Impact (acres)	Approx. Temporary Impact (acres)[1]
Developed	47.86	0	23.86
Landscaped/Ruderal	0.52	0	0
Paved Roadway[2]	2.10	0	0
Waters	14.27	0.01	2.30
Tidal Marsh	0.28	0	0
Total	**65.03**	**0.01**	**26.16**

[1] This value assumes that the largest of the three staging area options is utilized.

[2] The total acreage does not include the acreage for bridge surfaces over waters.

Ornamental trees and shrubs (native and non-native) are planted along the northern and southern bridge approaches, and in the parks on the southwest and northeast corners of the project footprint.

Impacts of the Standard Project Alternative

Construction activities associated with the Standard Project Alternative would take place in the existing footprint of the bridge and roadway and are not expected to impact natural or landscaped vegetation communities in the BSA. For further discussion of the impacts to waters, see Section 4.1.2.

Impacts of the Partial Preservation Alternative

Construction activities associated with the Partial Preservation Alternative would take place in the existing footprint of the bridge and roadway and are not expected to impact natural or landscaped vegetation communities in the BSA. For further discussion of the impacts to waters, see Section 4.1.2.

Avoidance and Minimization Efforts

Vegetation removal is not anticipated as a part of the proposed project activities, and there will be no impacts to natural vegetation communities. No avoidance and minimization efforts are needed.

Compensatory Mitigation

Vegetation removal is not part of the proposed project activities. Therefore, compensatory mitigation is not proposed.

Cumulative Impacts

The following other projects are anticipated to take place in the vicinity of the proposed project, and are considered as potentially having cumulative impacts requiring consideration.

Blue-Greenway Improvements. The Blue-Greenway is a network of waterfront parks, trails, habitat, and Bay access points from Mission Bay south to the San Francisco County line. The Port leads the interagency effort for industrial, recreational, and restoration purposes of this project. The channel was listed for immediate improvements in 2005, and is also listed for long-term improvements drafted to take place over the next 10 to 15 years. Improvements include public access to the waterway, open-space parks, a boat launch, and habitat restoration at the Pier 94 tidal marsh (Office of the Mayor 2006).

Southeast Outfall Islais Creek Crossing Replacement. SFPUC is proposing the Southeast Bay Outfall Islais Creek Crossing Replacement Project to improve the reliability of the Southeast Bay Outfall system, which transports treated effluent from the Southeast Water Pollution Control Plant to the Bay. The project would replace a segment of the system, consisting of two parallel pipelines that cross Islais Creek, just west of Third Street in the Bayview-Hunter's Point neighborhood. The existing pipelines beneath Islais Creek are deteriorating and have reached the end of their useful life. In June 2019, as part of an emergency project, SFPUC decommissioned one of the pipes and installed a temporary high-density polyethylene bypass pipeline across Islais Creek. The proposed project consists of installing two new permanent high-density polyethylene and steel pipelines beneath and immediately adjacent to Islais Creek. As part of the proposed project, the remaining in-service ductile iron pipeline beneath Islais Creek would be abandoned in place, and the temporary bypass pipeline would be removed. Construction of the proposed project would take place over an approximately 3.5-year period, expected to begin in 2021, and would entail approximately 27 months of active construction. Construction would require temporary closure of Islais Creek Park and Tulare Park.

Cargo Way Sewer Box Odor Reduction Project. As part of the SFPUC Sewer System Improvements, SFPUC has proposed a project to install a sewer flush line in the Cargo Way sewer to divert flows from the Islais Creek Booster Pump Station to the sewer box between Cargo Way and Mendell Street. The additional flows would help flush and reduce odors in the project area. Construction is underway, and completion is anticipated in winter 2022.

Marin Temporary Bus Maintenance Facility. SFMTA proposes to modify the existing facility at 1399 Marin Street to modernize the maintenance function and increase maintenance efficiency in the bus maintenance warehouse. The project is currently under review.

Because the proposed project would not result in any impacts to natural vegetation communities, it would not contribute to any cumulative impact to these areas in the BSA or regional area. The Blue-Greenway Open Space design has planned actions to improve landscape furnishings, including benches, railings, and bull-rails (metal structures used to tie a boat up at a dock) in the BSA. Many of these proposed projects do not yet have scheduled dates, and are not predicted to occur during bridge rehabilitation. With the exception of the Southeast Outfall Islais Creek Crossing Replacement, none of these other projects would interact with the Islais Creek waterway. Similar to the proposed project, the pipeline crossing replacement would involve replacement of an existing structure and would not be expected to result in a substantial reduction of estuarine habitat in the BSA. The proposed project is limited to the repair and rehabilitation of an existing bridge structure over the channel. There are no other known planned projects in the BSA that would create impacts that, when combined with the impacts of the proposed project, would generate substantial, unavoidable cumulative impact to natural vegetation communities.

4.1.2 Wetlands and Non-wetland Waters of the U.S.

Survey Results

Wetlands and other water resources (e.g., rivers, streams, and natural basins) are subsets of "waters of the United States" and receive protection under Section 404 of the CWA. The USACE has federal responsibility for administering regulations that concern waters and wetlands. The BSA contains 14.55 acres (633,628 square feet) of potentially jurisdictional wetlands of the U.S. (WUS) and OWUS (pursuant to Section 404). A summary of these features is presented in Table 4-2; shown on Figure 5; and described below.

Table 4-2 Potentially Jurisdictional Section 404 Wetlands and Waters of the U.S. in the BSA

Feature Type	Feature ID	Cowardin Classification	Square Feet	Acres
Wetlands				
Tidal Marsh	WUS-1	Estuarine Intertidal Emergent Wetland	3,710	0.09
Tidal Marsh	WUS-2	Estuarine Intertidal Emergent Wetland	4,419	0.1
Tidal Marsh	WUS-3	Estuarine Intertidal Emergent Wetland	1,532	0.04
Tidal Marsh	WUS-4	Estuarine Intertidal Emergent Wetland	2,159	0.05
Other Waters				
Islais Creek Channel	OWUS-1	Estuarine Subtidal Open Water	621,809	14.27
Total*			**633,628**	**14.55**

Note:
*The sum of some numbers may not add up due to rounding.

As described in Section 3.1.3.3, the BSA contains sections of saltmarsh and pickleweed mats, as well as soft substrate and hard substrate tidal communities.

Section 404 jurisdiction includes all open-water areas of the channel and adjacent shorelines to HTL. Where vertical walls are located, 404 jurisdiction was delineated up to the HTL elevation of 7.63 feet (NAVD 88; Figure 5). In other areas, HTL was delineated based on field indicators. Potentially jurisdictional wetlands were found in tidal marsh communities up to or just above the HTL. No non-tidal wetlands or waters were found in the BSA.

Impacts of the Standard Project Alternative

Implementing the Standard Project Alternative would not result in any impacts that fall outside of the existing footprint of the bridge abutments, but may cause brief and temporary increases in turbidity associated with reinforcement of the abutment. It is estimated that waters in the BSA could be temporarily impacted by these activities. Measures will be taken to protect water quality during these activities, and for work occurring over water on the bridge superstructure (see AMMs in Section 1.3.2). The Standard Project Alternative would result in a net decrease of permanent fill of OWUS in the channel, as well as temporary fills, as described in Table 4-3. The Standard Project Alternative would not result in fills of WUS.

Table 4-3 Fills Associated with the Standard Project Alternative

Fill Description	Submerged Volume ($yard^3$)*	Area ($feet^2$)	Fill Type
Old Fender Removal – 250 piles	-388	-350	Removal, permanent
Pin piles within the bridge abutments – six piles, 10-inch diameter	3	5	New, permanent
Navigational dolphin clusters - 20 piles, 12-inch diameter	48	16	New, permanent
Work barges east of bridge, draft of 5 feet	9,260	50,000	Temporary
Work barges west of bridge, draft of 5 feet**	9,260	50,000	Temporary
Summary of Fill	**Cubic Yards**	**Square Feet**	**Acres**
Net Permanent Fill of OWUS	**-337**	**-329**	**-0.01**
Net temporary Fill of OWUS	**18,520**	**100,000**	**2.30**

Notes:

* Volume estimates include all portions of the piles that are below MHHW. Assumes a pile length of 80 feet.

** The area to the west of Islais Creek Bridge may also be used during construction if other projects in the area do not prevent access to the waters west of the bridge.

MHHW = mean higher high water
OWUS = Other Waters of the U.S.

The 10-inch diameter pin piles would be installed in the existing structures of the Islais Creek Bridge. New fills outside of the project footprint would be limited to the four dolphin pile clusters placed at the corners of the bridge abutments. Additionally, areas of the channel would be impacted by construction barges that would be present for the majority of the construction period and be considered a temporary fill. At the staging area options, barges may be briefly anchored in San Francisco Bay to transfer construction materials. There is no anticipated loss to habitat due to this brief use of existing maritime facilities, although anchored barges would block light to submerged vegetation. Other temporary impacts include changes in water quality due to increased vessel traffic, and periods of increased turbidity. On completion of the project, all temporarily affected areas would be restored to approximately the original site conditions, and the project would result in a net decrease in permanent fill through the removal of the old creosote-treated timber fendering.

Impacts of the Partial Preservation Alternative

Impacts associated with replacement of the bridge and the use of barges would be the same as described above for the Standard Project Alternative. Impacts from implementing the Partial Preservation Alternative would result is small areas of permanent impacts that fall outside of the existing footprint of the control tower, and may cause brief and temporary increases in turbidity associated with reinforcement of the control tower and bridge abutments. The waters in the BSA would be permanently and temporarily impacted by these activities. Measures will be taken to protect water quality during these activities, and for work occurring over water on the bridge superstructure (see AMMs in Section 1.3.2). This alternative would result in a permanent net fill of OWUS in the channel, as well as temporary fills, as described in Table 4-4. This alternative would not result in fills of WUS.

Table 4-4 Fills Associated with the Partial Preservation Alternative

Fill Description	Submerged Volume ($yard^3$)*	Area ($feet^2$)	Fill Type
Old Fender Removal – 250 piles	-388	-350	Removal, permanent
Pin piles within the bridge abutments – six piles, 10-inch diameter	3	5	New, permanent
Navigational dolphin clusters – 20 piles, 12-inch diameter	48	16	New, permanent
Work barges east of bridge, draft of 5 feet	9,260	50,000	Temporary
Work barges west of bridge, draft of 5 feet**	9,260	50,000	Temporary
CIDH piles for retrofit of the Control Tower – 4 piles, 84-inch diameter	200	154	New, permanent
Grade beams and pile caps for control tower retrofit	500	502	New, permanent
Temporary cofferdam around control tower	10	900	Temporary

Summary of Fill	Cubic Yards	Square Feet	Acres
Net Permanent Fill of OWUS	**373**	**327**	**0.01**
Net temporary Fill of OWUS	**18,530**	**100,900**	**2.32**

Notes:

* Volume estimates include all portions of the piles that are below MHHW. Assumes a pile length of 80 feet.

** The area to the west of Islais Creek Bridge may also be used during construction if other projects in the area do not prevent access to the waters west of the bridge.

CIDH = cast-in-drilled-hole
MHHW = mean higher high water
OWUS = Other Waters of the U.S.

The permanent new fill associated with retrofit of the Control Tower would fall outside of its existing footprint, and a temporary cofferdam would be needed to complete work on the control tower foundation. On completion of the project, all temporarily affected areas will be restored to approximately the original site conditions.

Avoidance and Minimization Efforts

Temporary and permanent impacts to non-wetland waters of the U.S. are expected as a result of in-water work. Temporary encapsulation systems will be used to contain harmful materials (i.e., isolation casings or turbidity curtains). Avoidance and minimization efforts described in Section 1.3.2 will further decrease the magnitude of impacts to non-wetland waters of the U.S.

Compensatory Mitigation

Implementation of the project would result in an overall decrease of permanent fill in the waters of the U.S., no mitigation is required for the project's permanent impacts. The USACE may require mitigation for temporary fill if that fill would be in place for two or more years. The potential need of compensatory mitigation for temporary impacts (Tables 4-3 and 4-4) would be clarified during project permitting. If compensatory mitigation is required, potential options include mitigation banks, in-lieu fee arrangements, or separate project-specific activities such as on-site restoration.

Cumulative Impacts

This project occurs in a heavily developed area that contains fragmented wetlands and waters of the U.S. The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), which will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to wetlands and waters of the U.S. when other nearby projects are considered.

4.1.3 Trees

Survey Results

A total of 39 native and non-native landscape trees were identified in the BSA during the field review. The trees were associated with parks and other landscaped areas along the channel, east and west of the bridge, and in landscaped areas to the north and south of bridge approaches. One Monterey cypress was documented during 2014 and 2015 site visits. Cypress trees are protected under the Blue-Greenway Open Space Concept design plan.

Impacts of the Standard Project Alternative

No trees would be removed to construct the Standard Project Alternative.

Impacts of the Partial Preservation Alternative

No trees would be removed to construct the Partial Preservation Alternative.

Avoidance and Minimization Efforts

Vegetation removal is not anticipated as a part of the proposed project activities. Avoidance and minimization efforts described in Section 1.3.2 will further decrease the possibilities of impacts to trees in the BSA.

Compensatory Mitigation

No compensatory mitigation is proposed.

Cumulative Impacts

Project activities would not result in any potentially cumulative effects to trees.

4.2 Essential Fish Habitat

Survey Results

The subtidal and intertidal areas in the BSA provide EFH as designated in three FMPs: Pacific Salmon FMP, Pacific Groundfish FMP, and Coastal Pelagic FMP. Additionally, San Francisco Bay is designated as an Estuarine Habitat Areas of Particular Concern (HAPC) in those FMPs. HAPC are described in the regulations as subsets of EFH that are rare; particularly susceptible to human-induced degradation; especially ecologically important; or located in an environmentally stressed area.

Impacts of the Standard Project Alternative

Potential temporary disturbance to EFH may include changes to local water quality due to turbidity and hydroacoustic impacts during piles installation; the lack of access to habitat during removal of the existing bridge fenders and replacement with new piles; and disruption due to the presence of barges and divers. The removal of creosote-treated wood from the BSA would improve EFH conditions by removing a potential source of contaminants from the BSA, and measures will be taken to reduce disturbance of potentially contaminated sediments within the channel during construction. Barges used for construction access and support in the channel would remain in aquatic habitat for the entire duration of construction (approximately 18 to 24 months). Minor permanent changes to EFH are anticipated as a result of piles installed for the navigational dolphins. With implementation of project AMMs, including construction BMPs (Measure #18), the Standard Project Alternative may adversely affect EFH; such effects are expected to be minor, and would not substantially alter the value of EFH in the BSA.

Impacts of the Partial Preservation Alternative

For replacement of the bridge, installation of the navigational dolphins, and the use of barges, the potential impacts to EFH would be the same as described above for the Standard Project Alternative. Like the Standard Project Alternative, the Partial Preservation Alternative would provide benefits to EFH by removing creosote-treated wood from the BSA. Under this alternative, there would be the additional loss of EFH due to the placement of the CIDH piles, pile caps, and grade beams needed to retrofit the control tower. With implementation of project AMMs, including construction BMPs (Measure #18), the Partial Preservation Alternative may adversely affect EFH; such effects are expected to be minor, and would not substantially alter the value of EFH in the BSA.

Avoidance and Minimization Efforts

During in-water activities, measures will be taken to protect water quality according to standard Caltrans BMPs, and to maintain water quality standards as required by the permitting agencies. The AMMs listed in Section 1.3.2 will also reduce the potential effects to EFH during project construction.

Compensatory Mitigation

The project is not anticipated to substantially alter the value of EFH in the BSA; therefore, no compensatory mitigation is proposed. In July of 2017, NMFS found that the prior version of the project would adversely affect EFH for species managed under the Pacific Groundfish and Coastal Pelagic Fisheries Management Plans, but that the project contains sufficient measures to

avoid, minimize, mitigate, or otherwise offset those adverse effects. No compensatory mitigation for EFH is required or proposed.

Cumulative Impacts

Although temporary impacts to EFH are anticipated, these impacts are not anticipated to substantially alter the value of EFH in the BSA. The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), which will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to EFH when other nearby projects are considered.

4.3 Federal and State-Listed Wildlife Species

Based on the review of the USFWS species list, species occurrence databases and literature, and reconnaissance-level wildlife habitat assessments, the species listed in Table 4-5 were determined to have potential to be in the BSA. Appendix C shows all CNDDB documented occurrences of wildlife species within 5 miles of the project.

Table 4-5 Special-Status Wildlife Species With Potential to Occur in the BSA

Animals				
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**Potential to Occur**
Green sturgeon Southern DPS	*Acipenser medirostris*	FT and DCH	—	low
Steelhead – Central California Coast DPS	*Oncorhynchus mykiss*	FT and DCH	—	low
Longfin smelt	*Spirinchus thaleichthys*	FP	ST	low
Pacific herring	*Clupea pallasii*	—	State-Managed Fishery	low
California sea lion	*Zalophus californianus*	MMPA	—	low
Pacific harbor seal	*Phoca vitulina*	MMPA	—	low
California brown pelican	*Pelecanus occidentalis californicus*	MBTA, FD	FP	moderate
Double-crested cormorant	*Phalacrocorax auritus*	MBTA	WL	high
American peregrine falcon	*Falco peregrinus anatum*	MBTA	FP	low
Townsend big-eared bat	*Corynorhinus townsendii*	—	SCT, SSC	low
Pallid bat	*Antrozous pallidus*	—	SSC	low

Table 4-5 Special-Status Wildlife Species With Potential to Occur in the BSA

Animals				
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**Potential to Occur**
Notes: **Federal Status Designations** MBTA-Species protected by the Migratory Bird Treaty Act FT-Federal threatened FE-Federal endangered FD-Federal delisted FC-Federal Candidate MMPA – species protected by the Marine Mammal Protection Act			**State of California Status Designations** FP-Fully protected under California Fish and Game Code SE-State endangered SCT- State candidate threatened SSC-State species of concern ST-State threatened WL- Species of Special Concern Watch List	

A total of 56 special-status wildlife species were listed in the CNDDB results. A wildlife habitat assessment was conducted in the BSA in November 2015. Based on the most up-to-date literature review in 2016 and this technical study, 46 special-status wildlife species were considered to have no potential to occur, based on a lack of suitable habitat in the BSA. Seven of these species were determined to have a low potential to occur; two a moderate potential to occur; and one a high potential to occur. Typically, only species with a moderate or high potential to occur are discussed in an NES. All 56 special-status wildlife species considered are identified and briefly discussed in Appendix F.

Due to the nature of this bridge rehabilitation project, which includes work in developed areas, as well as in-water work in the waters of San Francisco Bay, eight species with a low potential to occur are considered in detail, in addition to two species with a moderate or high potential to occur (Table 4-5). These species are discussed in detail based on technical studies, literature review, and other similar projects in this area. All of the following species are special-status species, except for Pacific herring. Pacific herring are a specially managed fishery by CDFW, but have no federal or state special-status designation.

4.3.1 Green Sturgeon Southern Distinct Population Segment

Green sturgeon Southern DPS, a federally threatened species (NMFS 2009a), is a long-lived and slow-growing anadromous species (Moyle et al. 1992). Sturgeon spawning occurs in freshwater rivers in deep, fast water over a cobble substrate. After spawning, juveniles remain in fresh and estuarine waters for 1 to 4 years, although most juveniles migrate downstream during the summer and fall of their second year. Juveniles often spend some time in estuaries before migrating to the ocean, where they spend anywhere from 3 to 13 years before returning to their natal streams (University of California 2016). First spawning generally occurs at 15 years of age for males and 17 years for females (Moyle et al. 1992). The oldest documented fish reached

42 years, but this is probably an underestimate, and maximum ages of 60 to 70 years or more are likely. Adult green sturgeon can reach lengths up to 8.8 feet.

Green sturgeon are nocturnal benthic feeders, and in estuaries they may feed on amphipods, shrimp, clams, or anchovies. San Francisco Bay serves as an important habitat for all life stages of green sturgeon, as it supports rearing and serves as an important migratory/connectivity corridor between the Sacramento River system and nearshore coastal marine waters (Moyle et al. 1992).

4.3.1.1 Survey Results

Sturgeon use the Bay during migration via the Sacramento–San Joaquin River Estuary to reach spawning grounds, and they appear to spend time in the estuary without immediately migrating. Monitoring studies also show that the species may use San Francisco Bay year-round (Heublein et al. 2009; Lindley et al. 2011). The BSA of the proposed project is in the channel approximately 0.63 mile (3,300 feet) upstream from San Francisco Bay. The staging area options are along the western shores of the Bay and within the channel. The BSA is in a tidally influenced channel directly connected to San Francisco Bay, and therefore includes critical habitat and may provide habitat for benthic invertebrates; prey species of green sturgeon.

The waterway in the BSA is channelized, with an engineered, rocky bottom, as described in Section 3.1. The channel has a muddy substrate that can provide habitat for benthic invertebrates or other prey species of green sturgeon. The channel west of the Bridge has been identified as having contaminated sediments, with negative impacts to benthic, invertebrate communities (SWRCB 2003). A survey from the 1979 found almost no benthic organisms across five sampling events in the channel; in 1987 a research study concluded that the creek was “depauperate” in taxa richness and total abundance; and in 1995 and 1996 studies on invertebrate larvae showed low survival and development in the western segment of the channel (SWRCB 2003). Due to these long-term, recurrent conditions, it is expected that the channel provides marginal foraging habitat for sturgeon. Available information suggests that green sturgeon is more concentrated in the northern regions of San Francisco Bay and in San Pablo Bay than to the south; however, data show an individual foraging in South San Francisco Bay (Kelly et al. 2007; Spenst et al. 2012). There are no CNDDB records within 5 miles of the BSA. Based on this information, this species has potential to occur in the BSA in low numbers year-round.

Critical habitat was designated for this species in 2009 (NMFS 2009b). Designated critical habitat includes all tidally influenced areas of San Francisco Bay, San Pablo Bay, and Suisun Bay up to the elevation of MHW, including, but not limited to, areas upstream to the head of tide endpoint in numerous creeks. The BSA is in a tidally influenced channel directly connected to

San Francisco Bay, and therefore includes critical habitat. However, the habitat quality in the BSA is low due to the existing marginal habitat conditions of the aquatic and benthic environment within the channel itself.

4.3.1.2 Impacts of the Standard Project Alternative

NMFS has concurred that the proposed Standard Project Alternative would not result in the injury or capture of any green sturgeon (NMFS 2017), and no adverse effects to the species is expected to result from the proposed Standard Project Alternative. The Standard Project Alternative would not result in any obstruction to their movement, and there is sufficient habitat for the fish to retreat to away from project activities. Potential impacts to green sturgeon are limited to temporary habitat disturbance from construction, as described below.

Habitat Loss and Modification

There is potential for this species to occur in the BSA in low numbers year-round. The Standard Project Alternative would result in a decrease in fill of the channel due to removal of the old creosote-treated wood fenders, as described in Table 4-3. All permanent new fill would be installed adjacent to existing structures of the Islais Creek Bridge. Additionally, areas of the channel would be impacted by construction barges that would be present for the majority of the construction period. At the staging area options, barges may be briefly anchored in San Francisco Bay; but there is no anticipated impact to sturgeon habitat due to this brief use of existing maritime facilities.

In-water construction activities have the greatest potential to impact sturgeon. The project would cause temporary impacts to the channel (Table 4-3), but has been designed to minimize new fill and turbidity. The existing submarine cable would be abandoned in its place to avoid unnecessary disturbance to the channel bed. The old creosote-treated fender piles would be removed, which may temporarily increase turbidity while having the long-term benefit of removing a potential source of contaminants from Bay waters. The fill associated with each of these activities is presented in Table 4-3.

These fills would result in a loss of soft bottom substrate, and a new hard substrate habitat would be created by the installation of in-water composite dolphin piles. Piles can provide attachment surfaces for algae and sessile organisms and may provide cover for fish associated with hard substrates. Both the soft-substrate lost, and hard-substrate created are likely to have low habitat value for green sturgeon, in the event they use the channel for foraging. In consideration of the wide availability of higher-quality habitat for this species in the nearby waters of the Bay, the loss or modification of habitats described above is expected to have an insignificant and discountable effect on the species.

The work associated with the bridge rehabilitation would require the use of barges to access the bridge, and to serve as work platforms during bridge dismantling and installation of the new bridge span. These barges would constitute a temporary fill (Table 4-3) as they would be in place for the entirety of construction duration (approximately 16 months). As these barges would remain in place for 16 months, the benthic community shaded by them may experience shifts in species composition. Additionally, portions of the barges may contact the bottom of the channel during low tide, especially along the edges of the channel, trapping or injuring benthic invertebrates. These factors could reduce already low-quality foraging habitat for green sturgeon in the areas affected. However, these areas are already highly disturbed, and not expected to be used often by the species. Within the vicinity of the BSA, a large quantity of far more suitable habitat for the species is available.

Underwater Noise

Underwater noise has the potential to alter the behavior of fish; and if sufficiently loud, can cause temporary shifts in hearing ability or injury to internal organs. The proposed project involves the installation of dolphin piles and pin piles, which may generate substantial underwater noise. To reinforce the existing abutments, approximately 6 new piles would be installed using a barge equipped with a crane-mounted vibratory hammer and drilling apparatus. For the proposed navigational dolphins, a total of 20 piles would be installed, using a vibratory driver when feasible.

On July 8, 2008, the Fisheries Hydroacoustic Working Group (FHWG)—whose members include NMFS' Southwest and Northwest Divisions; the California, Washington, and Oregon Departments of Transportation; CDFW; and the FHWA—issued an agreement for establishment of interim threshold criteria to determine the effects of high-intensity sound on fish (FHWG 2008). Although these criteria are not formal regulatory standards, they generally are accepted as viable criteria for underwater noise effects on fish. The agreed-on threshold criteria for impulse-type noise to harm fish have been set at 206 decibels (dB) peak, 187 dB accumulated sound exposure level (SEL) for fish over 2 grams, and 183 dB for fish less than 2 grams (Table 4-6).

Table 4-6 NMFS Underwater Noise Thresholds for Fish

	Peak Noise (dB)	Accumulated Noise (SEL) (dB)
Thresholds for Impulse and Continuous Sound		
Fish under 2 grams in weight	>206	>183
Fish over 2 grams in weight	>206	>187

Notes:
> = greater than
dB = decibel

NMFS = National Marine Fisheries Service
SEL = sound exposure level

Source: (FHWG 2008)

The FHWG has determined that noise at or above the 206-dB peak level can cause barotrauma to auditory tissues, the swim bladder, or other sensitive organs. Noise levels above the accumulated SEL may cause temporary hearing-threshold shifts in fish. Behavioral effects are not covered under these criteria but could occur at these levels or lower. Behavioral effects may include fleeing, and the temporary cessation of feeding or spawning behaviors. A specific criterion has not yet been set by the FHWG for continuous noise, such as vibratory driving, so the same criteria as impulse-type noise were used for this analysis.

Because green sturgeon and steelhead spawn in freshwater far from the BSA, no young of listed species weighing less than 2 grams are expected in the BSA. Therefore, the 183-dB SEL criterion for fish of less than 2 grams would not apply for the listed species potentially present in the BSA. Therefore, for the purposes of this analysis, a 206-dB peak level and 187-dB SEL were used as thresholds for potential harm to listed fish species.

Additionally, NMFS often uses a 150 dB Root Mean Square (RMS) noise threshold to establish the area of potential behavioral effects to fish species. The area over which pile driving noise may exceed the 150 dB RMS threshold is shown on Figure 6. Although underwater sound produced by the project may be audible to fish beyond this point, overall sound levels less than 150 dB RMS are not expected to adversely modify fish behavior.

To determine the extent over which the aforementioned underwater noise thresholds may be exceeded, an underwater noise analysis was conducted for the project as originally designed, which has been provided in Appendix G. The original project design, as analyzed in Appendix G, required that as many as 250 piles be installed to replace the bridge fendering, along with several CIDH piles that would be installed to reinforce the bridge control tower. The analysis has determined that the vibratory-driving or impact pile-driving and drilling associated with the proposed project would not exceed injury or temporary hearing-shift thresholds for green sturgeon but may cause behavioral changes to individuals if present in close proximity to the bridge (up to 56 meters). Although there have been some changes to the expected pile-driving methods and materials, underwater noise levels are expected to be equal to or less than the levels provided in Appendix G for the following reasons:

- substantially fewer piles would be installed (26 versus 255);
- pile sizes are similar or smaller;

- piles would be installed using the same methods evaluated;
- vibratory drilling would be needed only briefly, at low power, to firmly seat the drill casing into the substrate; and
- pile installation for the abutments would occur in the enclosed abutment pits, with limited direct connectivity to waters of the Bay.

The use of vibratory-driving and pin piles rather than impact pile-driving methods would reduce the potential for hydroacoustic impacts to fish (Appendix G). When compared to steel piles, the use of composite piles would minimize noise during installation. Underwater noise from installation of the piles may cause behavioral impacts, where fish are likely to move away from project activities, in the area shown on Figure 6.

Figure 6 150 dB RMS Fish Harassment Zone

Water Quality

Temporarily disturbed sediments in the creek bed, during fender pile removal and dolphin pile installation would cause a localized increase in turbidity in the creek. The increase in turbidity is unavoidable, but would be short-term, occurring only during installation and removal of the structures. BMPs will be implemented during project construction to avoid and/or minimize potential impacts to special-status species and habitats to the greatest extent practicable. During construction, temporary encapsulation systems (i.e., turbidity curtains) will be used as needed to contain disturbed, potentially contaminated sediments from moving outside of the work area (See Measure #20). Given that the channel conditions provide marginal habitat for sturgeon, the impact is expected to be minimal.

The project would remove the existing creosote-treated wood fendering, which is known to leach contaminants into the surrounding water and substrate. Removing the creosote-treated piles would help to improve overall water quality in the channel. The work would occur in an area with a mud substrate, which may contain contaminated sediment. Piles would be cut at the mudline whenever possible to minimize disturbing sediment. A silt-curtain perimeter consisting of a float, a turbidity curtain, and ballast would be installed as needed to minimize turbidity migration beyond the work area. To further reduce disturbance of sediment the work may be supported by divers who would clear material at the bottom of the channel to the extent necessary to expose the top of the abandoned or broken timber piles for removal. If abandoned or broken timber piles are encountered beneath the mudline and create obstructions to placement of new piles, they would be pulled using a barge equipped with a crane-mounted vibratory hammer. As described in AMM 20, turbidity curtains would be used where needed to contain resuspended sediment and pulled piles would be promptly placed on a barge that would contain sediment adhering to the removed pile.

Falsework over the channel would be used, if needed, to contain debris falling from bridge work areas. Such falsework would be attached to the bridge and would not require the placement of temporary piles. The existing bridge would be taken out as a single unit and floated out on barges. The bridge would then be dismantled on barges into smaller pieces that may be transported to a staging area over existing paved structures, or offsite. These barges would be designed to properly contain any construction related debris. Dismantling that may cause sloughing of harmful materials may be performed offsite and in areas protected from runoff. Debris would be removed by the contractor in accordance with methods approved by the U.S. Environmental Protection Agency.

Any work in paved areas on the waterfront and on barges would require implementation of other standard Caltrans BMPs to prevent airborne or falling debris from entering the waters below.

4.3.1.3 Impacts of the Partial Preservation Alternative

Under the Partial Preservation Alternative, potential impacts to green sturgeon from Bridge replacement would be similar to that of the Standard Project Alternative. Seismic retrofit of the control tower would result in additional impacts to this species. The proposed project that NMFS has provided concurrence on did not include the use of cofferdams or dewatering (NMFS 2017), so additional consultation with NMFS would likely be needed for the Partial Preservation Alternative. Cofferdams have the potential to entrap fish, where they may be injured or killed during dewatering. Potential impacts to green sturgeon habitat under this alternative include permanent and temporary habitat disturbance from construction, as described below.

Habitat Loss and Modification

There is potential for this species to occur in the BSA in low numbers year-round. The Partial Preservation Alternative would result in a net fill of the channel, as described in Table 4-4. The permanent new fill would be installed adjacent to existing structures of the Islais Creek Bridge. Additionally, areas of the channel would be impacted by construction barges that would be present for the majority of the construction period. At the staging area options, barges may be briefly anchored in San Francisco Bay; but there is no anticipated impact to sturgeon habitat due to this brief use of existing maritime facilities.

In-water construction activities have the greatest potential to impact sturgeon. Implementation of this alternative would cause temporary impacts to the channel (Table 4-4), but has been designed to minimize new fill and turbidity. The existing submarine cable would be abandoned in its place to avoid unnecessary disturbance to the channel bed. The old creosote-treated fender piles would be removed, which may temporarily increase turbidity while having the long-term benefit of removing a potential source of contaminants from Bay waters. The fill associated with each of these activities is presented in Table 4-4.

These fills would result in a loss of soft bottom substrate, and a new hard substrate habitat would be created by the installation of in-water composite dolphin piles and components of the control tower foundation retrofit. Piles can provide attachment surfaces for algae and sessile organisms and may provide cover for fish associated with hard substrates. Both the soft-substrate lost, and hard-substrate created are likely to have low habitat value for green sturgeon, in the event they use the channel for foraging. In consideration of the wide availability of higher-quality habitat for this species in the nearby waters of the Bay, the loss or modification of habitats described above is expected to have an insignificant and discountable effect on the species.

The work associated with the bridge rehabilitation would require the use of barges to access the bridge, and to serve as work platforms during bridge dismantling and installation of the new

bridge span. These barges would constitute a temporary fill (Table 4-4) as they would be in place for the entirety of construction duration (approximately 16 months). As these barges would remain in place for 16 months, the benthic community shaded by them may experience shifts in species composition. Additionally, portions of the barges may contact the bottom of the channel during low tide, especially along the edges of the channel, trapping or injuring benthic invertebrates. These factors could reduce already low-quality foraging habitat for green sturgeon in the areas affected. However, these areas are already highly disturbed, and not expected to be used often by the species. Within the vicinity of the BSA, a large quantity of far more suitable habitat for the species is available.

Unlike the Standard Project Alternative, the Partial Preservation Alternative would require the use of a temporary cofferdam to dewater the area around the control tower, temporarily removing access to a small area of potential habitat for the species. The construction of a cofferdam could entrap fish, such as green sturgeon, if they are present when the cofferdam is installed.

Underwater Noise

Underwater noise generated during construction of the Partial Preservation Alternative would be similar what is described for the Standard Project Alternative in Section 4.3.2.1. Underwater noise from installation of the piles may cause behavioral impacts, where fish are likely to move away from construction activities, in the area shown on Figure 6. When compared to the Standard Project Alternative, this alternative would require more vibratory pile driving to install the temporary cofferdam and the casing for the CIDH piles needed for the retrofit of the control tower.

Water Quality

Impacts to water quality from implementation of the Partial Preservation Alternative would be similar to the Standard Project Alternative, described in Section 4.3.2.1. Temporarily disturbed sediments in the creek bed, during fender pile removal, dolphin pile installation, cofferdam installation, and the installation of new CIDH concrete piles would cause a localized increase in turbidity in the creek. The increase in turbidity is unavoidable, but would be short-term, occurring only during installation and removal of the structures. BMPs would be implemented during construction to avoid and/or minimize potential impacts to special-status species and habitats to the greatest extent practicable. During construction, temporary encapsulation systems (i.e., turbidity curtains) would be used as needed to contain disturbed, potentially contaminated sediments from moving outside of the work area (See Measure #20). Given that the channel conditions provide marginal habitat for sturgeon, the impact is expected to be minimal.

Potential water quality impacts from bridge replacement would be the same as the Standard Project Alternative. The project would remove the existing creosote-treated wood fendering, which is known to leach contaminants into the surrounding water and substrate. Removing the creosote-treated piles would help to improve overall water quality in the channel.

During the installation of CIDH piles for retrofit of the control tower, a steel casing would be used to isolate the boring from the surrounding waters. The casing would be embedded in the bed of the channel and would contain all the drilling mud as well as any water that comes into contact with concrete during pouring.

Any work in paved areas on the waterfront and on barges would require implementation of other standard Caltrans BMPs to prevent airborne or falling debris from entering the waters below.

4.3.1.4 Avoidance and Minimization Efforts

During in-water activities, measures will be taken to protect water quality according to standard Caltrans BMPs and to maintain water quality standards as required by the permitting agencies. The AMMs listed in Section 1.3.2 will also reduce the potential for effects to green sturgeon Southern DPS during project construction.

Additional AMMs would be needed for the Partial Preservation Alternative when dewatering occurs to rescue and relocate fish from the inside of the cofferdam.

4.3.1.5 Compensatory Mitigation

NMFS has concurred that the proposed project would not cause adverse impacts to green sturgeon Southern DPS (NMFS 2017); therefore, no compensatory mitigation is proposed for the Standard Project Alternative.

Unlike the Standard Project Alternative, the Partial Preservation Alternative would result in a permanent loss of marginally suitable habitat for green sturgeon. Coordination with NMFS would be needed to determine of compensatory mitigation would be required.

4.3.1.6 Summary of Potential Effects

The proposed project would result in a net reduction of fill to potential foraging habitat (waters of the channel) considered to be marginal for this species (Tables 4-3 and 4-4). Hydroacoustic impacts have been minimized by choosing composite piles which would be installed via vibratory methods when possible, and through the use of pin piles for abutment reinforcement. Underwater noise from vibratory pile driving or drilling associated with these piles would not exceed injury or temporary hearing threshold shifts for green sturgeon, if they are present. There would be no potential for fish entrapment, and water quality degradation has been minimized due

to proposed project design and implementation of several AMMs described in Section 1.3.2. Additionally, the proposed project would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate. Nominal temporary disturbances include the installation and removal of piles, construction noise, artificial lighting, and presence of construction divers and personnel on barges and rafts.

With the implementation of the proposed AMMs for the protection of water quality, the construction impacts are expected to be minimal. NMFS has concurred that the proposed project may affect water quality but is not likely to adversely affect green sturgeon Southern DPS or designated critical habitat for the species (NMFS 2017).

The Partial Preservation Alternative would result in greater impacts to the species due to the permanent loss of habitat and the need to dewater the control tower foundation for retrofit.

4.3.1.7 Cumulative Impacts

This project occurs in a heavily developed area that provides marginal habitat for this species. A small amount of habitat would be permanently lost and temporary impacts to sturgeon habitat are anticipated, but these impacts are not anticipated to result in adverse effects on the species. The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), which will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to green sturgeon Southern DPS when other nearby projects are considered.

4.3.2 Steelhead Central California Coast (CCC) DPS

The CCC DPS of steelhead is listed as Federally Threatened (NMFS 2006). Critical habitat for the CCC steelhead DPS was designated on May 5, 1999, and revised September 5, 2005 (NMFS 2005). Their range is defined by NMFS as all naturally spawned steelhead populations from the Russian River south to Aptos Creek in Santa Cruz County, including drainages of San Francisco, San Pablo, and Suisun bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin rivers.

Steelhead employ a variety of life history strategies that take advantage of the diversity of river systems and regional conditions to which they are adapted. Adult steelhead typically begin returning to San Francisco Bay in late fall, with most immigration occurring from December through February. Spawning takes place from January through April in freshwater streams. Adults spawn in clean gravel and cobbles, typically at tail crests or riffles where surface water is hydraulically forced into the gravel, thereby keeping it clean and the eggs well-oxygenated.

Juvenile steelhead are found in multiple habitat types, with habitat preferences changing with seasonal changes to stream conditions. Steelhead typically spend 2 years in freshwater, but freshwater residence time can range from 1 to 4 years (McEwan and Jackson 1996; Moyle 2002). Estuaries are often an important rearing area for juvenile steelhead on their way to the ocean. Steelhead can remain in the ocean for 1 to 4 years before returning to spawn the first time, with 2 years being the norm. However, unlike Chinook and Coho, steelhead do not necessarily die after spawning.

4.3.2.1 Survey Results

Prior to engineering and development, Islais Creek was naturally a tidal basin surrounded by saltmarsh. As described in Section 3.1.2.3, the channel is a heavily developed, dredged channel with varying mud, cobble, riprap, and bulkhead bottom. There is no suitable spawning habitat in the connecting the channel or its tributaries. Steelhead occurring in the BSA would be migrants from the nearby San Francisco Bay. There are no CNDDB records within 5 miles of the BSA, and there is a low potential for this species to occur in the BSA.

Adult steelhead abundance in San Francisco Bay increases in late fall through February. Spawning takes place from January through April in well-oxygenated waters of freshwater streams. Juvenile steelhead migrate as smolts to the ocean from January through May, with peak outmigration in March and April (Fukushima 1998).

Although the estuarine waters adjacent to the BSA are important foraging and rearing habitat, habitat conditions in the channel are marginally suitable due to heavy development and the presence of contaminated sediment, as described in Section 3.1.

Critical habitat was designated for this species in 2009 (USFWS 2009). Because designated critical habitat for steelhead CCC DPS includes San Francisco Bay and the tidally influenced reaches of tributaries of the Bay, the BSA is in designated critical habitat. However, as described in Section 3.1, the channel contains degraded habitat and thus provides low quality habitat for this species.

4.3.2.2 Impacts of the Standard Project Alternative

There is low potential for steelhead to occur in the BSA. Like the green sturgeon, this species may be affected by hydroacoustic impacts, water quality impacts, and habitat loss. As described in Section 4.3.1 regarding project impacts on green sturgeon, the project has been designed to prevent injury to fish from in-water work; to avoid unnecessary turbidity increase from channel bed disturbance; avoid debris falling into open water; and to use BMPs to maintain water quality standards during in-water construction activities.

Hydroacoustic impacts have been minimized by choosing composite piles that would be installed via vibratory methods when possible, and the use of pin piles for reinforcing the abutments. Pile driving or drilling associated with these piles would not exceed injury or temporary hearing threshold shifts for CCC steelhead if they are present. There would be no potential for fish entrapment, and water quality degradation has been minimized due to project design and implementation of AMMs described in Section 1.3.2. Additionally, the Standard Project Alternative would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate. Nominal temporary disturbances include the installation and removal of piles, underwater construction noise, artificial lighting, and presence of construction divers and personnel on barges and rafts.

If in-water construction occurs during the steelhead migration season, limited direct effects are anticipated to steelhead CCC DPS due to the use of barges, installation of piles, and removal of the old fender piles. In consideration with the wide availability of higher quality habitat for this species in the nearby waters of the Bay, and the fact that the BSA is not located along a migratory pathway for this species, the loss or modification of habitats described above is expected to have an insignificant and discountable effect on the species. NMFS has provided concurrence with this determination (NMFS 2017).

4.3.2.3 Impacts of the Partial Preservation Alternative

There is low potential for steelhead to occur in the BSA. Like the green sturgeon, this species may be affected by hydroacoustic impacts, water quality impacts, and habitat loss. As described in Section 4.3.1 regarding impacts on green sturgeon, the Partial Preservation Alternative would require the use of a cofferdam for retrofit of the control tower foundation, and this cofferdam has the potential to entrap green sturgeon during dewatering.

Hydroacoustic impacts have been minimized by choosing composite piles that would be installed via vibratory methods when possible, and the use of CIDH methods for reinforcing the control tower foundation. Pile driving or drilling associated with these piles would not exceed injury or temporary hearing threshold shifts for CCC steelhead if they are present. Water quality degradation has been minimized due to proposed design and implementation of AMMs described in Section 1.3.2. Like the proposed project, this alternative would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate. As summarized in Table 4-4, the Partial Preservation Alternative would cause a net loss of marginal estuarine habitat that may be utilized by the species.

If in-water construction occurs during the steelhead migration season, limited direct effects are anticipated to steelhead CCC DPS due to the use of barges, installation of piles, and removal of

the old fender piles. In consideration with the wide availability of higher quality habitat for this species in the nearby waters of the Bay, and the fact that the BSA is not located along a migratory pathway for this species, the loss or modification of habitats described above is expected to have an insignificant and discountable effect on the species.

4.3.2.4 Avoidance and Minimization Efforts

During in-water activities, measures will also be taken to protect water quality according to standard Caltrans BMPs; and to maintain water quality standards under the CWA according to RWQCB. The AMMs listed in Section 1.3.2 will also reduce the potential for effects to steelhead CCC DPS during project construction.

Additional AMMs would be needed for the Partial Preservation Alternative when dewatering occurs to rescue and relocate fish from the inside of the cofferdam.

4.3.2.5 Compensatory Mitigation

NMFS has concurred that the project would not cause adverse impacts to steelhead CCC DPS (NMFS 2017); therefore, no compensatory mitigation is proposed for the Standard Project Alternative.

Unlike the Standard Project Alternative, the Partial Preservation Alternative would result in a permanent loss of marginally suitable habitat for green sturgeon. Coordination with NMFS would be needed to determine of compensatory mitigation would be required.

4.3.2.6 Summary of Potential Effects

The proposed project would result in a net reduction of fill to potential foraging habitat (tidal waters of the channel) considered to be marginal for this species (Tables 4-3 and 4-4). Hydroacoustic impacts have been minimized by choosing composite piles that would be installed via vibratory methods when possible, and the use of pin piles for abutment reinforcement. Underwater noise from vibratory pile driving or drilling associated with these piles would not exceed injury or temporary hearing threshold shifts for steelhead if they are present. There would be no potential for fish entrapment, and water quality degradation has been minimized due to proposed project design and implementation of AMMs described in Section 1.3.2. Additionally, the proposed project would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate. Nominal temporary disturbances include the installation and removal of piles, construction noise, artificial lighting, and presence of construction divers and personnel on barges and rafts. NMFS has concurred that the proposed project may affect steelhead CCC DPS but is not likely to adversely affect the species (NMFS 2017).

The Partial Preservation Alternative would result in greater impacts to the species due to the permanent loss of habitat and the need to dewater the control tower foundation for retrofit.

4.3.2.7 Cumulative Impacts

This project occurs in a heavily developed area that provides marginal habitat for this species. A small amount of habitat would be permanently lost and temporary impacts to steelhead habitat are anticipated, but these impacts are not anticipated to result in adverse effects on the species. The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), which will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to steelhead CCC DPS when other nearby projects are considered.

4.3.3 Longfin Smelt

Longfin smelt are a proposed for listing under FESA, and designated as state Threatened under CESA. The longfin smelt is an anadromous fish that inhabits the San Francisco Bay Delta. Adult longfin smelt occur in bays, estuaries, and nearshore coastal areas, and migrate into freshwater rivers to spawn from January through March (USFWS 2012). Longfin smelt are rarely found in water temperatures greater than 22 degrees Celsius. They are mostly found in mid-water or near the bottom and are known to migrate up and down in the water column, following prey at night (USFWS 2012).

4.3.3.1 Survey Results

The BSA is approximately 3,300 feet upstream from San Francisco Bay, where longfin smelt are expected to spend part of their lifespan. Longfin smelt prefer deep, cool waters, and the manipulated hydrology of the channel does not provide spawning habitat. Two CNDDB records exist within 5 miles of the BSA, from CDFW trawl surveys dated from 1995 and 2010 (CDFW 2016). There is a low potential for this species to occur in the BSA.

4.3.3.2 Impacts of the Standard Project Alternative

There is low potential for longfin smelt to occur in the BSA. Like the green sturgeon and steelhead, this species may be affected by the disturbance associated with the planned in water work, and by water quality impacts. As described in Section 4.3.1 regarding project impacts to green sturgeon, the project has been designed to avoid unnecessary turbidity increase from channel bed disturbance; to use debris containment systems; and to use BMPs to maintain water quality standards during in-water construction activities. With implementation of the AMMs,

injury or mortality of this species would not occur, and impacts to habitat for this species would be minimal.

4.3.3.3 Impacts of the Partial Preservation Alternative

There is low potential for longfin smelt to occur in the BSA. Like the green sturgeon and steelhead, this species may be affected by the disturbance associated with the planned in water work, and by water quality impacts. As described in Section 4.3.1 regarding project impacts to green sturgeon, this alternative has been designed to avoid unnecessary turbidity increase from channel bed disturbance; to use debris containment systems; and to use BMPs to maintain water quality standards during in-water construction activities.

Unlike the Standard Project Alternative, the Partial Preservation Alternative would require the use of a temporary cofferdam to dewater the area around the control tower, temporarily removing access to a small area of potential habitat for the species. The construction of a cofferdam could entrap fish, such as longfin smelt, if they are present when the cofferdam is installed.

4.3.3.4 Avoidance and Minimization Efforts

During in-water activities, measures will be taken to protect water quality according to standard Caltrans BMPs; and to maintain water quality standards under the CWA according to RWQCB. The AMMs listed in Section 1.3.2 will also reduce the potential for effects to longfin smelt during project construction.

Additional AMMs would be needed for the Partial Preservation Alternative when dewatering occurs to rescue and relocate fish from the inside of the cofferdam.

4.3.3.5 Compensatory Mitigation

The project is not anticipated to cause impacts to Longfin smelt, and therefore no compensatory mitigation is proposed for the Standard Project Alternative.

Unlike the Standard Project Alternative, the Partial Preservation Alternative would result in a permanent loss of marginally suitable habitat for green sturgeon. Coordination with NMFS would be needed to determine of compensatory mitigation would be required.

4.3.3.6 Summary of Potential Effects

The proposed project would result in a net reduction of fill to potential foraging habitat (waters of the channel) considered to be marginal for this species (Tables 4-3 and 4-4). Hydroacoustic impacts have been minimized by choosing composite piles which would be installed via

vibratory methods when possible, and the use of pin piles to reinforce the bridge abutments. Underwater noise from pile driving or drilling associated with these piles would not exceed injury or temporary hearing threshold shifts for longfin smelt if they are present. There would be no potential for fish entrapment, and water quality degradation has been minimized due to proposed project design and implementation of AMMs described in Section 1.3.2. In summary, the project would not result in take of longfin smelt, and in consideration with the wide availability of higher quality habitat for this species in the nearby waters of the Bay, the loss or modification of habitats described above is expected to have an insignificant and discountable effect on the species.

The Partial Preservation Alternative would result in greater impacts to the species due to the permanent loss of habitat and the need to dewater the control tower foundation for retrofit.

4.3.3.7 Cumulative Impacts

This project occurs in a heavily developed area that provides marginal habitat for this species. A small amount of habitat would be permanently lost and temporary impacts to longfin smelt habitat are anticipated, but these impacts are not anticipated to result in adverse effects on the species. The proposed project would incorporate AMMs, including standard Caltrans BMPs (Measure #18), which would protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to longfin smelt when other nearby projects are considered.

4.4 Other Special-Status Wildlife Species

This section discusses the other special-status wildlife species that have the potential to occur in the BSA.

4.4.1 Pacific Herring

Pacific herring is regulated as a CDFW state-managed California commercial fishery. They are also considered an important food source for a variety of birds, mammals, fishes, and invertebrates (CDFW 2016). CDFW conducts herring research, including annual dive surveys and spawn deposition surveys, and collects commercial and research fishery data. The range of the species includes the Pacific Coast from California around the Pacific Rim to Korea. Adult herring begin migration in the early fall to spawn in inshore bays and estuaries (CDFW 2016). San Francisco and Tomales bays have the largest spawning aggregations in California. Spawning occurs in intertidal and shallow subtidal zones, and eggs are deposited on eelgrass, kelp, or hard substrates in the water. (CDFW 2016). Juvenile herring typically stay in the Bay through the summer before migrating out to sea (CDFW 2016).

4.4.1.1 Survey Results

The BSA is within the range of spawning Pacific herring. The piles supporting the control tower and the fender system all provide in-water structures that herring could use for egg deposition during spawn events, although creosote-treated wood may adversely affect the eggs or larvae when used as a spawning substrate (Vines et al. 1998). Pacific herring spawning events have a low likelihood to occur in the channel (WRA Environmental Consultants 2015). Spawning events have occasionally occurred in Mission Creek to the north (Caltrans 2015a). Most spawning in 2013-2014 occurred in the North Bay, which may have been due to drought conditions which may have caused herring to search for spawning sites with lower salinity; however, there were spawning events documented in the south Bay along the eastern side of the San Francisco Peninsula in the 2015-2016 season (CDFW 2016c). There are no CNDDB records within 5 miles of the BSA; however, due to recent documented spawning events within 5 miles of the BSA, the potential for spawning Pacific herring to occur in the BSA is considered to be moderate.

4.4.1.2 Impacts of the Standard Project Alternative

Suitable spawning habitats potentially exist in and adjacent to the BSA, and work would likely occur during the spawning season. However, the wood piles in the BSA are not optimal spawning substrate because they are treated with creosote. Spawning adult herring are vulnerable to hydroacoustic impacts, water quality impacts, and habitat loss similar to those described above for green sturgeon, steelhead, and longfin smelt. Herring spawn are also especially vulnerable to impacts from turbidity. As described in Section 4.3.1 regarding project impacts to green sturgeon, the project has been designed to adhere to interim criteria for injury to fish from pile-driving activities; to avoid unnecessary turbidity increase from channel bed disturbance; to use debris containment systems; and to use BMPs to maintain water quality standards during in-water construction activities. No habitat loss is anticipated from the replacement of bridge components and in-water structures. Additionally, the proposed project would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate (Vines et al. 1998). The new navigational dolphins would replace creosote-treated wood piles, which would improve overall water quality in the channel.

CDFW can be consulted to determine the potential for project activities to impact Pacific herring. Through the consultation process, AMMs specific to Pacific herring will be identified (Measure #9). Biological monitoring will likely be required by CDFW to identify spawn events during the herring spawning season (December 1 to February 28) if removal of the old fender piles occurs during that time. If herring spawning is observed, in-water work will be suspended

within 500 meters, and the work may not continue until spawning has ended and embryos have hatched (up to 21 days) (CDFW 2014).

4.4.1.3 Impacts of the Partial Preservation Alternative

For replacement of the bridge, installation of the navigational dolphins, and the use of barges, the potential impacts to Pacific herring would be the same as described above for the Proposed Project. As described in Section 4.3.1 regarding impacts to green sturgeon, this alternative has been designed to adhere to interim criteria for injury to fish from pile-driving activities; to avoid unnecessary turbidity increase from channel bed disturbance; to use debris containment systems; and to use BMPs to maintain water quality standards during in-water construction activities. Additionally, the proposed project would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate (Vines et al. 1998). This alternative would result in the permanent net loss of 326 square feet of estuarine habitat due to the installation of the CIDH piles, pile caps, and grade beams needed to retrofit the Control Tower.

4.4.1.4 Avoidance and Minimization Efforts

During in-water activities, measures will be taken to protect water quality according to standard Caltrans BMPs; and to maintain water quality standards under the CWA according to RWQCB. The AMMs listed in Section 1.3.2 will also reduce the potential for effects to Pacific herring during project construction.

4.4.1.5 Compensatory Mitigation

The project is not anticipated to cause adverse impacts to Pacific herring, and therefore no compensatory mitigation is proposed.

4.4.1.6 Summary of Potential Effects

Water quality degradation has been minimized due to proposed project design and implementation of AMMs described in Section 1.3.2. Additionally, the proposed project would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate (Vines et al. 1998). In summary, the project would not impact spawning herring, and would improve overall spawning habitat conditions in the BSA.

4.4.1.7 Cumulative Impacts

This project occurs in a heavily developed area that provides a marginal spawning area for this species. The proposed project would remove creosote-treated wood from habitat that may be used by this species. The proposed project will incorporate AMMs, including standard Caltrans

BMPs (Measure #18), which will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to Pacific herring when other nearby projects are considered.

4.4.2 Marine Mammals

All marine mammals with potential to occur in San Francisco Bay are protected under the MMPA. Pacific harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*) have low potential to occur inside the BSA as they may occasionally use the estuarine waters in the BSA to forage year round.

4.4.2.1 Survey Results

No marine mammals were observed in the BSA during site visits. There are 0 CNDDB records of Pacific harbor porpoise, Pacific harbor seal, or California sea lion within 5 miles of the BSA.

Harbor porpoises with the potential to occur in the Bay are assumed to be part of the San Francisco–Russian River stock. Current NMFS estimates for this stock are 9,886 porpoises (Carretta et al. 2013). Harbor porpoises are typically observed in northern areas of the Bay, closer to the Golden Gate (Keener 2014, Duffy 2015). However, prey species including anchovies and herring, are known to occur in the Bay waters and associated tidal waters (WRA Environmental Consultants 2015; FoundSF.org 2015).

Pacific harbor seals typically forage in the deeper waters of San Francisco Bay in areas of higher relief (Grigg et al 2012). Seals also haul out on offshore rocks, sandy beaches, and floating docks, wharfs, and other man-made structures in the Bay. The closest haul-out site to the BSA is approximately 4.38 miles away on the south side of Yerba Buena Island (Caltrans 2015a). There is no suitable habitat for seals to haul out in or adjacent to the BSA. The channel does not include the species' preferred deep-water foraging habitat.

California sea lion can be found year-round in San Francisco Bay but are most abundant from late summer to late spring, outside their breeding season (Caltrans 2015a). California sea lion do not pup in San Francisco Bay; most individuals in the Bay are subadult males (Caltrans 2015a). Similar to harbor seals, sea lions haul out on offshore rocks, sandy beaches, and floating docks, wharfs, and other man-made structures. Their diet includes fish such as Pacific whiting, rockfish, anchovy, hake, flatfish, small sharks, and cephalopods including squid and octopus (Lowrey et al 1991). Prey species, including herring, are known to occur in adjacent estuarine waters (WRA Environmental Consultants 2015). However, the channel provides only marginal foraging or haul-out habitat.

4.4.2.2 Impacts of the Standard Project Alternative

There is low potential for marine mammal species to occur in the BSA during project activities. All three species discussed in Section 4.4.2 are sensitive to water quality impacts, habitat loss, and hydroacoustic impacts. In-water construction activities have the potential to cause short-term, temporary behavioral disruptions to marine mammals that may be foraging or hauled out in nearby waters. The project has been designed to minimize underwater noise, new fill, and turbidity. The existing submarine cable would be abandoned in place to avoid unnecessary disturbance to the channel bed. Existing fenders would be cut at the mudline and removed. The new navigational dolphins, when installed, would have a smaller footprint than the existing fendering system.

The new fender system would replace creosote-treated wood, which would improve overall water quality in the channel. The work would occur in an area with a mud substrate. An encapsulation containment system would be used to contain debris for bridge component repair and rehabilitations, deck work, asbestos and lead paint removal, rust, and corrosion removal. Implementation of debris containment systems for work over water and implementation of other standard Caltrans BMPs will prevent airborne or falling debris from entering the waters below.

4.4.2.3 Impacts of the Partial Preservation Alternative

For replacement of the bridge, installation of the navigational dolphins, and the use of barges, the potential impacts to marine mammals would be the same as described above for the Proposed Project. There would be potential for additional noise impacts associated with this alternative due to the installation of the temporary cofferdam and four CIDH piles needed to retrofit the control tower. The control tower retrofit would also result in the permanent loss of 326 square feet of estuarine habitat in the BSA.

4.4.2.4 Avoidance and Minimization Efforts

The AMMs listed in Section 1.3.2 will reduce the potential for effects to marine mammals. Caltrans may also consult with NOAA/NMFS to identify potential impacts to marine mammals and specific AMMs to protect them (Measure #7).

4.4.2.5 Compensatory Mitigation

The project is not anticipated to cause any adverse impacts to marine mammals; therefore, no compensatory mitigation is proposed.

4.4.2.6 Cumulative Impacts

This project occurs in a heavily developed area that provides marginal habitat for marine mammals. The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), which will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to marine mammals when other nearby projects are considered.

4.4.3 California Brown Pelican

California brown pelican are federally delisted, and their nesting colony and communal roosts are State Fully Protected. Nesting colonies are located exclusively along the southern California coast from the Channel Islands south to the Gulf of California. California brown pelicans are communal nesters, with breeding occurring between March and August. They feed primarily on sardines, mackerels, and anchovies, and while foraging pelicans will rest on water, rocks, jetties, and man-made structures.

4.4.3.1 Survey Results

There are 10 known California brown pelican roosting sites in the Bay Area, all along the outer coast of San Francisco County, not in the Bay (CDFG 2007). There are no CNDDB records within 5 miles of the BSA. The BSA provides foraging and day-loafing habitat for pelicans on the open water, rocks, the control tower, the wooden fenders, and the piles in the channel; but pelicans are not expected to roost or breed in the BSA. Pelicans were not observed during the site visit in 2015.

4.4.3.2 Impacts of the Standard Project Alternative

Foraging and loafing habitat for California brown pelican exists in and adjacent to the BSA in the channel. Moderate potential exists for this species to occur in the BSA. This species is vulnerable to temporary disturbance from the presence of construction activity and potential impacts to air and water quality. Foraging and roosting birds can easily avoid construction activities, and sufficient habitat is available in the waters of the Bay for them to relocate.

4.4.3.3 Impacts of the Partial Preservation Alternative

Foraging and loafing habitat for California brown pelican exists in and adjacent to the BSA in the channel. Moderate potential exists for this species to occur in the BSA. This species is vulnerable to temporary disturbance from the presence of construction activity and potential impacts to air and water quality. Foraging and roosting birds can easily avoid construction activities, and sufficient habitat is available in the waters of the Bay for them to relocate.

4.4.3.4 Avoidance and Minimization Efforts

The AMMs listed in Section 1.3.2 will reduce the potential for effects to California brown pelican before and during project construction.

4.4.3.5 Compensatory Mitigation

Because nesting habitat is not present and thus would not be affected by the proposed project, and disturbance of foraging areas would be minimized, compensatory mitigation is not proposed.

4.4.3.6 Cumulative Impacts

This project occurs in a heavily developed area that provides marginal foraging habitat for this species. No disturbance would occur to nesting or roosting sites for this species. The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), which will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not contribute to cumulative impacts to California brown pelican when other nearby projects are considered.

4.4.4 Double-Crested Cormorant

Double-crested cormorant nesting colonies are considered a resource of conservation and are on the CDFW watch list. Cormorants are year-round residents along the coast of California, and can occur in inland fresh, brackish, and saline waters (USFWS 2009). Cormorants are communal nesters, and breed from April through August. The species feeds primarily on fish but will also eat crustaceans and amphibians. In the Bay, herring are an important food source for cormorants (USFWS 2009).

4.4.4.1 Survey Results

The BSA provides foraging and loafing habitat for cormorants in the open water, rocks, control tower, wooden fenders, and piles in the channel. Double-crested cormorants are not expected to roost or breed in the BSA. There are established nesting colonies in the Bay on the San Francisco–Oakland Bay Bridge, Richmond–San Rafael Bridge, San Mateo Bridge, and Yerba Buena and Alcatraz islands (CNDDB 2016). The nearest nesting colony is on the San Francisco-Oakland Bay Bridge. During the site visit in November 2015, an individual double-crested cormorant was observed on the northeast banks of the channel at low tide, close to the mouth of San Francisco Bay.

4.4.4.2 Impacts of the Standard Project Alternative

Foraging and loafing habitat exists in and adjacent to the BSA in the channel, and there is moderate potential for this species to occur in the BSA. This species is vulnerable to temporary disturbance from the presence of construction activity, and potential impacts to air and water quality. Foraging and loafing birds can easily avoid construction activities, and sufficient habitat is available upstream and downstream for relocation. Pacific herring are an important prey species for cormorants, and the project includes AMMs to protect Pacific herring and herring spawns (Measure #9). The project includes measures to protect air and water quality, debris containment systems, and turbidity minimization. No direct effects are anticipated to double-crested cormorant and their habitat.

4.4.4.3 Impacts of the Partial Preservation Alternative

Foraging and loafing habitat exists in and adjacent to the BSA in the channel, and there is moderate potential for this species to occur in the BSA. This species is vulnerable to temporary disturbance from the presence of construction activity, and potential impacts to air and water quality. Foraging and loafing birds can easily avoid construction activities, and sufficient habitat is available upstream and downstream for relocation. Pacific herring are an important prey species for cormorants, and the project includes AMMs to protect Pacific herring and herring spawns (Measure #9). As with the proposed project, this alternative includes measures to protect air and water quality, debris containment systems, and turbidity minimization. No direct effects are anticipated to double-crested cormorant and their habitat under this alternative.

4.4.4.4 Avoidance and Minimization Efforts

The AMMs listed in Section 1.3.2 will reduce the potential for effects to double-crested cormorant before and during project construction. AMMs include preconstruction surveys, biological monitoring, and non-disturbance buffers for nesting birds.

4.4.4.5 Compensatory Mitigation

Because active nesting habitat would be avoided and disturbance of individual birds will be minimized, compensatory mitigation is not proposed.

4.4.4.6 Cumulative Impacts

This project occurs in a heavily developed area that provides marginal foraging habitat for this species. No disturbance would occur to nesting sites for this species; and the proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), that will protect surrounding habitat and water quality. Other known projects in the area are expected to largely take place in areas that are already developed. Therefore, the proposed project would not

contribute to cumulative impacts to double-crested cormorants when other nearby projects are considered.

4.4.5 Migratory Birds

All migratory birds in the BSA are protected by the MBTA. Many species of migratory birds may inhabit the BSA at a time and will typically use similar resources.

Migratory birds that are unlikely to nest but are likely to forage in the BSA include migratory shorebirds and waterfowl. Hundreds of species of migratory shorebirds and waterfowl have been documented to occur in the Bay Area regularly (Takekawa et al. 2006). Several migratory shorebirds and waterfowl that breed in the area are considered nesting birds and are covered under the MBTA.

Nesting raptors are protected under CFGC Section 3503.5, which states, "It is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." In addition, the white-tailed kite is a California fully protected species, and the American peregrine falcon is a California endangered species. The white-tailed kite is a year-round resident in coastal and valley lowlands in California. Nests are usually near open foraging areas (Shuford and Gardali 2008). The American peregrine falcon generally feeds and nests near water. This species nests on protected ledges of high cliffs, banks, dunes, and mounds in woodland, forest, and coastal habitats. However, pairs are also known to nest on human-made structures such as bridges and buildings (Shuford and Gardali 2008). Peregrine falcons forage over most wetland habitats that harbor many bird species it uses as prey. Peregrines prey on bird species such as ducks, shorebirds, and doves (Goals Project 2000).

4.4.5.1 Survey Results

During the most recent site survey in November 2015, several migratory birds were observed in the BSA, including multiple gull species, American coot (*Fulica americana*), Great Blue Heron (*Ardea herodias*), and Horned grebe (*Podiceps auritus*). A large variety of migratory bird species can potentially nest anywhere in the BSA except for paved road surfaces and the active channel of Mission Creek. Several species, including house finch (*Haemorhous mexicanus*), bushtits (*Psaltriparus minimus*), hummingbirds (*Trochilidae* sp.), and black phoebe (*Sayornis nigricans*) can potentially nest on the bridge structure, the landscape trees, and the adjacent buildings. Migratory birds may also forage over open water and in landscape/ruderal habitat.

No individual nesting raptors were seen during site visits. There are no records reported in the CNDDB in or near the BSA.

4.4.5.2 Impacts of the Standard Project Alternative

No vegetation removal is anticipated with proposed project activities. With implementation of the specific AMMs proposed below, permanent impacts to migratory birds (including take of individuals, nestlings, or eggs) are not anticipated from project construction.

4.4.5.3 Impacts of the Partial Preservation Alternative

No vegetation removal is anticipated under this alternative. With implementation of the specific AMMs proposed below, permanent impacts to migratory birds (including take of individuals, nestlings, or eggs) are not anticipated from construction of this alternative.

4.4.5.4 Avoidance and Minimization Efforts

Construction of the proposed project could disturb or destroy nesting birds that are protected under the MBTA. Nesting birds could be temporarily displaced because of habitat alteration or noise disturbance from construction equipment. If any migratory birds are nesting in the remaining trees in the BSA or under the existing overcrossing structure during project construction, direct mortality of eggs or chicks could occur, resulting in an impact to species protected under the MBTA. To avoid mortality of birds protected under the MBTA, the following AMMs are proposed:

1. If construction is scheduled during the nesting season for migratory birds (February 1 through August 31), structures in the project footprint, including the remaining trees, will be surveyed for nesting migratory birds no more than 3 days prior to the start of ground disturbing activities. The overcrossing will be inspected weekly for signs of nesting activity, from the start of the nesting season until the end of the season or until the existing overcrossing has been removed, depending on which event occurs first.

If nests are identified in trees or under the overcrossing structure during preconstruction surveys, the following measures will be implemented:

1. Buffers will be established with agency guidance around active migratory bird nests found in trees or on the ground. The size of the buffer may vary for different species and will be determined in coordination with CDFW. A qualified biologist will delineate the buffer using environmentally sensitive area fencing, pin flags, and/or caution tape. The buffer zone will be maintained around all active tree-nest sites until the young have fledged and are foraging independently. In the event that an active tree-nest is found after the completion of preconstruction surveys and after construction begins, all construction activities will be stopped until a qualified biologist has evaluated the nest and erected the appropriate buffer around it.

2. A qualified biologist will work with CDFW before the start of nesting season (February 1) to determine and implement appropriate techniques to remove any existing nests and to discourage migratory birds from developing new nests on the underside of the overcrossing for the duration of construction. Strategies may include installing exclusionary netting underneath the bridge and plugging drain holes with wire mesh prior to nesting season. In the event that nesting birds are present and attempt to build nests during construction, a biologist will work with CDFW to implement a strategy to prevent nests from becoming established.

4.4.5.5 Compensatory Mitigation

Because active nesting habitat will be avoided and disturbance of individual migratory birds will be minimized, compensatory mitigation is not proposed.

4.4.5.6 Cumulative Impacts

The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), which will protect any established nests from disturbance. Other known projects in the area are expected to largely take place in areas that are already developed. The proposed project would not contribute to cumulative impacts to migratory birds when other nearby projects are considered.

4.4.6 Bats

The pallid bat (*Antrozous pallidus*), a state species of special concern, is found at low elevations throughout California. This nocturnal species emerges approximately 30 to 60 minutes after sunset to hunt for food such as insects, spiders, and small mammals. Typically, pallid bats forage within 1 to 3 miles of their day roost. Day roosts are often found in caves, crevices, and buildings, and other tall structures that have access to open foraging areas. Night roosts can be found on natural and man-made structures, such as porches, that are in open areas. Pallid bats mate during late October through February. During early April, maternity colonies consisting of up to 100 individuals form. During this time, males may roost separately or in the nursery colony (Zeiner *et al.* 1990). There are no CNDDB records within 5 miles of the BSA.

The Townsend's big-eared bat (*Corynorhinus townsendii*) can be found throughout California in varying elevational ranges. The Townsend's big-eared bat is a nocturnal species that emerges at night to hunt small insects, such as moths and beetles. They are typically found in a mosaic of habitats that contain trees for cover and feed along habitat edges. This species is not known to move over far distances to hibernation sites. Of the 1,500 banded individuals that Pearson et al. (1952) tracked, the farthest distance traveled was 20 miles. Day roosts are often found in caves, crevices, and buildings, and other tall structures that have access to open foraging areas. Night roosts, or hibernation sites, tend to be cooler; while natal roosts are warmer (Zeiner *et al.* 1990).

There is one CNDDB record from 2005 within 5 miles of the project site, near Twin Peaks, San Francisco.

The WBWG Regional Priority Matrix shows the pallid bat and Townsend's big-eared bat as "high priority" species. The WBWG defines "high priority" bat species as species that are imperiled or in high risk of imperilment, and should be considered the highest priority for funding, planning, and conservation actions. "Medium priority" bat species are species of concern that warrant further evaluation, research, and conservation actions of both the species and potential threats (WBWG 2007).

4.4.6.1 Survey Results

No roosting bats or signs of roosting bats were found during reconnaissance surveys. Potential roosting bat sites are present in the trees and human-made structures that exist in the BSA.

4.4.6.2 Impacts of the Standard Project Alternative

Implementation of the Standard Project Alternative could result in the disturbance of suitable roosting and nesting sites for special-status and high priority bat species, specifically on the underside of bridges. Disruption of suitable roosting and nesting sites would potentially have a temporary negative effect on bats. Although the Standard Project Alternative would result in the partial demolition of the control tower and rehabilitation of the bridge, impacts to bats are not expected to occur with the implementation of the AMMs discussed below. As a result, there would be no long-term negative effect on bats.

It is not anticipated that noise or activity levels from construction activities will produce a recognizable increase in the amount of noise or activity currently experienced in the BSA. Therefore, if construction in the BSA occurs when bats are roosting, noise and increased activity would not be anticipated to disturb the bats in or adjacent to the BSA. Implementation of the AMM described above would prevent any additional disturbance of roosting bats. No permanent or temporary impacts to these species are anticipated because the project will not contribute to a permanent loss of roosting habitat, habitat fragmentation or a loss of suitable foraging habitat.

4.4.6.3 Impacts of the Partial Preservation Alternative

Implementation of the Partial Preservation Alternative could result in the disturbance of suitable roosting and nesting sites for special-status and high priority bat species, specifically on the underside of bridges. Disruption of suitable roosting and nesting sites would potentially have a temporary negative effect on bats. The control tower would be retained under this alternative, and impacts to bats are not expected to occur with the implementation of the AMMs discussed below. As a result, there would be no long-term negative effect on bats.

It is not anticipated that noise or activity levels from construction activities would produce a recognizable increase in the amount of noise or activity currently experienced in the BSA. Therefore, if construction in the BSA occurs when bats are roosting, noise and increased activity would not be anticipated to disturb the bats in or adjacent to the BSA. Implementation of the AMM described above would prevent any additional disturbance of roosting bats. No permanent or temporary impacts to these species are anticipated because this alternative would not contribute to a permanent loss of roosting habitat, habitat fragmentation or a loss of suitable foraging habitat.

4.4.6.4 Avoidance and Minimization Efforts

Disturbance of bats is of particular concern during the maternity roosting season (April 15 through August 31), when bats are likely to be raising young. The following AMM will be implemented to avoid and minimize potential adverse effects on special-status and high-priority bats.

1. No more than 3 days prior to the start of ground-disturbing activities, a qualified biologist will survey the trees and human-made structures in the BSA for evidence of bat roosts (e.g., bat guano). If bat roosts are found during preconstruction surveys, the roosts will be flagged and avoided during construction. To the extent possible, night work will be limited in areas where roosts are observed.
2. If roosts cannot be avoided during construction, exclusionary strategies will be developed through coordination with CDFW.

4.4.6.5 Compensatory Mitigation

No compensatory mitigation is proposed, because with the implementation of the AMMs, the project is not likely to permanently impact special-status and high-priority bats in the BSA.

4.4.6.6 Cumulative Impacts

The BSA is not known to contain any bat roosts. The proposed project will incorporate AMMs, including standard Caltrans BMPs (Measure #18), that will minimize disturbance to foraging areas and bat roosts that may be discovered during construction. Therefore, the project would not contribute to cumulative impacts to special-status and high-priority bats.

Chapter 5 Conclusions and Regulatory Determinations for the Proposed Project

5.1 Federal Endangered Species Act Summary

Caltrans initiates consultation with USFWS or NMFS when a project has the potential to affect a federally listed species and/or adversely modify designated critical habitat. Construction-related noise and in-water disturbance in the project's BSA may directly affect green sturgeon Southern DPS, and steelhead CCC DPS, species which are under the jurisdiction of NMFS. Additionally, the project may directly affect longfin smelt, a species for which NMFS has published a proposed rule to list. Informal consultation was conducted for a prior iteration of this project. In July of 2017, Caltrans received a letter of concurrence from NMFS that the project would not adversely affect green sturgeon Southern DPS and steelhead CCC DPS. NMFS also concurred that designated critical habitat for these species would not be adversely affected by the project. The project, as described above, has not been substantially revised in a way that would have any effects to FESA-listed species or their designated critical habitats that were not considered in the prior consultation. Therefore, Caltrans has determined that it will not be necessary to reinitiate consultation with NMFS for potential effects to FESA-listed species, although further coordination with NMFS may be needed if the ruling to list longfin smelt is finalized.

Green Sturgeon Southern DPS and Steelhead CCC DPS

No take is anticipated for these two species. Hydroacoustic impacts have been reduced by using pile piles to reinforce the bridge abutments, and by using vibratory methods when possible. There is no potential for fish entrapment, and water quality degradation has been minimized due to the proposed action's design and implementation of AMMs. Nominal temporary disturbances include underwater noise from the installation and removal of piles and, artificial lighting, localized turbidity, and the presence of construction divers and personnel on barges and rafts. These impacts are short in duration and temporary in nature. Long-term benefits include a net decrease of fill in the Bay, and the removal of creosote-treated piles. Therefore, NMFS has concurred that the proposed action **may affect, but is not likely to adversely affect, green sturgeon Southern DPS and steelhead CCC DPS** (NMFS 2017)**.**

Critical Habitat for Green Sturgeon Southern DPS and Steelhead CCC DPS

The BSA for the proposed action contains critical habitat for both green sturgeon and steelhead in tidally influenced waters. However, the PCEs of the critical habitat areas in the action area are marginal, as the action area is not part of a migratory pathway and is degraded by poor sediment quality and extensive modification of the channel. Potential temporary adverse effects to critical habitat for these species may include changes to local water quality due to turbidity, and

hydroacoustic impacts during pile installation, habitat disturbance during removal of the existing bridge fenders, and disturbance due to the presence of barges and divers. Barges used for construction access and support in the channel would remain in aquatic habitat for the entire duration of construction (approximately 18 to 24 months). Long-term benefits to critical habitat include a net decrease in fill and removal of creosote-treated piles.

Proposed AMMs include the limitation to the use of composite pile fenders, which would be installed via vibratory methods when possible; the use of turbidity curtains and debris containment systems; restrictions on night lighting; and the implementation of construction BMPs. NMFS has concurred (NMFS 2017) that, with the implementation of these AMMs, the proposed action **will not result in any adverse effects to critical habitat for the green sturgeon Southern DPS and Steelhead CCC DPS**.

5.2 Essential Fish Habitat Summary

The subtidal and intertidal areas in the project's BSA provide EFH as designated in three FMPs: Pacific Salmon FMP, Pacific Groundfish FMP, and Coastal Pelagic FMP. Additionally, San Francisco Bay is designated as an Estuarine HAPC in those FMPs. HAPC are described in the regulations as subsets of EFH that are rare; particularly susceptible to human-induced degradation, especially ecologically important; or located in an environmentally stressed area.

Potential temporary disturbance to EFH may include changes to local water quality due to turbidity and hydroacoustic impacts during pile installation; the lack of access to habitat during removal of the existing bridge fenders; and disruption due to the presence of barges and divers. Barges used for construction access and support in the channel would remain in aquatic habitat for the entire duration of construction (approximately 18 to 24 months). The proposed project would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate. Minor permanent changes to EFH are anticipated as a result of piles installed for the new navigational dolphins. With implementation of project AMMs and construction BMPs, the proposed project may adversely affect EFH; such effects are expected to be minor and would not substantially alter the value of EFH in the BSA (NMFS 2017)**.**

The AMMs listed in Section 1.3.2 that will provide protection of EFH include worker environmental awareness training (Measure #5), the use of a vibratory pile-driver when possible (Measure #6), the use of turbidity curtains and divers to minimize turbidity and the use of debris containment structures (Measure #10 and #20), construction practices to prevent concrete leaks (Measure #19), restrictions for night lighting (Measure #13), implementation of staging area restrictions (Measure #14), implementation of Caltrans standard BMPs (Measure #18), and proper storage of concrete waste and stockpiles (Measure #19).

5.3 Marine Mammal Protection Act

The MMPA protects all marine mammals; and the take of marine mammals, with certain exceptions, is prohibited under the MMPA. The channel supports marginal habitat for marine mammal foraging due to channel engineering and excavation and historical industrial use of the channel. However, because of the proximity to San Francisco Bay, there is potential for harbor porpoise, Pacific harbor seal and California sea lion to infrequently occur. Either an IHA or Letter of Authorization could be required for this project and is at the discretion of NMFS once project information is received. Possible consultation with NOAA/NMFS regarding marine mammal safety is considered under AMMs, Measure #7.

5.4 California Endangered Species Act Consultation Summary

Construction noise could indirectly affect special-status species that may occur in the area; however, this impact would not result in take of these species, as defined by CESA. Construction-related noise and in-water disturbance has a low possibility to have a behavioral effect on migrant or foraging longfin smelt that may enter the channel. There is no suitable spawning habitat in the BSA. An Incidental Take Permit under CESA from CDFW is not anticipated.

The AMMs and BMPs that will provide protection of longfin smelt are the same as those presented in Section 5.1 for FESA-listed species and EFH.

5.5 Section 10 and Section 404 Wetlands and Other Waters Coordination Summary

A total of 14.55 acres of potential waters of the U.S. was identified in the BSA, of which 0.28 acre is potential jurisdictional wetlands, and 14.27 acres are potential jurisdictional OWUS. The project would result in a net decrease in fill of waters of the U.S. and temporary fill of 2.30 acres, due to the presence of construction barges. These impacts would be temporary and there will be no permanent fill of wetlands.

Rehabilitation of Islais Creek Bridge would affect wetland and non-wetland waters of the U.S. as defined under Section 404 of the CWA. As a result, the project would require one or more permits from the USACE pursuant to Section 404 of the CWA and Section 9 of the Rivers and Harbors Act; and a Water Quality Certification from the San Francisco Bay RWQCB, pursuant to Section 401 of the CWA.

The definition of ‘stream’ under the CFGC does not include tidal sloughs or other tidally influenced areas. Therefore, the channel, as a tidal water, does not fall under the jurisdiction of CFGC Section 1602.

5.6 United States Coast Guard

The channel is a USCG-regulated navigable waterway. Proactive coordination with USCG is necessary in the project design and configuration to maintain navigable waters during construction duration. A permit would be required from USCG before construction is approved.

5.7 San Francisco Bay Conservation and Development Commission

Waters under the jurisdiction of the BCDC include all waters up to MHW or the inland edge of marsh vegetation, up to 5 feet above MSL, in areas of tidal marsh. In the BSA, there are 14.55 acres of water under the jurisdiction of BCDC. The project would result in a net decrease in permanent fill and a temporary fill of 2.30 acres of waters under BCDC jurisdiction. The new bridge would also be wider, resulting in a net increase in overwater structure of approximately 1,710 square feet. A BCDC permit will be required because project activities take place in the agency's jurisdiction. Environmental staff will attend meetings with the BCDC to discuss potential project effects and BCDC permitting requirements.

5.8 Migratory Bird Treaty Act

Migratory birds and their occupied nests are protected by the MBTA (16 United States Code [USC] Section 703 Supp. I 1989). This applies to all wild birds except the house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), and some game species. The MBTA specifically prohibits the take of birds or bird nests. "Take" is defined in 50 CFR 10.12 as means to pursue or attempt to pursue to hunt, shoot, wound, kill, trap, capture, or collect. Only "collect" applies to nests. Executive Order 13186, issued on January 1, 2001, also requires that any project with federal involvement address impacts to federal actions on migratory birds. The project will comply with the MBTA through the proposed AMMs described in Section 1.3.2.

5.9 Invasive Species

The intent of Executive Order 13112, Invasive Species, is "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause." To reduce the likelihood of introduction of invasive species, soil and plant material from areas that support invasive species will not be disposed of in areas that support native vegetation. The project will comply with the Executive Order through the proposed AMMs described in Section 1.3.2.

Chapter 6 Conclusions and Regulatory Determinations for the Partial Preservation Alternative

6.1 Federal Endangered Species Act Summary

Caltrans initiates consultation with USFWS or NMFS when a project has the potential to affect a federally listed species and/or adversely modify designated critical habitat. Construction-related noise and in-water disturbance in the project's BSA may directly affect green sturgeon Southern DPS, and steelhead CCC DPS, species which are under the jurisdiction of NMFS. Additionally, the project may directly affect longfin smelt, a species for which NMFS has published a proposed rule to list. Since this alternative would require construction of a cofferdam and dewatering, the informal consultation that was conducted for a prior iteration of this project is not expected to be sufficient since dewatering may require capture and relocation of ESA-listed species. Therefore, Caltrans has determined that it would be necessary to reinitiate consultation with NMFS for potential effects to FESA-listed prior to the implementation of this alternative.

Green Sturgeon Southern DPS and Steelhead CCC DPS

Hydroacoustic impacts have been reduced by using CIDH piles, and by using vibratory methods when possible. Water quality degradation has been minimized due to the design and implementation of AMMs under this alternative. Nominal temporary disturbances include underwater noise from the installation and removal of piles and borings for the CIDH piles, artificial lighting, localized turbidity, and the presence of construction divers and personnel on barges and rafts. These impacts are short in duration and temporary in nature. Long-term benefits include the removal of creosote-treated piles, but this alternative would result in a net increase of fill, removing a small area of estuarine habitat from the BSA. Construction and dewatering of the cofferdam needed for this alternative has the potential to entrap fish, which could result in take of green sturgeon, if they are present. Further consultation with NMFS would be needed for this alternative.

Critical Habitat for Green Sturgeon Southern DPS and Steelhead CCC DPS

The BSA for the proposed action contains critical habitat for both green sturgeon and steelhead in tidally influenced waters. However, the PCEs of the critical habitat areas in the action area are marginal, as the action area is not part of a migratory pathway and is degraded by poor sediment quality and extensive modification of the channel. Potential temporary adverse effects to critical habitat for these species may include changes to local water quality due to turbidity, and hydroacoustic impacts during pile installation, habitat disturbance during removal of the existing bridge fenders, and disturbance due to the presence of barges and divers. Barges used for construction access and support in the channel would remain in aquatic habitat for the entire

duration of construction (approximately 18 to 24 months). Long-term benefits to critical habitat include the removal of creosote-treated piles, but this alternative would result in a net increase of fill, removing a small area of estuarine habitat from the BSA.

Proposed AMMs include the limitation to the use of composite pile fenders, which would be installed via vibratory methods when possible; the use of turbidity curtains and debris containment systems; restrictions on night lighting; and the implementation of construction BMPs. Construction and dewatering of the cofferdam needed for this alternative has the potential to entrap fish, which could result in take of green sturgeon, if they are present. Further consultation with NMFS would be needed for this alternative**.**

6.2 Essential Fish Habitat Summary

The subtidal and intertidal areas in the project's BSA provide EFH as designated in three FMPs: Pacific Salmon FMP, Pacific Groundfish FMP, and Coastal Pelagic FMP. Additionally, San Francisco Bay is designated as an Estuarine HAPC in those FMPs. HAPC are described in the regulations as subsets of EFH that are rare; particularly susceptible to human-induced degradation, especially ecologically important; or located in an environmentally stressed area.

Potential temporary disturbance to EFH may include changes to local water quality due to turbidity and hydroacoustic impacts during pile installation; the lack of access to habitat during removal of the existing bridge fenders and use of a cofferdam for retrofit of the control tower foundation; and disruption due to the presence of barges and divers. Barges used for construction access and support in the channel would remain in aquatic habitat for the entire duration of construction (approximately 18 to 24 months). This alternative would result in the removal of creosote-treated wood, which is known to leach contaminants into the surrounding water and substrate, but would also permanently fill a small area of estuarine habitat in the BSA. Minor permanent changes to EFH are anticipated as a result of piles installed for the new navigational dolphins and installation of concrete structures for the control tower retrofit. With implementation of project AMMs and construction BMPs, the proposed project may adversely affect EFH; such effects are expected to be minor and would not substantially alter the value of EFH in the BSA (NMFS 2017)**.**

The AMMs listed in Section 1.3.2 that will provide protection of EFH include worker environmental awareness training (Measure #5), the use of a vibratory pile-driver when possible (Measure #6), the use of turbidity curtains and divers to minimize turbidity and the use of debris containment structures (Measure #10 and #20), construction practices to prevent concrete leaks (Measure #19), restrictions for night lighting (Measure #13), implementation of staging area

restrictions (Measure #14), implementation of Caltrans standard BMPs (Measure #18), and proper storage of concrete waste and stockpiles (Measure #19).

6.3 Marine Mammal Protection Act

The MMPA protects all marine mammals; and the take of marine mammals, with certain exceptions, is prohibited under the MMPA. The channel supports marginal habitat for marine mammal foraging due to channel engineering and excavation and historical industrial use of the channel. However, because of the proximity to San Francisco Bay, there is potential for harbor porpoise, Pacific harbor seal and California sea lion to infrequently occur. Either an IHA or Letter of Authorization could be required for this project and is at the discretion of NMFS once project information is received. Possible consultation with NOAA/NMFS regarding marine mammal safety is considered under AMMs, Measure #7.

6.4 California Endangered Species Act Consultation Summary

Construction noise could indirectly affect special-status species that may occur in the area; however, this impact would not result in take of these species, as defined by CESA. Construction-related noise and in-water disturbance has a low possibility to have a behavioral effect on migrant or foraging longfin smelt that may enter the channel. There is no suitable spawning habitat in the BSA. An Incidental Take Permit under CESA from CDFW is not anticipated.

The AMMs and BMPs that will provide protection of longfin smelt are the same as those presented in Section 5.1 for FESA-listed species and EFH.

6.5 Section 10 and Section 404 Wetlands and Other Waters Coordination Summary

A total of 14.55 acres of potential waters of the U.S. was identified in the BSA, of which 0.28 acre is potential jurisdictional wetlands, and 14.27 acres are potential jurisdictional OWUS. Implementation of this alternative would result in a small (0.01 acres) net increase in permanent fill of waters of the U.S. and temporary fill of 2.32 acres, due to the presence of construction barges and temporary cofferdam.

Rehabilitation of Islais Creek Bridge would affect wetland and non-wetland waters of the U.S. as defined under Section 404 of the CWA. As a result, the project will require one or more permits from the USACE pursuant to Section 404 of the CWA and Section 9 of the Rivers and Harbors Act; and a Water Quality Certification from the San Francisco Bay RWQCB, pursuant to Section 401 of the CWA.

The definition of 'stream' under the CFGC does not include tidal sloughs or other tidally influenced areas. Therefore, the channel, as a tidal water, does not fall under the jurisdiction of CFGC Section 1602.

6.6 United States Coast Guard

The channel is a USCG-regulated navigable waterway. Proactive coordination with USCG is necessary in the project design and configuration to maintain navigable waters during construction duration. A permit will be required from USCG before construction is approved.

6.7 San Francisco Bay Conservation and Development Commission

Waters under the jurisdiction of the BCDC include all waters up to MHW or the inland edge of marsh vegetation, up to 5 feet above MSL, in areas of tidal marsh. In the BSA, there are 14.55 acres of water under the jurisdiction of BCDC. The project would result in a net decrease in permanent fill and a temporary fill of 2.30 acres of waters under BCDC jurisdiction. The new bridge would also be wider, resulting in a net increase in overwater structure of approximately 1,710 square feet. A BCDC permit will be required because project activities take place in the agency's jurisdiction. Environmental staff will attend meetings with the BCDC to discuss potential project effects and BCDC permitting requirements.

6.8 Migratory Bird Treaty Act

Migratory birds and their occupied nests are protected by the MBTA (16 United States Code [USC] Section 703 Supp. I 1989). This applies to all wild birds except the house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), and some game species. The MBTA specifically prohibits the take of birds or bird nests. "Take" is defined in 50 CFR 10.12 as means to pursue or attempt to pursue to hunt, shoot, wound, kill, trap, capture, or collect. Only "collect" applies to nests. Executive Order 13186, issued on January 1, 2001, also requires that any project with federal involvement address impacts to federal actions on migratory birds. The project will comply with the MBTA through the proposed AMMs described in Section 1.3.2.

6.9 Invasive Species

The intent of Executive Order 13112, Invasive Species, is "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause." To reduce the likelihood of introduction of invasive species, soil and plant material from areas that support invasive species will not be disposed of in areas that support native vegetation. The project will comply with the Executive Order through the proposed AMMs described in Section 1.3.2.

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Appendix A Photographs of the BSA

Photos 1 and 2: Corrosion Under the Bridge Deck Corrosion and Concrete Cracks in Bridge Deck

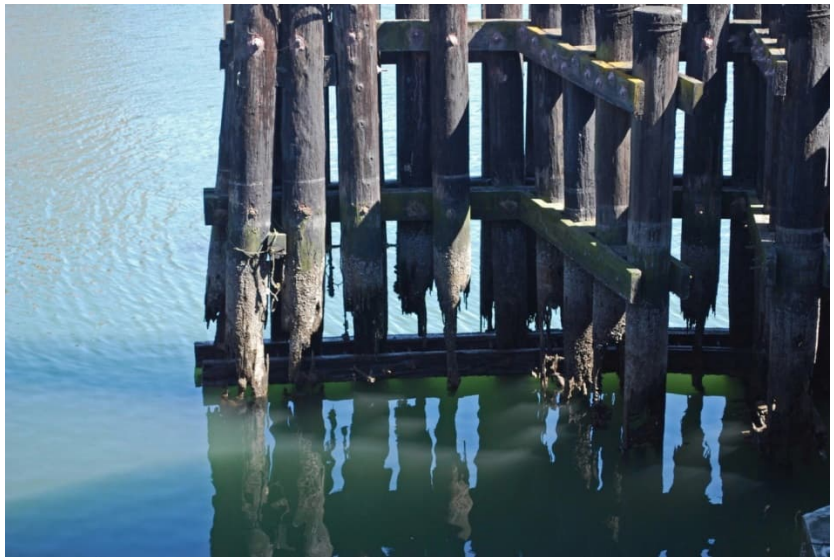


Photo 3: Damaged Fender Piles

Photo 4: Taken from Islais Landing, to the southwest of the Bridge, looking east.

Photo 5: Ornamental Tree (*Pittosporum* sp.) Landscape Along Third Street.

Photo 6: View of Islais Creek Shoreline Access Park, taken from Islais Landing, southeast of the bridge, looking northwest.

Photo 7: Northeastern side of bridge, west/southwest aspect (mudflat inundated during high tide). Taken in the vicinity of Tulare Park.

Photo 8: Northeastern side of bridge, western aspect (mudflat during low tide).

Photo 9: Southwestern side of bridge during high tide, northeastern aspect.

Photo 10: Tidal wetlands on southwestern side of bridge during high tide, northern aspect.

Photo 11: Tidal wetlands on southwestern side of bridge during high tide, northern aspect.

Photo 12: Southeastern side of bridge during high tide, northern aspect.

Photo 13: Northwestern side of bridge during low tide, northern aspect.

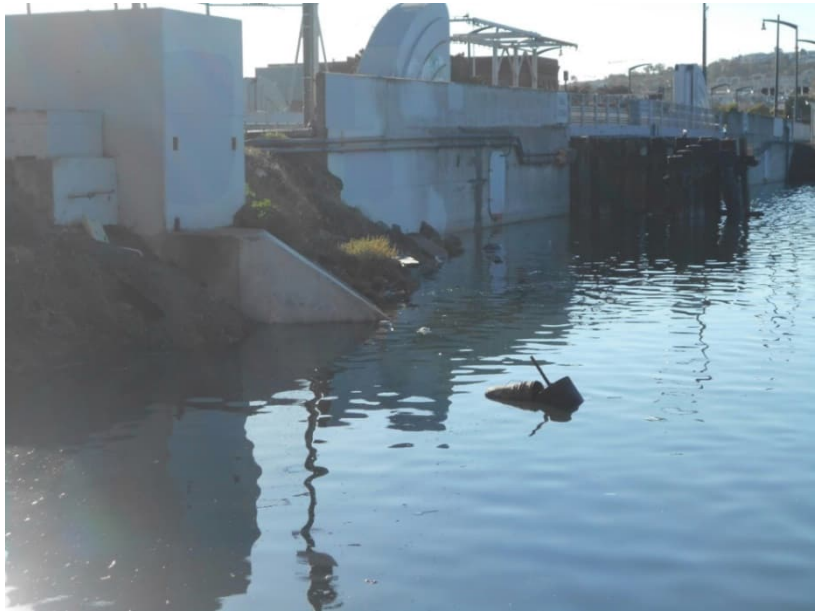


Photo 14: Northwestern side of bridge, southeastern aspect.

Appendix B Laws and Regulations

Federal Laws and Regulations

The National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] § 4321) requires the consideration of environmental impacts of proposed federal agency actions, including the issuance of permits or approval of funding. NEPA declares a continuing federal policy "to use all practicable means and measures...to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations." "NEPA directs a systematic, interdisciplinary approach" to planning and decision making and requires environmental statements for "major federal actions significantly affecting the quality of the human environment." Implementing regulations by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] Parts 1500-1508) requires federal agencies to identify and assess reasonable alternatives to proposed actions that would restore and enhance the quality of the human environment, and avoid or minimize adverse environmental impacts. Federal agencies are further directed to emphasize significant environmental issues in project planning, and to integrate impact studies required by other environmental laws and Executive Orders into the NEPA process. The NEPA process should therefore be seen as an overall framework for the environmental evaluation of federal actions.

Endangered Species Act of 1973 (16 USC 1531-1543). The Federal Endangered Species Act (FESA) and subsequent amendments provide guidance for the conservation of endangered and threatened species, and the ecosystems on which they depend. FESA and its implementing regulations prohibit the take of any fish or wildlife species that is federally listed as Threatened or Endangered without prior approval pursuant to either Section 7 or Section 10 of the FESA. FESA defines "take" as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Section 7 requires federal agencies, in consultation with, and with the assistance of the Secretary of the Interior or the Secretary of Commerce, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. The USFWS and NOAA Fisheries share responsibilities for administering the Act. Regulations governing interagency cooperation under Section 7 are found at 50 CFR Part 402. The opinion issued at the conclusion of consultation will include a statement authorizing take that may occur incidental to an otherwise legal activity.

Section 9 lists those actions that are prohibited under the FESA. Take of a species listed in accordance with the FESA is prohibited. There are two processes whereby take is allowed when it is incidental to an otherwise legal activity.

Section 10 is the review process for nonfederal projects that do not have to comply with Section 7 of FESA but still need to avoid take of listed species. Under this process, these project proponents are issued either an incidental take permit or develop a habitat conservation plan (HCP).

Migratory Bird Treaty Act (16 USC 703-711). This treaty with Canada, Russia, Mexico, and Japan makes it unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, or kill migratory birds. The law applies to the removal of nests (such as swallow nests on bridges) occupied by migratory birds during the breeding season. The USFWS administers the MBTA. All native species of birds are protected during active nesting. The protection extends to the adult birds and nest contents, including eggs and nestlings. Non-native bird species are not provided protection by the MBTA.

Clean Water Act (33 USC 1251-1376). The Clean Water Act (CWA) provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters.

Section 401 requires that an applicant for a federal license or permit that allows activities resulting in a discharge to waters of the U.S. must obtain a state certification that the discharge complies with other provisions of the CWA. The Regional Water Quality Control Board (RWQCB) administers the certification program in California. Section 402 establishes a permitting system for the discharge of any pollutant (except dredge or fill material) into waters of the U.S.

Section 404 establishes a permit program administered by the U.S. Army Corps of Engineers (USACE) regulating the discharge of dredged or fill material into waters of the U.S. (including wetlands). Implementing regulations by the USACE are found at 33 CFR Parts 320-330. Guidelines for implementation are referred to as Section 404 (b)(1). These guidelines and were developed by the United States Environmental Protection Agency, in conjunction with the USACE (40 CFR Parts 230). The Guidelines allow the discharge of dredged or fill material into the aquatic system only if there is no practicable alternative that would have fewer adverse impacts.

Section 9 Rivers and Harbors Appropriate Act of 1899 (33 USC § 403). Prior to Section 404 of the CWA, USACE jurisdiction was limited to navigable waters subject to Section 9 of the

Rivers and Harbors Appropriation Act. USACE continues to oversee Section 9, which regulates activities affecting "navigable waters of the United States" and are defined as "...those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water mark (MHW) and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce (33 USC § 403)." Section 9 jurisdiction extends to MHW, and includes tidal areas currently subject to tidal influence, as well as unfilled areas currently behind levees that were historically below MHW. MHW is the average of all high tides. It is typically determined from the nearest tide level station and then surveyed in the field from a benchmark of known elevation.

Fish and Wildlife Coordination Act (16 USC 661-666). This act applies to any federal project where the waters of any stream or other body of water are impounded, diverted, deepened, or otherwise modified. Project proponents are required to consult with USFWS and the appropriate state wildlife agency. These agencies prepare reports and recommendations that document project effects on wildlife and identify measures that may be adopted to prevent loss or damage to wildlife resources. The term “wildlife” includes both animals and plants. Provisions of the Act are implemented through the NEPA process and Section 404 permit process.

Magnuson-Stevens Fishery Conservation and Management Act (PL 194-297). The Fishery Conservation and Management Act (MSA) of 1976 (16 U.S.C. 1801 et seq.) was amended in 1996 and renamed the Magnuson-Stevens Fishery Conservation Management Act. The amended portion addresses substantially reduced fish stocks that declined as a result of direct and indirect habitat loss. Major provisions include the following: the MSA requires national fishery conservation and management standards to provide for the sustained participation of fishery-dependent communities; modifies operation of established Fishery Management Councils; mandates that the Secretary of Commerce shall take actions to identify overfished species and take action to rebuild those stocks; and mandates the Secretary of Commerce to promulgate guidelines for identification of essential fish habitat by Fishery Management Councils. Other federal agencies are required to consult with the Secretary when actions they take impact designated essential fish habitat.

The Marine Mammal Protection Act of 1972 (MMPA) (16 USC Chapter 31) protects all marine mammals. The take of marine mammals, with certain exceptions, is prohibited under the MMPA. The MMPA authorizes incidental take of a small number of marine mammals during specific activities. There are two types of incidental take authorizations: Incidental Harassment Authorization (IHA), and Letter of Authorization (LOA). The type of authorization is based on the potential effect on marine mammals (harassment, injury, mortality) and the duration of the project.

Executive Order 13112 – Invasive Species (64 CFR 6183) establishes a national policy to prevent the introduction of invasive species and provide for their control; as well as to minimize the economic, ecological, and human health impacts that invasive species cause. Federal agencies whose actions may affect the status of invasive species are to identify such actions, use relevant programs, such as budgetary constraints permit, to: (a) prevent introductions of invasive species; (b) detect and control populations of such species; (c) monitor populations of invasive species; (d) provide for restoration of native species; (e) conduct research leading to prevention of introductions and more effective control measures; and (f) promote public education on invasive species.

Executive Order 11990 – Protection of Wetlands was designed to protect wetlands and minimize adverse impacts associated with the destruction of wetlands. It requires all projects with a federal nexus to avoid construction in wetlands unless there is no alternative, or the construction is designed in such a way that it includes all practicable measures to minimize impacts to wetlands.

State Laws and Regulations

California Environmental Quality Act (CEQA) (P.R.C. 21000 et seq.). CEQA establishes state policy to prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures. CEQA applies to actions directly undertaken, financed, or permitted by state lead agencies. Regulations for implementation are found in the state CEQA Guidelines published by the Resources Agency. These guidelines establish an overall process for the environmental evaluation of projects that is similar to that promulgated under NEPA. The Guidelines make provisions for joint NEPA/CEQA documents.

The California Endangered Species Act (CESA) generally parallels the main provisions of the FESA, but extends the take prohibitions to species proposed for listing. Sections 2080 and 2081 of California Fish and Game Code (CFGC) prohibit the take (defined as hunting, pursuing, catching, capturing, or killing) of Endangered, Threatened, or candidate species unless otherwise authorized by permit. CESA allows for take incidental to otherwise lawful development projects except for those species listed as Fully Protected. State lead agencies are required to consult with CDFW to ensure that any action they undertake is not likely to jeopardize the continued existence of any listed or candidate species or result in destruction or adverse modification of essential habitat.

The Native Plant Protection Act (NPPA) of 1977 (CFGC § 1 900 – 1913) includes provisions that prohibit the taking and possession of plants from the wild, and a salvage requirement for landowners and project proponents who may encounter rare plants during the course of

implementing a project that may impact those species. If a landowner has been informed of a listed plant species on his property, CDFW must be notified at least 10 days in advance of any land use change that might affect the species or its habitat, thereby affording CDFW an opportunity to conduct a salvage operation. Candidate species are also protected from taking by the NPPA. CDFW has demonstrated a general policy of regarding many of the plants on the California Native Plant Society's (CNPS) Lists 1 and 2 as meeting the definitions of Chapter 10, Section 1901 of the NPPA. Therefore, those plants also qualify for protection under CEQA.

California Fish and Game Code Sections 1602. Under these sections of the CFGC, the project sponsor and other agencies are required to notify CDFW prior to any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. Preliminary notification and project review generally occurs during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, CDFW is required to propose reasonable project changes to protect the resource. These modifications are formalized in a Streambed Alteration Agreement that becomes part of the plans, specifications, and bid documents for the project.

Porter-Cologne Water Quality Control Act of 1969. Under Porter-Cologne, the RWQCBs have jurisdiction over state water quality permitting activities. The Act specifies water quality provisions and discharge requirements for regulating the discharge of waste that could affect the quality of state waters. Under the act, the State Water Resources Control Board has the ultimate authority over state water rights and water quality policy. However, the appropriate RWQCB is tasked with setting waste discharge requirements (WDRs) for projects and for updating basin plans (water quality control plans) for protected waters of the State. Waters of the State are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state (Water Code Section 13050(e)) which include all waters within the state's boundaries, whether private or public, including waters in both natural and artificial channels."

McAteer-Petris Act preserves San Francisco Bay from indiscriminate filling and established the San Francisco Bay Conservation and Development Commission (BCDC).

California Fish and Game Code (CFGC) Sections 3503–3505, 3513, 3800, and 4150 make unlawful the take or possession of all migratory non-game birds and their nests. The majority of birds and mammals are protected under the CFGC. Section 4150 states that all non-game mammals or parts thereof may not be taken or possessed except as provided otherwise in the code or in accordance with regulations adopted by CDFW. Activities resulting in mortality of non-game mammals or disturbances that cause the loss of maternity colonies of bats may be considered "take" by CDFW.

California Fully Protected Species CFGC Sections 3511, 4700, 5050, and 5515 is the state's first attempt to identify and provide additional protection to those animals that were considered rare or faced possible extinction. Lists were created for fish, mammals, birds, amphibians, and reptiles. However, this listing/review process was not as rigorous as required under CESA, and a number of Fully Protected Species in California are actually fairly common. Fully Protected Species may not be taken or possessed at any time, and no licenses or permits may be issued for their take except for collection associated with scientific research and relocation of bird species to protect livestock. Under the state definition, "take" is an action that directly or indirectly kills species. The state definition does not include the terms "harass" and "harm," as does the FESA take definition.

California Fish and Game Code Sections 8550–8559 require that herring may be taken for commercial purposes only under a permit, subject to regulations adopted by the Fish and Game Commission. The Commission may, whenever necessary to prevent overuse, to ensure efficient and economic operation of the fishery, or to otherwise carry out this article, limit the total number of permits that are issued and the amount of herring that may be taken under the permits. The Commission, in limiting the total number of permits, will take into consideration any restriction of the fishing area and the safety of others, who, for purposes other than fishing, use the waters from which herring are taken.

State Senate Bill 857 (Fish Passages) (Streets and Highways Code [SHC] Article 3.5) requires an assessment for potential barriers to fish passage for any repair or construction project using state or federal transportation funds that affects a stream crossing on a stream where anadromous fish are, or historically were, found. In addition, the statute requires related actions to systematically review and remediate barriers to fish passage related to transportation projects.

Bay Area Conservation and Development Commission (BCDC) was created by the legislature in 1965. The Commission's jurisdiction includes the open water, marshes, and mudflats of greater San Francisco Bay; the first 100 feet inland from the shoreline around San Francisco Bay; and portions of most creeks, rivers, sloughs, and other tributaries that flow into San Francisco Bay. A BCDC permit is needed prior to placing solid material, new or repaired docks, pile-supported or cantilevered structures in San Francisco Bay or certain tributaries that flow into the Bay; and or before constructing, remodeling, or repairing a structure.

Local Laws and Regulations

California Department of Transportation (Caltrans) Policies

Transportation projects are planned and constructed to avoid or minimize impacts to biological resources whenever practicable.

Caltrans evaluates and plans for mitigation of adverse impacts to natural resources during the early stages of transportation planning and decision making.

Caltrans works closely with resource agencies and Federal Highway Administration (FHWA) in the development and implementation of mitigation for project impacts necessary to satisfy state and federal laws while ensuring that mitigation necessitated by impacts to sensitive resources is a reasonable expenditure of highway funds.

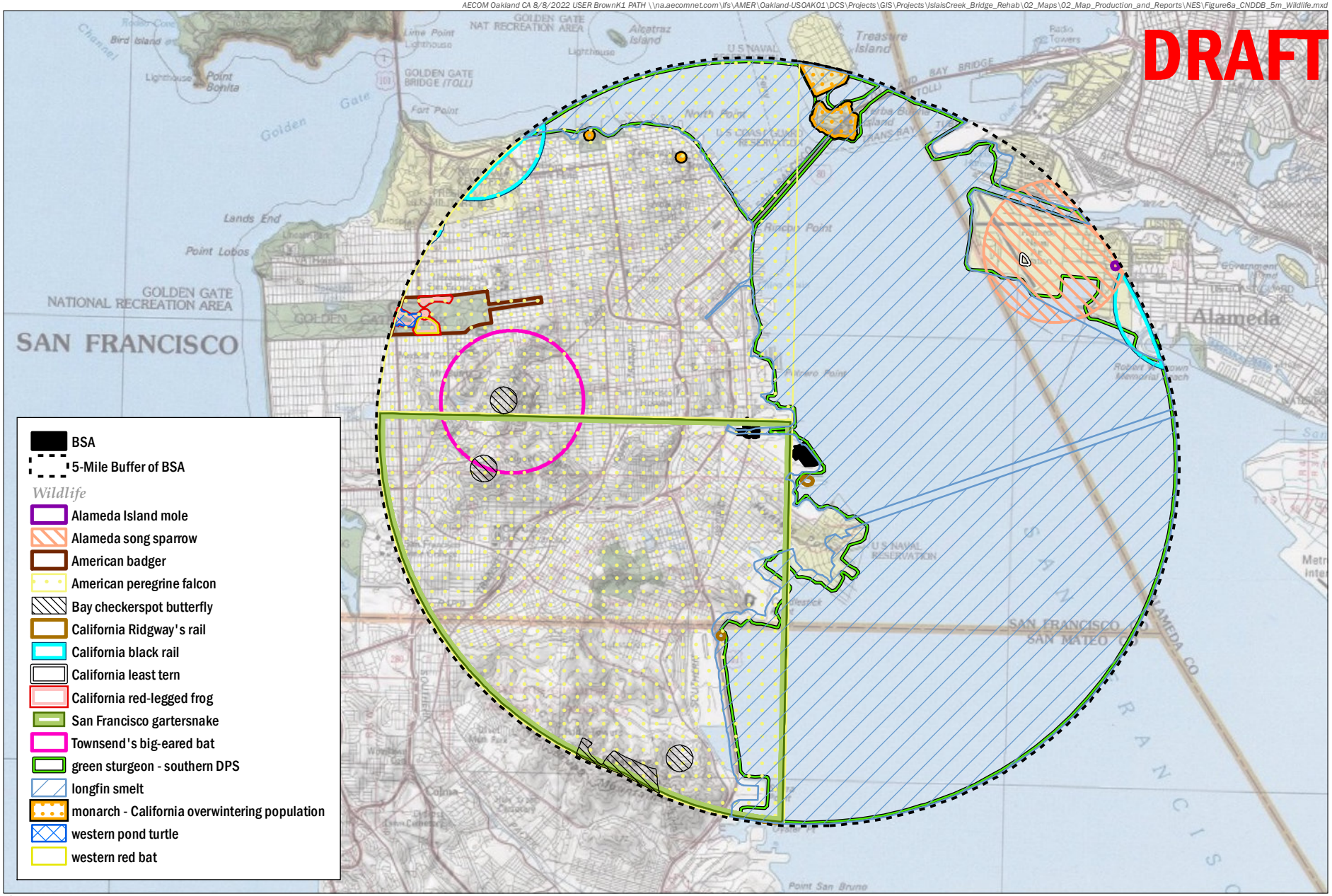
If impact avoidance is not possible, the first consideration is to minimize impacts on site.

If on-site mitigation is not practical, off-site compensation may be required. Off-site mitigation may include land acquisition and habitat improvement.

Federal Highway Administration Policies

Designation of Non-federal Representative (50 CFR Section 402.08) allows federal agencies to delegate Informal Consultation and preparation of biological studies to a non-federal representative. The FHWA has previously delegated Informal Consultation for projects funded by the federal-aid highway program to Caltrans (by letter to the USFWS and National Marine Fisheries Service dated August 7, 1986). This delegation of authority provides for the project sponsor to perform certain aspects of consultation, acting on behalf of the FHWA for FESA consultation, and cannot be further delegated to local agencies or their consultants.

Appendix C Complete CNDDB-Documented Occurrences



Source: CNDDB 5/2022; USGS, 2012

AECOM

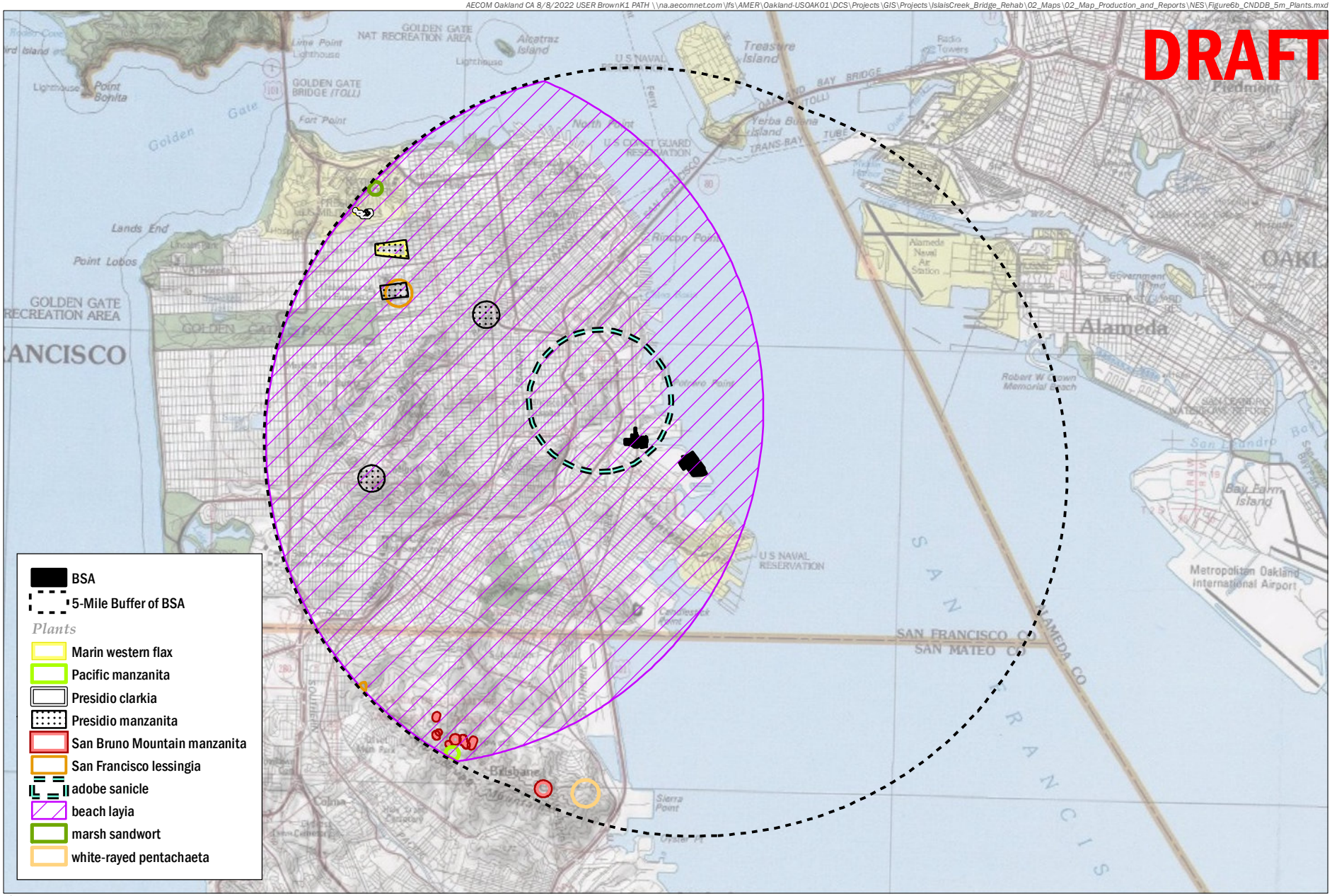
San Francisco Public Works

Islais Creek Bridge Replacement Project

FEDERAL PROJECT NO. BRLO-5934 (168)

Appendix C-1

CNDDB Wildlife Occurrences within 5 miles of the Biological Study Area



Source: CNDDB 5/2022; USGS, 2012

AECOM

San Francisco Public Works

Islais Creek Bridge Replacement Project

FEDERAL PROJECT NO. BRLO-5934 (168)

Appendix C-2

CNDDB Plant Occurrences within 5 miles of the Biological Study Area

Appendix D-1 and D-2 USFWS Species Letter and Official NMFS Species List

Pecora, David

From: Pecora, David
Sent: Wednesday, March 29, 2023 5:35 PM
To: NMFS SpeciesList - NOAA Service Account
Subject: Species List for Islais Creek Bridge Rehabilitation Project

Federal Agency: Federal Highway Administration – California Division
Federal Agency Address: 650 Capitol Mall, Suite 4-100, Sacramento, CA 95814-4708
Non-Federal Agency Representative: California Department of Transportation
Non-Federal Agency Address: Caltrans District 04, 111 Grand Ave, Oakland, CA 94612
Non-federal agency conducting biological studies: AECOM, 300 Lakeside Drive, Suite 400, Oakland, CA 94612, USA
Point of contact: David Pecora, Sr Biologist at AECOM, 973-525-9976, david.pecora@aecom.com
Project Name: Islais Creek Bridge Rehabilitation Project

Quad Name **San Francisco South**
Quad Number **37122-F4**

ESA Anadromous Fish

SONCC Coho ESU (T) -
CCC Coho ESU (E) - **X**
CC Chinook Salmon ESU (T) -
CVSR Chinook Salmon ESU (T) -
SRWR Chinook Salmon ESU (E) -
NC Steelhead DPS (T) -
CCC Steelhead DPS (T) - **X**
SCCC Steelhead DPS (T) -
SC Steelhead DPS (E) -
CCV Steelhead DPS (T) -
Eulachon (T) -
sDPS Green Sturgeon (T) - **X**

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat -
CCC Coho Critical Habitat - **X**
CC Chinook Salmon Critical Habitat -
CVSR Chinook Salmon Critical Habitat -
SRWR Chinook Salmon Critical Habitat -
NC Steelhead Critical Habitat -
CCC Steelhead Critical Habitat -
SCCC Steelhead Critical Habitat -

SC Steelhead Critical Habitat -
CCV Steelhead Critical Habitat -
Eulachon Critical Habitat -
sDPS Green Sturgeon Critical Habitat - X

ESA Marine Invertebrates

Range Black Abalone (E) - X
Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat - X

ESA Sea Turtles

East Pacific Green Sea Turtle (T) - X
Olive Ridley Sea Turtle (T/E) - X
Leatherback Sea Turtle (E) - X
North Pacific Loggerhead Sea Turtle (E) - X

ESA Whales

Blue Whale (E) - X
Fin Whale (E) - X
Humpback Whale (E) - X
Southern Resident Killer Whale (E) - X
North Pacific Right Whale (E) - X
Sei Whale (E) - X
Sperm Whale (E) - X

ESA Pinnipeds

Guadalupe Fur Seal (T) - X
Steller Sea Lion Critical Habitat -

Essential Fish Habitat

Coho EFH - X
Chinook Salmon EFH - X
Groundfish EFH - X
Coastal Pelagics EFH - X

Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds
See list at left and consult the NMFS Long Beach office
562-980-4000

MMPA Cetaceans - **X**

MMPA Pinnipeds - **X**

NOTE NEW PHONE # BELOW

David Pecora
he, him, his
Senior Biologist
973-525-9976
david.pecora@aecom.com

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To:
Project Code: 2022-0069396
Project Name: Islais Creek Bridge Replacement Project

March 30, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

PROJECT SUMMARY

Project Code: 2022-0069396
Project Name: Islais Creek Bridge Replacement Project
Project Type: Bridge - Replacement
Project Description: The Islais Creek Bridge is located along Third Street, a major arterial along an industrial area of the southern San Francisco waterfront. The bridge is approximately 1,700 feet east of Interstate 280 and approximately 3,300 feet west of the Bay. San Francisco Public Works (SFPW) proposes to replace the superstructure of the Islais Creek Bridge in accordance with California Department of Transportation (Caltrans) procedures. The project will improve approaches along Third Street, replace the bridge superstructure to bring the structure up to current seismic standards, reinforce the existing abutments, and upgrade bridge safety features. Construction duration is estimated to be approximately 18- to 24-months and is assumed to begin no sooner than spring 2025.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.7473931,-122.38715680723126,14z

Counties: San Francisco County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 18 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Salt Marsh Harvest Mouse *Reithrodontomys raviventris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/613	Endangered

BIRDS

NAME	STATUS
California Clapper Rail *Rallus longirostris obsoletus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4240	Endangered
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered
Marbled Murrelet *Brachyramphus marmoratus* Population: U.S.A. (CA, OR, WA) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Western Snowy Plover *Charadrius nivosus nivosus* Population: Pacific Coast population DPS-U.S.A. (CA, OR, WA), Mexico (within 50 miles of Pacific coast) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8035	Threatened

REPTILES

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: East Pacific DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
San Francisco Garter Snake *Thamnophis sirtalis tetrataenia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5956	Endangered

AMPHIBIANS

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened

FISHES

NAME	STATUS
Longfin Smelt *Spirinchus thaleichthys* Population: San Francisco Bay-Delta DPS No critical habitat has been designated for this species.	Proposed Endangered
Tidewater Goby *Eucyclogobius newberryi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/57	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
California Seablite *Suaeda californica*	Endangered
Population:	
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/6310	
Franciscan Manzanita *Arctostaphylos franciscana*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.	
Species profile: https://ecos.fws.gov/ecp/species/5350	
Presidio Manzanita *Arctostaphylos hookeri var. ravenii*	Endangered
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/7216	
Robust Spineflower *Chorizanthe robusta var. robusta*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.	
Species profile: https://ecos.fws.gov/ecp/species/9287	
San Francisco Lessingia *Lessingia germanorum (=L.g. var. germanorum)*	Endangered
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/8174	
Showy Indian Clover *Trifolium amoenum*	Endangered
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/6459	
White-rayed Pentachaeta *Pentachaeta bellidiflora*	Endangered
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/7782	

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPAC USER CONTACT INFORMATION

Agency: San Francisco city
Name: David Pecora
Address: 300 Lakeside Drive
Address Line 2: Suite 400
City: Oakland
State: CA
Zip: 94612
Email david.pecora@aecom.com
Phone: 9735259976

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration
Name: David Pecora
Email: mkpdppecora@gmail.com

Appendix E Vascular Plant List

Appendix E: Plant List

Plant Species Common Name	Scientific Name	Nativity	Cal-IPC Status	Wetland Indicator Status
Bailey's acacia	*Acacia baileyana*	Non-Native (planted)		NL
blackwood acacia	*Acacia melanoxylon*	Non-Native (planted)	Cal-IPC Limited	NL
golden wattle	*Acacia longifolia*	Non-Native (planted)		NL
California buckeye	*Aesculus californica*	Native (planted)		NL
yarrow	*Achillea millefolium*	Non-Native		FACU
African lily	*Agapanthus africanus*	Non-Native (planted)		NL
fat hen	*Atriplex patula*	Native		FACW
wild oats	*Avena* spp.	Non-Native	Cal-IPC Moderate	NL
coyote brush	*Baccharis pilularis*	Native (planted)		NL
black mustard	*Brassica nigra*	Non-Native	Cal-IPC Moderate	NL
bromes	*Bromus* sp.	Non-Native	Cal-IPC High	NL
bottlebrush	*Callistemon* sp.	Non-Native (planted)		NL
Italian thistle	*Carduus pycnocephalus*	Non-Native		NL
deerbrush	*Ceanothus* sp.	Native (planted)		NL
spotted sandmat	*Chamaesyce maculata*	Native		UPL
Bermuda grass	*Cynodon dactylon*	Non-Native	Cal-IPC Moderate	FACU
hairy crabgrass	*Digitaria sanguinalis*	Non-Native		FACU
saltgrass	*Distichlis spicata*	Native		FAC
Pride of Madeira	*Echium candicans*	Non-Native	Cal-IPC Limited	NL
storksbill	*Erodium* spp.	Non-Native		NL
blue bunchgrass	*Festuca idahoensis*	Native (planted)		FACU
Italian rye grass	*Festuca perennis*	Non-Native	Cal-IPC Moderate	NL
fennel	*Foeniculum vulgare*	Non-Native	Cal-IPC High	NL
marsh gumplant	*Grindelia stricta*	Native		FACW
Crete weed	*Hedypnois cretica*	Non-Native		NL
Monterey cypress	*Hesperocyparis macrocarpa*	Native		NL
chaparral yucca	*Hesperoyucca whipplei*	Native (Planted)		NL

Plant Species Common Name	Scientific Name	Nativity	Cal-IPC Status	Wetland Indicator Status
toyon	*Heteromeles arbutifolia*	Native (Planted)		NL
seaside barley	*Hordeum marinum*	Non-Native	Cal-IPC Moderate	FAC
iris	*Iris* sp.	Non-Native (Planted)		NL
prairie junegrass	*Koeleria cristata*	Native		NL
sweet alyssum	*Lobularia maritima*	Non-Native	Cal-IPC Limited	NL
Brisbane box	*Lophostemon confertus*	Non-Native (planted)		NL
dwarf mallow	*Malva neglecta*	Non-Native		NL
bushmallow	*Malacothamnus* sp.	Native		NL
pink melaleuca	*Melaleuca nesophila*	Non-Native (planted)		NL
broad-leaved paperbark	*Melaleuca quinquenervia*	Non-Native (planted)		NL
sourgrass	*Oxalis pes-caprae*	Non-Native	Cal-IPC Moderate	NL
Canary island date palm	*Phoenix canariensis*	Non-Native (planted)		NL
Monterey pine	*Pinus radiata*	Native (Planted)		NL
pittosporum	*Pittosporum* sp.	Non-Native (planted)		NL
narrowleaf plantain	*Plantago lanceolata*	Non-Native	FAC	NL
plum pine	*Podocarpus* sp.	Non-Native (planted)		NL
hollyleaf cherry	*Prunus ilicifolia*	Native (planted)		NL
coast live oak	*Quercus agrifolia*	Native (planted)		NL
Italian buckthorn	*Rhamnus alaterna*	Non-Native (planted)		NL
pickleweed	*Salicornia pacifica*	Native		OBL
willow	*Salix* sp.	Native (planted)		NL
alkali Russian thistle	*Salsola soda*	Non-Native	Cal-IPC Moderate	FACW
sage	*Salvia* sp.	Native (planted)		NL
bush seepweed	*Suaeda nigra*	Native		OBL
common dandelion	*Taraxacum officinale*	Non-Native		FACU
clover	*Trifolium* sp.	Non-Native		NL
vetch	*Vicia* spp.	Non-Native		NL

Notes:
CAL-IPC-California Invasive Plant Council
Species observed by AECOM employee site visits conducted in 2015.
Sources: Calflora 2016; Lichvar et al. 2016.

Appendix F Special-Status Species with Potential to Occur in the BSA

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Plants					
San Mateo thorn-mint	*Acanthomintha duttonii*	FE/SE/1B.1	Serpentine grassland. Blooms April-June. Elevation < 1,000 feet.	**None.** No suitable serpentine or grassland habitat in the BSA.	**No Effect**
Blasdale's bent grass	*Agrostis blasdalei*	— / — / 1B.2	Dunes, gravelly soils, coastal bluffs, scrub. Blooms May-July. Elevation <350 feet.	**None.** No suitable habitat consisting of gravelly soils or dunes in the BSA. No known occurrences in the BSA.	**NA**
Franciscan onion	*Allium peninsulare* var. *franciscanum*	— / — / 1B.2	Dry hillsides. Blooms May-June. Elevation < 1,000 feet.	**None.** No suitable hillside habitat in the BSA.	**NA**
Bent-flowered fiddleneck	*Amsinckia lunaris*	— / — / 1B.2	Coastal bluff scrub, cismontane woodland, valley, and foothill grassland. Blooms March–June. Elevation 10–1,500 feet.	**None.** No suitable cismontane, foothill or grassland habitat in the BSA.	**NA**
Franciscan manzanita	*Arctostaphylos franciscana*	FE / — /1B.1	Coastal scrub (serpentinite). Blooms February–April. Elevation 200–990 feet.	**None.** No suitable serpentine or coastal scrub habitat in the BSA. A single plant was rediscovered in 2009 in the Presidio in San Francisco. Previously considered extinct since 1947.	**No Effect**
San Bruno Mountain manzanita	*Arctostaphylos imbricata*	— / SE / 1B.1	Rocky. Chaparral and coastal scrub. Blooms February–May. Elevation 910–1,220 feet.	**None.** No suitable habitat in the BSA. Known from fewer than five occurrences on San Bruno Mountain, San Mateo County.	**NA**
Presidio manzanita	*Arctostaphylos montana* ssp. *ravenii*	FE / SE /1B.1	Serpentinite outcrop. Chaparral, coastal prairie, and coastal scrub. Blooms February–March. Elevation 150–710 feet.	**None.** No suitable habitat in the BSA. Known from only one extant native occurrence at the Presidio in San Francisco; plants there belong to a single clone.	**No Effect**
Montara manzanita	*Arctostaphylos montaraensis*	— / — / 1B.2	Chaparral (maritime) and coastal scrub. Blooms January–March. Elevation 265–1,650 feet.	**None.** No suitable chaparral or costal scrub habitat in the BSA.	**NA**
Pacific manzanita	*Arctostaphylos pacifica*	— / SE / 1B.2	Chaparral and coastal scrub. Blooms February–April. Elevation ~980 feet.	**None.** No suitable habitat in the BSA. Known only from San Bruno Mountain, San Mateo County.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Kings Mountain manzanita	*Arctostaphylos regismontana*	— / — / 1B.2	Granite, sandstone outcrops, edge of conifer forest, chaparral. Blooms January-March. Elevation 490–2,600 feet.	**None.** No suitable conifer or chaparral habitat in the BSA.	
Marsh sandwort	*Arenaria paludicola*	FE / SE / 1B.1	Sandy, openings. Marshes and swamps (freshwater or brackish). Blooms May–August. Elevation 10–560 feet.	**None.** Known from only two natural occurrences in Black Lake Canyon and at Oso Flaco Lake in Southern California. No known occurrences in the BSA.	**No Effect**
Coastal marsh milk-vetch	*Astragalus pycnostachyus* var. *pycnostachyus*	— / —/ 1B.2	Coastal marshes, seeps, adjacent sand. Blooms June-September. Elevation < 493 feet.	**None.** No suitable marsh, seep, or sand habitat in the BSA. No known occurrences have been observed in the BSA.	**NA**
Alkali milk-vetch	*Astragalus tener* var. *tener*	— / — / 1B.2	Adobe clay. Playas, valley and foothill grassland, and vernal pools. Blooms March–June. Elevation 5–200 feet.	**None.** No suitable habitat in the BSA; one known occurrence in San Francisco County at Mission Dolores in 1868.	**NA**
Round-leaved filaree	*California macrophylla*	— / — / 1B.1	Clay. Cismontane woodland, and valley and foothill grassland. Blooms March–May. Elevation 50–3,960 feet.	**None.** No suitable woodland or grassland habitat in the BSA.	**NA**
Pappose tarplant	*Centromadia parryi* ssp. *parryi*	— / — / 1B.2	Often alkaline, chaparral, coastal prairie, meadows and seeps, marshes, and swamps (coastal salt), valley and foothill grassland (vernally mesic). Blooms May-November. Elevation <1,380 feet.	**None.** No suitable alkaline, chaparral, swamp, or coastal prairie habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Point Reyes bird's-beak	*Chloropyron maritimum* ssp. *palustre*	— / — / 1B.2	Marshes and swamps, and coastal salt. Blooms June-October. Elevation 7-26 feet.	**None.** Presumed extant in San Francisco North quadrant, however; there is no coastal salt marsh habitat in the BSA There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
San Francisco Bay spineflower	*Chorizanthe cuspidata* var. *cuspidata*	— / — / 1B.2	Sandy habitat. Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub. Blooms April-August. Elevation 9-706 feet.	**None.** Presumed extant in San Francisco North quadrant; however, there is no suitable sandy, costal bluff scrub, coastal dune, coastal prairie, or costal scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Robust spineflower	*Chorizanthe robusta* var. *robusta*	FT / — / 1B.1	Sandy or gravelly. Chaparral (maritime), cismontane woodland (openings), coastal dunes, and coastal scrub. Blooms April–September. Elevation 30–330 feet.	**None.** No suitable habitat in the BSA. Currently, there are 11 populations Santa Cruz County (USFWS 2010b). There is one known occurrence 3.4 miles from the BSA. The exact Oceanview location is known for this occurrence.	**No Effect**
Sonoma spineflower	*Chorizanthe valida*	FE / SE / 1B.1	Coastal prairie (sandy). Blooms June–August. Elevation 33–1,000 feet.	**None.** No coastal prairie habitat in the BSA. Only known extant occurrence was rediscovered in 1980 at Pt. Reyes NS.	**No Effect**
Franciscan thistle	*Cirsium andrewsii*	— / — / 1B.2	Mesic, sometimes serpentinite. Broadleafed upland forest, coastal bluff scrub, coastal prairie, and coastal scrub. Blooms March–July. Elevation 0–495 feet.	**None.** No suitable serpentinite, upland forest, or coastal scrub habitat in the BSA. No known CNDDB occurrences within 5 miles of the BSA.	**NA**
Crystal Springs fountain thistle	*Cirsium fontinale* var. *fontinale*	FE / SE / 1B.1	Serpentinite seeps, chaparral (openings), cismontane woodland, meadows and seeps, and valley and foothill grasslands. Blooms April-October. Elevation 140-575 feet.	**None.** No suitable serpentinite, chaparral, cismontane woodland, meadow, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**No Effect**
Mount Tamalpais thistle	*Cirsium hydrophilum* var. *vaseyi*	—/ — / 1B.2	Serpentinite seeps. Broadleafed upland forest, chaparral, and meadows and seeps. Blooms May–August. Elevation 792–2,046 feet.	**None.** No suitable serpentinite, upland forest, chaparral, and meadow habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Compact cobwebby thistle	*Cirsium occidentale* var. *compactum*	— / — / 1B.2	Chaparral, coastal dunes, coastal prairie, and coastal scrub. Blooms April–June. Elevation 15–495 feet.	**None.** No suitable dune, prairie scrub, or chaparral habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Presidio clarkia	*Clarkia franciscana*	FE / SE / 1B.1	Valley and foothill grassland (serpentine) and coastal scrub. Blooms May–June. Elevation 80–1,105 feet.	**None.** No serpentine habitat in BSA. Restricted to Oakland Hills, Alameda County, and the Presidio, San Francisco County. There is one known occurrence within 5 miles of the BSA. This occurrence was observed at 4.7 miles from the BSA, at Inspiration Point, east of Arguello Blvd., entrance to the Presidio.	**No Effect**
Round-headed Chinese-houses	*Collinsia corymbosa*	— / — / 1B.2	Coastal dunes. Blooms April–June. Elevation 0–65 feet.	**None.** No coastal dune habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
San Francisco collinsia	*Collinsia multicolor*	— / — / 1B.2	Sometimes serpentinite. Closed-cone coniferous forest and coastal scrub. Elevation 100–825 feet.	**None.** No suitable serpentinite or forest habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Western leatherwood	*Dirca occidentalis*	— / — / 1B.2	Mesic Broadleaved upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest, and riparian woodland. Blooms January–April. Elevation 165–1,300 feet.	**None.** No suitable forest, woodland, or riparian habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
San Mateo woolly sunflower	*Eriophyllum latilobum*	FE / SE / 1B.1	Cismontane woodland. Blooms May-June. Elevation 145–1,085 feet.	**None.** No cismontane woodland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**No Effect**
San Joaquin spearscale	*Etriplex joaquiniana*	— / — / 1B.2	Alkaline. Chenopod scrub, meadows and seeps, playas, and valley and foothill grassland. Blooms April–October. Elevation 5–2,755 feet.	**None.** No suitable chenopod scrub, meadows, seeps, playas, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Hillsborough chocolate lily	*Fritillaria biflora* var. *ineziana*	— / — / 1B.1	Serpentinite, cismontane woodland, and valley and foothill grassland. Blooms March-April. Elevation ~ 495 feet.	**None.** No suitable cismontane, woodland, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Marin checker lily	*Fritillaria lanceolata* var. *tristulis*	— / — / 1B.1	Coastal bluff scrub, coastal prairie, and coastal scrub. Blooms February–May. Elevation 50–495 feet.	**None.** No suitable coastal bluff scrub, coastal prairie, and coastal scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Fragrant fritillary	*Fritillaria liliacea*	— / — / 1B.2	Often serpentine. Cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland. Blooms February–April. Elevation 10–1,345 feet.	**None.** No suitable serpentinite, cismontane woodland, coastal prairie, or scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Blue coast gilia	*Gilia capitata* ssp. *chamissonis*	— / — / 1B.1	Coastal dunes and coastal scrub. Blooms April–July. Elevation 10–660 feet.	**None.** No suitable dune or scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Dark-eyed gilia	*Gilia millefoliata*	— / — / 1B.2	Coastal dunes. Blooms April–July. Elevation 10–100 feet.	**None.** No coastal dune habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Diablo helianthella	*Helianthella castanea*	— / — / 1B.2	Broadleafed upland forest, Chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland. Blooms March–June. 200-4,290 feet.	**None.** No suitable forest, woodland, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Congested-headed hayfield tarplant	*Hemizonia congesta* ssp. *congesta*	— / — / 1B.2	Sometimes roadsides. Valley and foothill grassland. Blooms April–November. Elevation 65–1,837 feet.	**None.** No grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Short-leaved evax	*Hesperevax sparsiflora* var. *brevifolia*	— / —/ 1B.2	Coastal bluff scrub (sandy), coastal dunes, and coastal prairie. Blooms March–June. Elevation 0–710 feet.	**None.** No suitable coastal dune, bluff, or prairie habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Marin western flax	*Hesperolinon congestum*	FT / ST / 1B.1	Serpentinite. Chaparral and valley and foothill grassland. Blooms April–July. Elevation 16–1,214 feet.	**None.** No suitable serpentinite, chaparral, or grassland habitat in the BSA. There is one CNDDB occurrences within 5 miles of the BSA at the Laurel Hills Cemetery, in San Francisco. This observation occurred 4 miles outside of the BSA.	**No Effect**
Santa Cruz tarplant	*Holocarpha macradenia*	FT / SE / 1B.1 (*Critical habitat has been designated*)	Often clay. Coastal terrace prairie and grassland. Blooms June–October. Elevation 35–720 feet.	**None.** No suitable habitat in the BSA. Natural populations are restricted to coastal terrace prairie habitat in Santa Cruz and Monterey counties (USFWS 2014a). There are no CNDDB occurrences within 5 miles of the BSA.	**No Effect**
Kellogg's horkelia	*Horkelia cuneata* var. *sericea*	— / — / 1B.1	Sandy or gravelly openings. Closed-cone coniferous forest, chaparral (maritime), coastal dunes, and coastal scrub. Blooms April–September. Elevation 35–660 feet.	**None.** No suitable forest, dune, or scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Point Reyes horkelia	*Horkelia marinensis*	— / — / 1B.2	Sandy. Coastal dunes, coastal prairie, coastal scrub. Blooms May–September. Elevation 16–2,500 feet.	**None.** No suitable coastal dune, prairie, or scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Perennial goldfields	*Lasthenia californica* ssp. *macrantha*	— / — / 1B.2	Coastal bluff scrub, coastal dunes, coastal scrub. Blooms January-November. Elevation 16–1,700 feet.	**None.** No suitable coastal bluff scrub, dune, or scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Beach layia	*Layia carnosa*	FE / SE / 1B.1	Restricted to openings in coastal sand dunes. Blooms March–July. Elevation 0–200 feet.	**None.** No suitable dune habitat in the BSA. Its current distribution includes occurrences spread across six very isolated dune systems in Humboldt, Marin, Monterey, and Santa Barbara counties (USFWS 2010c). There is one historical record in CNDDB within 5 miles of the BSA. This occurrence was observed within 1 mile of the BSA near the San Francisco Sand dunes (exact location is unknown).	**No Effect**
Coast yellow leptosiphon	*Leptosiphon croceus*	— / — / 1B.1	Coastal bluff scrub and coastal prairie. Blooms April-May. Elevation 32-495 feet.	**None**. No suitable scrub, coastal, or prairie habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Rose leptosiphon	*Leptosiphon rosaceus*	— / — / 1B.1	Coastal bluff scrub. Blooms April-July. Elevation 0-330 feet.	**None.** No coastal bluff scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Crystal Springs lessingia	*Lessingia arachnoidea*	— / — / 1B.2	Serpentinite. Often found on roadsides, cismontane woodland, coastal scrub, and valley and foothill grassland. Blooms July-October. Elevation 195-985 feet.	**None.** No serpentine soil found in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
San Francisco lessingia	*Lessingia germanorum*	FE / SE / 1B.1	Coastal scrub (remnant dunes). Blooms June–November. Elevation 85–365 feet.	**None.** No coastal bluff scrub habitat in the BSA. Known from only four occurrences at the Presidio, San Francisco County; and one on San Bruno Mountain, San Mateo County. There are no CNDDB occurrences within 5 miles of the BSA.	**No Effect**
Coast lily	*Lilium maritimum*	— / — / 1B.1	Sometimes roadside. Broadleafed upland forest, closed-cone coniferous forest, coastal prairie, coastal scrub, marshes, and swamps (freshwater), North Coast coniferous forest. Blooms May–August. Elevation 15–1,560 feet.	**None.** No suitable forest, prairie, marsh, or swamp habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Ornduff's meadowfoam	*Limnanthes douglasii* ssp. *ornduffii*	— / — / 1B.1	Agricultural fields, meadows, and seeps. Blooms November-May. Elevation 32-67 feet.	**None.** No suitable agricultural, meadow, or seep habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Indian Valley bush-mallow	*Malacothamnus aboriginum*	— / — / 1B.2	Rocky, granitic, often in burned areas. Chaparral, cismontane woodland. Blooms April-October. Elevation 490-5,580 feet.	**None.** No suitable chaparral or cismontane woodland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Arcuate bush-mallow	*Malacothamnus arcuatus*	— / — / 1B.2	Chaparral and cismontane woodland. Blooms April–September. Elevation 50–1,170 feet.	**None.** No suitable chaparral or woodland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Davidson's bush-mallow	*Malacothamnus davidsonii*	— / — / 1B.2	Chaparral, cismontane woodland, costal scrub, and riparian woodland habitat. Blooms June-January. Elevation 606-2,905 feet.	**None.** No suitable cismontane or chaparral habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Hall's bush-mallow	*Malacothamnus hallii*	— / — / 1B.2	Chaparral and coastal scrub habitat. Blooms May-October. Elevation 32-2,500 feet.	**None.** No suitable chaparral or scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Marsh microseris	*Microseris paludosa*	— / — / 1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. Blooms April–July. Elevation 20–990 feet.	**None.** No suitable forest, woodland, or grassland habitat in the BSA.	**NA**
Northern curly-leaved monardella	*Monardella sinuata* ssp. *nigrescens*	— / — / 1B.2	Sandy. Chaparral (SCR Co.), coastal dunes, coastal scrub, and lower montane coniferous forest (SCR Co., ponderosa pine sandhills). Blooms April–September. Elevation 0–990 feet.	**None.** No suitable habitat in the BSA.	**NA**
Woodland woolythreads	*Monolopia gracilens*	— / — / 1B.2	Serpentine. Broadleafed upland forest (openings), chaparral (openings), cismontane woodland, North Coast coniferous forest (openings), and valley and foothill grassland habitat. Blooms February-July. Elevation 325-4,000 feet.	**None**. No suitable serpentine, forest, chaparral, woodland, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
White-rayed pentachaeta	*Pentachaeta bellidiflora*	FE / SE / 1B.1	Cismontane woodland, and valley and foothill grassland (often serpentinite). Blooms March – May. Elevation 115–2,045 feet.	**None.** No suitable habitat in the BSA. Currently, this species is only known from an occurrence east of Interstate 280 into Eastwood Regional Park, and a possible occurrence on the west side of Upper Crystal Springs Reservoir—both in San Mateo County (USFWS 2010a). There are no CNDDB occurrences within 5 miles of the BSA.	**No Effect**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Choris' popcorn flower	*Plagiobothrys chorisianus* var. *chorisianus*	— / — / 1B.2	Mesic. Chaparral, coastal prairie, and coastal scrub. Blooms March–June. Elevation 50–530 feet.	**None.** No suitable chaparral, prairie, or scrub habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
San Francisco popcorn flower	*Plagiobothrys diffusus*	— / SE / 1B.1	Coastal prairie and valley and foothill grassland. Blooms March–June. Elevation 200–1,190 feet.	**None.** No suitable prairie or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Hickman's cinquefoil	*Potentilla hickmanii*	— / — / 1B.1	Coastal bluff scrub, closed-cone coniferous forest, meadows, and seeps (vernally mesic), and marshes and swamps (freshwater). Blooms April–August. Elevation 30–490 feet.	**None.** No suitable forest, meadow, or seep habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Adobe sanicle	*Sanicula maritima*	— / — / 1B.1	Clay, serpentinite. Chaparral, coastal prairie, meadows and seeps, and valley and foothill grassland. Bloom February–May. Elevation 100–800 feet.	**None.** No suitable serpentinite, chaparral, prairie, meadow, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
San Francisco campion	*Silene verecunda* ssp. *verecunda*	— / — / 1B.2	Sandy. Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland. Blooms February–August. Elevation 100–795 feet.	**None.** No suitable coastal bluff scrub, chaparral, coastal prairie, scrub, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
Santa Cruz microseris	*Stebbinsoseris decipiens*	— / — / 1B.2	Open areas, sometimes serpentinite. Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland. Blooms April–May. Elevation 35–1,650 feet.	**None.** No suitable serpentinite, forest, prairie, or grassland habitat in the BSA. There are no CNDDB occurrences within 5 miles of the BSA.	**NA**
California seablite	*Suaeda californica*	FE / — / 1B.1	Narrow zone at the upper edge of tidal marsh, and prefers coarse marsh sediments or sheltered estuarine beaches. Requires well-drained marsh substrates; primarily, sandy wave-built berms or ridges along marsh banks, and estuarine beaches. Blooms July–October. Elevation 0–50 feet.	**None.** Current extant naturally occurring distribution is restricted to the shorelines of Morrow Bay, San Luis Obispo County (USFWS 2010e). It is currently known from four sites in San Francisco Bay due to several reintroductions between 1999 and 2008 (USFWS 2013): Pier 98 (Heron's Head Marsh) and Pier 94, San Francisco County, and Eastshore State Park (EBRPD) and Robert's Landing Marsh, Alameda County. The know occurrence was observed 0.5 mile from the BSA in India Basin Shoreline Park in San Francisco.	**No Effect**

Common Name	Scientific Name	Status[1] (Federal/State/CNPS)	Habitat Requirements[2]	Potential to Occur in the BSA	Federal ESA Determination
Two-fork clover	*Trifolium amoenum*	FE / — / 1B.1	Coastal bluff scrub, valley, and foothill grassland (sometimes serpentinite). Blooms April–June. Elevation 15–1,362 feet.	**None.** No valley or foothill grassland habitat in the BSA. There are three known occurrences within 5 miles of the BSA.	**No Effect**
Saline clover	*Trifolium hydrophilum*	— / — / 1B.2	Marshes and swamps, valley, and foothill grassland (mesic, alkaline), and vernal pools. Blooms April–June. 0–100 feet	**None.** No suitable marsh, swamp grassland, or vernal pool habitat in the BSA. The know occurrences was observed 0.5 mile from the BSA.	**NA**
San Francisco owl's-clover	*Triphysaria floribunda*	— / — / 1B.2	Usually serpentinite. Coastal prairie, coastal scrub, and valley and foothill grassland. Blooms April–June. Elevation 100–530 feet.	**None.** No suitable serpentinite, coastal prairie, coastal scrub, or grassland habitat in the BSA. The known occurrences were observed 0.5 mile from the BSA.	**NA**
Coastal triquetrella	*Triquetrella californica*	— / — / 1B.2	Coastal bluff scrub and coastal scrub. Elevation 100–330 feet.	**None.** No suitable coastal bluff scrub or coastal scrub habitat in the BSA. The known occurrences were observed 0.05 mile from the BSA.	**NA**

Notes:

1. Conservation status definitions are as follows:
   - U.S. Fish and Wildlife Service designations:
     - FE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
     - FT Threatened: Any species likely to become Endangered within the foreseeable future.
   - California Department of Fish and Game designations:
     - SE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
     - ST Threatened: Any species likely to become Endangered within the foreseeable future.
   - California Native Plant Society designations:
     - 1A Plants are presumed extirpated.
     - 1B Plants rare, Threatened, or Endangered in California and elsewhere.
     - 2 Plants rare, Threatened, or Endangered in California, but more common elsewhere.
     - 3 Plants for which more information is needed – a review list.
     - 4 Plants of limited distribution – a watch list.
   - California Native Plant Society threat categories:
     - .1 Seriously Endangered in California.
     - .2 Fairly Endangered in California.
     - .3 Not very Endangered in California.

Federal ESA Determinations:

- NA Not applicable (species not federally listed).
- No Effect Species has no potential to occur in the BSA or would not be affected in any way.

2. Habitat information from CNPS Online Rare and Endangered Plant Inventory and USFWS Environmental Conservation Online System.

3. Information on known locations in the vicinity of the project limits was compiled from CNDDB, CNPS Online Rare and Endangered Plant Inventory, Calflora or otherwise noted.

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Invertebrates					
Mission blue butterfly	*Aricia icarioides missionensis*	FE / —	Uses three host plants: *Lupinus albifrons* var. *collinus; L. formosus* var. *formosus*; and less frequently, *L. variicolor*. Uses a variety of nectar plant species found in grassland and coastal scrub communities.	**None.** Populations of the mission blue butterfly are known from southern Marin, San Francisco, and San Mateo counties in California (USFWS 2010d). There are no grassland or coastal scrub communities; and the known host plants were not observed in the BSA. There are seven CNDDB records within 5 miles of the BSA, with the closest observation 1.8 miles from the BSA on San Bruno Mountain reservoir hill area on the western edge of San Bruno Mountain, east of Daly City and west of Guadalupe Canyon Parkway.	**No Effect**
San Bruno elfin butterfly	*Callophrys mossii bayensis*	FE / —	Occurs in coastal grassy mountainous areas near San Francisco Bay. Located on steep, north-facing slopes above 500 feet elevation that contains populations of host plant; *Sedum spathulifolium.* Uses a variety of nectar plants occurring in upper-elevation grasslands and scrub.	**None.** The BSA is in an urbanized, semi-industrialized, low-elevation area. Suitable habitat is not present in or adjacent to the BSA. There is one CNDDB record within 5 miles of the BSA. This occurrence was 4 miles from the BSA on San Bruno Mountain ridgeline and NE slope in San Bruno Mountain County Park.	**No Effect**
Bay checkerspot butterfly	*Euphydryas editha bayensis*	FT / — (*Critical habitat has been designated*)	Serpentine areas in Santa Clara and San Mateo counties where its hostplant, dwarf plantain (*Plantago erecta*) is present.	**None**. The BSA is outside of the known range for this species. There is no critical habitat in the BSA. There are four CNDDB records within 5 miles of the BSA. The closest occurrence is 3 miles outside of the BSA on San Bruno Mountain, south slope along the ridgeline. There has not been a sighting since 2000.	**No Effect**
Black abalone	*Haliotis cracherodii*	FE / — (*Critical habitat has been designated*)	Crevices, cracks, and holes of intertidal and shallow subtidal rocks. Areas of moderate to high surf. Found in coastal waters from Point Arena, California, to Bahia Tortugas and Isla Guadalupe, Mexico. Rare north of San Francisco and south of Punta Eugenia.	**None.** This species has not been recorded from San Francisco Bay, and the BSA lacks the rocky, high energy marine waters that supports this species. The closest known occurrences. There are no CNDDB records within 5 miles of the BSA.	**No Effect**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Callippe silverspot butterfly	*Speyeria callippe*	FE / — (*Critical habitat has been designated*)	Occurs at only a few remaining sites: the Oakland Hills in Alameda County, the hills between Vallejo and Cordelia in Solano County, and San Bruno Mountain in South San Francisco. Inhabits grasslands supporting its host plant: Johnny jump-up (*Viola pedunculata*).	**None**. This species only occurs in grassland habitat with Johnny jump-up host plant), which is not present in the BSA. There is no critical habitat in the BSA. There are five CNDDB records within 5 miles of the BSA. The closest known occurrence is in the Orphan Asylum, 2 miles outside of the BSA.	**No Effect**
Myrtle's Silverspot butterfly	*Speyeria zerene myrtleae*	FE/—	Inhabits coastal dunes, coastal prairie, and coastal scrub at elevations ranging from sea level to 1,000 feet, and as far as 3 miles inland. Adults prefer areas protected from onshore winds but can be observed in exposed areas when winds are calm. Critical factors for habitat include the presence of the presumed larval host plant, *Viola adunca* (western dog violet), and the availability of nectar sources for adults.	**None.** This species occurs only in coastal dune, scrub, and prairie habitat with western dog violet host plants, which do not occur in the BSA. There are no CNDDB records within 5 miles of the BSA.	**No Effect**
Fish					
Pacific Herring	*Clupea pallasii*	—/State Managed Fishery	Spawning occurs in intertidal and shallow subtidal zones of embayments, including San Francisco Bay. Eggs are deposited on eelgrass, kelp, or hard substrates in the water. Juvenile herring typically stay in the Bay through the summer before migrating out to sea.	**Low.** There is suitable spawning habitat, in the form of piles and other submerged maritime structures, in the BSA. Although most herring spawning occurs north of the Bay Bridge, spawning may occasionally occur in the vicinity of the BSA.	**NA**
Tidewater goby	*Eucyclogobius newberryi*	FE / SSC (*Critical habitat has been designated*)	Found primarily in waters of coastal lagoons, estuaries, and marshes, often in sandy shallows with low salinity levels.	**None**. Tidewater goby are not expected to occur in San Francisco County (USFWS 2014b). There are no CNDDB records within 5 miles of the BSA. The BSA is outside of the designated critical habitat for this species.	**No Effect**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Delta smelt	*Hypomesus transpacificus*	FT/ SE (*Critical habitat has been designated*)	Delta smelt are found only from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo counties in the upper Sacramento–San Joaquin Estuary. Seldom found at salinities > 10 parts per thousand (ppt). Most often occurs at salinities < 2 ppt.	**None**. Delta smelt range from the Suisun Bay upstream to the upper Sacramento–San Joaquin Estuary (USFWS 2012). There are no CNDDB records within 5 miles of the BSA. The BSA is outside of the designated critical habitat for this species.	**No Effect**
Coho salmon – central California coast ESU	*Oncorhynchus kisutch*	FE/SE	This evolutionarily significant unit, or ESU, includes naturally spawned coho salmon originating from rivers south of Punta Gorda, California, to and including Aptos Creek, as well as such coho salmon originating from tributaries to San Francisco Bay. Spawning habitat is small streams with stable gravel substrates. The remainder of the life-cycle is spent foraging in estuarine and marine waters of the Pacific Ocean.	**None.** Coho salmon-central California coast ESU range from the western side of the San Francisco Bay Peninsula to the designated critical habitat of Oregon. There are no CNDDB records within 5 miles of the BSA.	**No Effect**
Steelhead—Central California Coast DPS	*Oncorhynchus mykiss irideus*	FT / — (*Critical habitat has been designated*)	Anadromous; All naturally spawned populations below natural and manmade impassable barriers from the Russian River (inclusive) to Aptos Creek (inclusive); and the drainages of San Francisco, San Pablo, and Suisun bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin rivers. Tributary streams to Suisun Marsh, including Suisun Creek, Green Valley Creek, and an unnamed tributary to Cordelia Slough, commonly referred to as Red Top Creek.	**Low**. Designated Critical habitat for Steelhead Central California Coast DPS includes the San Francisco Bay and streams in the San Francisco Bay. There is no suitable spawning habitat in Islais Creek watershed (FoundSF.org 2015). Any steelhead occurring in the BSA would be migrants from the nearby Bay. There are no CNDDB records within 5 miles of the BSA.	**Not Likely to Adversely Affect**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Green sturgeon – Southern DPS	*Acipenser medirostris*	FT/— *(Critical habitat has been designated)*	Anadromous; Southern DPS includes coastal spawning populations from the Russian River south to the Sacramento River. Found in nearshore oceanic waters, bays, and estuaries. Prefers to spawn in lower reaches of large rivers with swift currents and large cobble.	**Low.** This species migrates through San Francisco Bay while traveling between the Ocean and the spawning areas. They are also known to forage in the Bay year-round. Foraging likely occurs in the northern and northern-central areas of the Bay more than other areas due to the location of the Sacramento River delta, but foraging may occur throughout the Bay. There are no CNDDB records within 5 miles of the BSA. All of San Francisco Bay is designated as critical habitat for this species.	**Not Likely to Adversely Affect**
Chinook salmon— Central Valley spring-run ESU	*Oncorhynchus tshawytscha*	FT / ST (*Critical habitat has been designated*)	Migrates through San Francisco Bay and Delta; spawns in upper Sacramento River and tributaries. Adults need access to natal streams; eggs and fry need cool water with dissolved oxygen and clean gravel; juveniles migrate out to the ocean after a few months.	**None**. Chinook salmon Central Valley spring-run ESU pass through San Francisco Bay to migrate into the Sacramento–San Joaquin Delta. The Sacramento–San Joaquin Delta and San Pablo, and San Francisco bays are designated as critical habitat. This species is not expected to occur in the Islais Creek channel, which would be a departure from their migration route. There are no CNDDB records within 5 miles of the BSA.	**No Effect**
Chinook salmon— Sacramento River winter-run ESU	*Oncorhynchus tshawytscha*	FE / SE (*Critical habitat has been designated*)	Anadromous; coastal rivers; streams and creeks from Klamath River to the Russian River basin. Adults need access to natal streams; eggs and fry need cool water with adequate dissolved oxygen and clean gravel; juveniles migrate out to the ocean. Migrates through San Francisco Bay and Delta; spawns in upper Sacramento River and tributaries. Life history information in southern portion of the ESU is extremely limited.	**None**. Chinook salmon Sacramento River winter-run ESU passes through San Francisco Bay to migrate into the Sacramento–San Joaquin Delta. There is no critical habitat designated for this species in San Francisco Bay. This species is not expected to occur in the Islais Creek channel, which would be a departure from their migration route. There are no CNDDB records within 5 miles of the BSA.	**No Effect**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Longfin smelt	*Spirinchus thaleichthys*	FP/ ST	Occurs in bays and estuaries from Monterey Bay to the Smith River. Enters lower tidal portions of larger streams to spawn; not typically found in nontidal sections of small streams.	**Low**. This species' range includes all of San Francisco and San Pablo bays and into the Sacramento San Joaquin delta (CDFG 2009). Longfin smelt prefer deeper cooler waters, and are not expected to spend time in nearshore habitats or creeks. There are two CNDDB records within 5 miles of the BSA. These records are from CDFW trawl surveys. One is from 2010 in the central San Francisco Bay, and the record includes numerous specimens collected from 1913 to 2010. The other is from 1995 in South San Francisco Bay, south of Alameda, and the record includes sampling from 1922 and 1980-1995 of larvae collected in the south Bay in high outflow years.	**NA**
Amphibians					
California red-legged frog	*Rana draytonii*	FT / SSC (*Critical habitat has been designated*)	Requires slow-moving or still water for egg laying and larval development. Occurs in freshwater marshes, stock ponds, and riparian habitats. May aestivate in underground refuges in adjacent upland areas in rodent burrows or cracks during dry periods.	**None.** There is no suitable upland or breeding habitat in or adjacent to the BSA, which would include freshwater marshes or grasslands. There are four CNDDB records within 5 miles of the BSA, with the closest occurrence 4.5 miles from the BSA. These occurrences are from Golden Gate Park, and one is from the Presidio, areas that have both upland and breeding habitat.	**No Effect**
Reptiles					
Green Sea Turtle, East Pacific DPS	*Chelonia mydas*	FT/—	Subtropical and temperate marine waters around the globe. On the California coastline, the species is most common off of southern California but is occasionally seen further north. Nesting does not occur on the California coastline.	**None.** This species rarely occurs in the marine waters in the vicinity of San Francisco Bay and is not associated with the estuarine habitats of San Francisco Bay. The BSA does not contain seagrass or other habitat elements suitable for the species.	**No Effect**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Western pond turtle	*Emys marmorata*	— / SSC	Occurs in both permanent and seasonal freshwater habitat, including marshes, streams, rivers, ponds, and lakes. Also found in agricultural irrigation and drainage canals. They favor habitats with large amounts of emergent logs or boulders, where several individuals may congregate to bask.	**None**. The BSA is outside of freshwater aquatic habitat. There are no CNDDB records within 5 miles of the BSA. This species was recently reintroduced to Mountain Lake in the Presidio.	**NA**
San Francisco garter snake	*Thamnophis sirtalis tetrataenia*	FE / SE, FP	Found in densely vegetated ponds near open hillsides. Freshwater aquatic habitats with shallow water edges are essential. Upland habitat; south- or west-facing slopes with suitable sites for basking; and rodent burrows or thick mats of grass for shelter and hibernacula.	**None**. There are no densely vegetated freshwater ponds in or adjacent to the BSA. There are seven CNDDB records within 5 miles of the BSA. The nearest occurrence is approximately 1 mile from the BSA.	**No Effect**
Birds					
Northern harrier	*Circus cyaneus*	—/— / SSC	Reside in open areas such as tundra, steppes, grasslands, meadows, wetlands, and agricultural zones. Breeding habitat may include open wetlands, wet meadows, pastures, old fields, freshwater and brackish marshes, grasslands, agricultural fields, shrublands, and riparian corridor.	**None.** There is no suitable breeding or foraging habitat in the BSA. Ecological requirements for the northern harrier are not present in or adjacent to the BSA. There are no CNDDB records within 5 miles of the BSA.	**NA**
White-tailed kite	*Elanus leucurus*	—/—/FP	Savanna, open woodlands, marshes, desert grassland, partially cleared lands, and cultivated fields. Generally avoids areas with extensive winter freezes, but rainfall and humidity vary greatly throughout this bird's range. White-tailed kites hunt over lightly grazed or ungrazed fields, where there may be larger prey populations than in more heavily grazed areas.	**None.** No suitable habitat in the BSA. Ecological requirements such as desert grassland, open woodland, and ungrazed habitat are not present in or adjacent to the BSA. There are no CNDDB records within 5 miles of the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
American peregrine falcon	*Falco peregrinus anatum*	—/—/FP	Breeding occurs in open landscapes with cliffs (or skyscrapers) for nest sites. They can be found nesting at elevations up to about 12,000 feet, as well as along rivers and coastlines; or in cities, where the local Rock Pigeon populations offer a reliable food supply. In migration and winter, Peregrine Falcons can be found in nearly any open habitat, but with a greater likelihood along barrier islands, mudflats, coastlines, lake edges, and mountain chains.	**Low.** Potential for foraging in the BSA, but there are no tall structures that would be suitable nest sites in the BSA. There are no CNDDB records for the American peregrine falcon within the BSA.	**NA**
Saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*	—/—/SSC	Found in freshwater marshes, coastal swales, swampy riparian thickets, brackish marshes, salt marshes, and the edges of disturbed weed fields and grasslands that border soggy habitats. In the San Francisco Bay region as a whole, about 60 percent of yellowthroats breed in brackish marsh, 20 percent in riparian woodland/swamp, 10 percent in freshwater marsh, 5 percent in salt marsh, and 5 percent in upland vegetation. Most abundant in Bay Area tidal marshes where pickleweed is least prevalent, and where bulrush (*Scirpus* spp.), peppergrass (*Lepidium latifolium*), and common cattail (*Typha latifolia*) are most prevalent.	**None.** There is no tidal marsh, salt marsh, or brackish waters in the BSA; therefore, no suitable habitat is present in the BSA. There are no CNDDB records within 5 miles of the BSA.	**NA**
California black rail	*Laterallus jamaicensis coturniculus*	— / ST, FP	Inhabits tidal marshes, mainly in the northern San Francisco Bay area. The majority of the species' population is currently found in the historical marshes of San Pablo Bay, Suisun Bay, and Carquinez Strait. Found in freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays.	**None**. There is no tidal marsh habitat in or adjacent to the BSA. The area surrounding the BSA is developed. There is one historical CNDDB record within 5 miles of the BSA from 1945 in downtown San Francisco. The nearest occurrence was observed 2.8 miles from the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Alameda song sparrow	*Melospiza melodia pusillula*	— / SSC	Inhabits pickleweed (*Salicornia* spp.) marshes; nests low in pickleweed and gumweed (*Grindelia* spp.) bushes, but high enough to escape high tides. Restricted to tidal salt marshes on the fringes of south San Francisco Bay east to El Cerrito, south to Alviso, and west to San Francisco. Found in relatively large marshes, including Emeryville and Alameda, and in most remnant patches of marsh vegetation along sloughs, dikes, and levees, including some highly disturbed and urbanized sites.	**None.** There is no tidal salt marsh habitat or pickleweed in the BSA. There is one historical CNDDB record of occurrence within 5 miles, from 1900, at Alameda Point, Alameda County.	**NA**
Bryant's savannah sparrow	*Passerculus sandwichensis alaudinus*	—/—/SSC	Occupies low tidally influenced habitats, adjacent ruderal areas, moist grasslands in and just above the fog belt; and infrequently, drier grasslands. Bayshore habitats are composed primarily of broad expanses of higher parts of pickleweed marsh, 1.5 to 3 meters above mean sea level, above cord-grass stands, and where the pickleweed community merges into grassland.	**None.** BSA is included in the yearlong range of the sparrow; however, the BSA does not include plant communities/species necessary for foraging and nesting. There are no CNDDB records within 5 miles of the BSA.	**NA**
California brown pelican	*Pelecanus occidentalis californicus*	FD / — /FP (nesting colony and communal roosts)	Coastal range from the Gulf of California to southern British Columbia. Nests on islands in the Gulf of California and along the California coast to the Channel Islands.	**Moderate.** California brown pelican have the potential to forage in the BSA. They may also day-loaf in the BSA, including on the rocks and the wooden pier and piles below the bridge. There were 10 known pelican roosting sites in the San Francisco Bay area, all along the coast of San Francisco. There are no CNDDB records within 5 miles of the BSA.	**NA**
Double-crested cormorant	*Phalacrocorax auritus*	—/WL (breeding colony)	Inhabits brackish and freshwater habitats on lakes, rivers, swamps, bays, and coasts.	**High.** Although there is not a breeding colony in the BSA, there is high potential for cormorants to forage and roost in the BSA. The nearest nesting colony is on the eastern span of the San Francisco–Oakland Bay Bridge (CDFW 2016).	**NA**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Ridgeway's rail (formerly California clapper rail)	*Rallus obsoletus*	FE / SE, FP	Salt marshes and brackish marshes traversed by tidal sloughs in the vicinity of the San Francisco Bay. Associated with Salicornia native *Spartina* spp. dominated salt marshes.	**None**. There is no salt or brackish marsh habitat in or adjacent to the BSA. The area surrounding the BSA is developed (urbanized, industrialized). There are two CNDDB records within 5 miles of the BSA; both from 2011: Pier 98/Heron's Head Park, and a marsh area between Highway 101 and the San Francisco Bay, near Candlestick Point. The nearest occurrence is approximately 1 mile from the BSA.	**No Effect**
California least tern	*Sternula antillarum browni*	FE / SE, FP	Nest colonially on the ground in sandy or gravelly beaches. Forages over open water in coastal regions. In San Francisco Bay, inhabits abandoned salt ponds and forages along estuarine shores.	**None**. There are two known significant breeding areas for the least tern in San Francisco Bay: Hayward and Alameda. Least terns generally forage within 2 miles of the nesting site in shallow waters close to shore (Atwood and Minksy 1983). The closest point between the BSA and the nearest breeding colony is 4.4 miles, at the former Alameda Naval Weapons Station. It is unlikely that this species will forage in waters near the BSA. The only CNDDB record within 5 miles of the BSA is of the breeding colony in Alameda.	**No Effect**
Mammals					
Pallid bat	*Antrozous pallidus*	—/—/SSC	Habitats include mountainous areas, intermontane basins, and lowland desert scrub, arid deserts, and grasslands, often near rocky outcrops and water; in some areas, this species also inhabits open coniferous forest and woodland. Day roosts include crevices of rock outcrops, caves, mine tunnels, buildings, bridges, and hollows of live and dead trees. Hibernation occurs in caves and mines, although not very many hibernation records are available. Young are born in maternity colonies, usually in rock crevices or buildings.	**Low.** There may be marginally suitable foraging or roosting habitat in the BSA. There are no known records within 5 miles of the BSA.	**NA**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
Townsends's big-eared bat	*Corynorhinus townsendii*	— / SCT, SSC	California in a wide variety of habitats, most commonly in mesic sites. Roosts in the open, hanging from walls and ceilings.	**Moderate.** There may be suitable roosting habitat in the landscaped trees, buildings, and structures in and adjacent to the BSA. There is one CNDDB record within 5 miles of the BSA from 2005, in the Twin Peaks area of San Francisco.	**NA**
Pacific harbor seal	*Phoca vitulina*	MMPA / —	Found year-round in the San Francisco Bay Estuary. They feed in the deeper waters of San Francisco Bay near the Golden Gate Bridge and along the deeper channels extending into the North and South bays. March to June, Pacific harbor seals pup at multiple haul-out sites along the shores of San Francisco Bay.	**Low.** The closest known harbor seal haul-out site is approximately 6 miles northeast of the BSA on Yerba Buena Island. There is no suitable habitat for seals to haul out in or adjacent to the BSA. Islais Creek does not include the preferred deep-water foraging habitat for this species. There are no CNDDB records within 5 miles of the BSA.	**NA**
Harbor porpoise	*Phocoena*	MMPA / —	This species inhabits near-shore habitats throughout the cold-temperate waters of the northern hemisphere. Off the West Coast of the U.S. and Canada, harbor porpoise are essentially continuously distributed from Point Conception, California to Barrow, Alaska. They feed on small schooling fish such as anchovy, and herring, and squid.	**None.** The harbor porpoise was absent from the Bay for approximately 65 years and has recently returned. Prey species, including anchovies and herring, are known to occur in Islais Creek. There are no CNDDB records within 5 miles of the BSA.	**NA**
Salt marsh harvest mouse	*Reithrodontomys raviventris*	FE / SE, FP	Only in the saline-emergent wetlands of San Francisco Bay and its tributaries. Pickleweed (*Salicornia* sp.) is primary habitat. Builds loosely organized nests and requires higher areas to escape high tides.	**None**. There is no suitable habitat in or adjacent to the BSA. There are no emergent wetlands or pickleweed in or adjacent to the BSA. There are no CNDDB records from within 5 miles of the BSA.	**No Effect**

Common Name	Scientific Name	Status[1] (Federal/State)	Habitat Requirements	Potential to Occur in the BSA	Federal ESA Determination
California sea lion	*Zalophus californianus*	MMPA / —	Found from Vancouver Island, British Columbia to the southern tip of Baja California in Mexico. Breeds mainly on offshore islands, ranging from southern California's Channel Islands south to Mexico, although a few pups have been born on Año Nuevo and the Farallon Islands in central California. Opportunistic eaters, feeding on squid, octopus, herring, rockfish, mackerel, and small sharks.	**Low.** California sea lions are relatively abundant in San Francisco Bay from late summer to late spring. In June and July, most of the sea lions head south to breeding grounds on the Channel Islands, although some remain year-round in San Francisco Bay. Prey species, including herring, are known to occur in Islais Creek. There are no CNDDB records within 5 miles of the BSA.	**NA**

Federal Status Designations:

FE	Listed as Endangered under the federal Endangered Species Act
FT	Listed as Threatened under the federal Endangered Species Act
FC	Candidate for listing under the federal Endangered Species Act
FD	Delisted; was formerly listed as Threatened or Endangered
PE	Proposed for listing as Endangered
MMPA	Protected under Marine Mammal Protection Act
ESU	Evolutionarily Significant Unit
FMP	Fisheries Management Plan

State of California Status Designations:

SE	Listed as Endangered under the California Endangered Species Act
ST	Listed as Threatened under the California Endangered Species Act
SD	Delisted; was formerly listed as Threatened or Endangered
FP	Fully Protected Species under California Fish and Game Code
SSC	California Department of Fish and Wildlife Species of Special Concern

Federal ESA Determinations:

NA	Not Applicable (species not federally listed).
No Effect	Species has no potential to occur in the BSA or would not be affected in any way.
Not Likely to Adversely Affect	Effects to species are discountable, insignificant, or wholly beneficial.

Appendix G Underwater Noise Assessment

ANALYSIS OF UNDERWATER SOUND LEVELS – ISLAIS CREEK BRIDGE REHABILITATION PROJECT
in
City and County of San Francisco, California
04-SF-0-CR
34C0024
Federal Project No. BRLO-5934 (168)

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INTRODUCTION

This study is an assessment of potential sound levels generated by planned pile driving activities involved with the San Francisco Public Works proposed rehabilitation and repair of the Islais Creek Bridge referred to as the Islais Creek Bridge Rehabilitation Project in the City of San Francisco in San Francisco County, California. The proposed project would replace the deteriorating wooden fender piles and would add four (4) concrete piers at the corners of the foundation of the existing control tower. This report includes the prediction of underwater sound levels calculated based on the results of measurements for similar projects. Predicted underwater sound levels are compared against interim thresholds that have been accepted by the Federal Highway Administration (FHWA), Caltrans, the National Oceanic and Atmospheric Administration (NOAA) and the California Department of Fish and Wildlife (CDFW). These thresholds are discussed in the report.

Pile driving could produce underwater noise in Islais Creek. Most of the pile driving activities will be in the creek channel. At this time, there are approximately 250 timber piles to be installed for the new fender system and four (4) reinforced concrete drilled piers, ranging in size from five (5) feet in diameter to seven (7) feet in diameter.

There is no accurate way to predict underwater sound levels from these activities, other than to rely on acoustic data measured from previous measurements. Available underwater sound data for projects involving the installation of similar piles were reviewed. The sound levels for pile driving activities proposed by the project were estimated using these data combined with an understanding of how and where these activities would occur. These predictions are essentially a best estimate based on empirical data and engineering judgment, but by their very nature have a certain degree of uncertainty associated with them. The duration of driving for each pile installation was also estimated as part of the noise prediction process. The number of pile strikes anticipated to occur was estimated from these predicted pile driving/installation times. Again, these are based on available data from similar projects and engineering estimates.

UNDERWATER SOUNDS FROM PILE DRIVING

Fundamentals of Underwater Noise

When a pile driving hammer strikes a pile, a pulse is created. This propagates through the pile and radiates sound into the water and the ground substrate as well as the air. Sound pressure pulse as a function of time is referred to as the waveform. Caltrans currently uses peak, root mean square (RMS), and sound exposure level (SEL) as descriptors for impulsive underwater sounds. The peak pressure is the highest absolute value of the measured waveform, and can be a negative or positive pressure peak. The RMS level is determined by analyzing the waveform and computing the average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy.[1] This RMS term is described as $RMS_{90\%}$ in

[1] Richardson, Greene, Malone & Thomson, *Marine Mammals and Noise*, Academic Press, 1995 and Greene, personal communication.

this report. This has been approximated in the field for pile driving sounds by measuring the signal with a precision sound level meter set to the "impulse" RMS setting ($RMS_{impulse}$). Another measure of the pressure waveform that can be used to describe the pulse is the sound energy itself. The total sound energy in the pulse is referred to in many ways, such as the "total energy flux" $(E_T)^2$. The "total energy flux" is equivalent to the un-weighted SEL, a common unit of sound energy used in airborne acoustics to describe short-duration events. The unit is dB re $1\mu Pa^2$-sec. In this report, peak pressures and RMS sound pressure levels are expressed in dB re 1µPa; however, in other literature they can take other forms such as a Pascal or pounds per square inch. The total sound energy accumulates over the duration of the impulse. How rapidly the energy accumulates may be significant in assessing the potential effects of impulses on fish. Figure 1 illustrates the descriptors used to describe the acoustical characteristics of an underwater pile driving pulse. ***Table 1*** includes the definitions of terms commonly used to describe underwater sounds.

Descriptors such as the peak pressure, $RMS_{90\%}$, and SEL or "total energy flux" are useful descriptors in describing the magnitude of these impulses. The peak pressure refers to the magnitude of maximum pressure fluctuation. The RMS averaged over 90 percent of the impulse includes averaging over a relatively long period of the impulse where the pressure fluctuation is much lower. For instance, about 50 percent of the energy from a typical pile driving impulse accumulates in less than a quarter of the time that 90 percent of the energy accumulates. The SEL or "total energy flux" is normalized to one second and, therefore, is not as useful for discerning differences in impulses where the majority of the energy occurs within $1/10^{th}$ of a second. However, SEL is useful to researchers in assessing impacts to animals. The pressure waveforms show the individual characteristics of these strikes; however, it is difficult to identify any meaningful differences in the impulses. A plot showing the accumulated sound energy over the duration of the impulse (or at least the portion where much of the energy accumulates) appears to be the best available tool to illustrate the differences in source strength.

[2] Finerran, et al., *Temporary Shift in Masked Hearing Thresholds in Odontocetes after Exposure to Single Underwater Impulses from a Seismic Watergun*, Journal of the Acoustical Society of America, June 2002.

Table 1 - Definitions of Underwater Acoustical Terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro pascals (µPa) and 1 µPa for
Equivalent Noise Level, L_{eq}	The average noise level during the measurement period.
Peak Sound Pressure, unweighted (dB)	Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure. This pressure is expressed in this report as a decibel (referenced to a pressure of 1µPa) but can also be expressed in units of pressure, such as µPa or PSI.
RMS Sound Pressure Level, (NMFS Criterion)	The average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy for one pile driving impulse.[3]
Sound Exposure Level (SEL), dB re 1µPa^2 sec	Proportionally equivalent to the time integral of the pressure squared and is described in this report in terms of dB re 1µPa^2 sec over the duration of the impulse. Similar to the unweighted Sound Exposure Level (SEL) standardized in airborne acoustics to study noise from single events.
Cumulative SEL	Measure of the total energy received through a pile driving event (here defined as pile driving over one day or maximum of 3 piles that occurs within a day).
Waveforms, µPa over time	A graphical plot illustrating the time history of positive and negative sound pressure of individual pile strikes shown as a plot of µPa over time (i.e., seconds)
Frequency Spectra, dB over frequency range	A graphical plot illustrating the distribution of sound pressure vs. frequency for a waveform, dimension in RMS pressure and defined frequency bandwidth.

[3] The underwater sound measurement results obtained during the Pile Installation Demonstration Project indicated that most pile driving impulses occurred over a 50 to 100 millisecond (msec) period. Most of the energy was contained in the first 30 to 50 msec. Analysis of that underwater acoustic data for various pile strikes at various distances demonstrated that the acoustic signal measured using the standard "impulse exponential-time-weighting" (35-msec rise time) correlated to the RMS (impulse) level measured over the duration of the impulse.

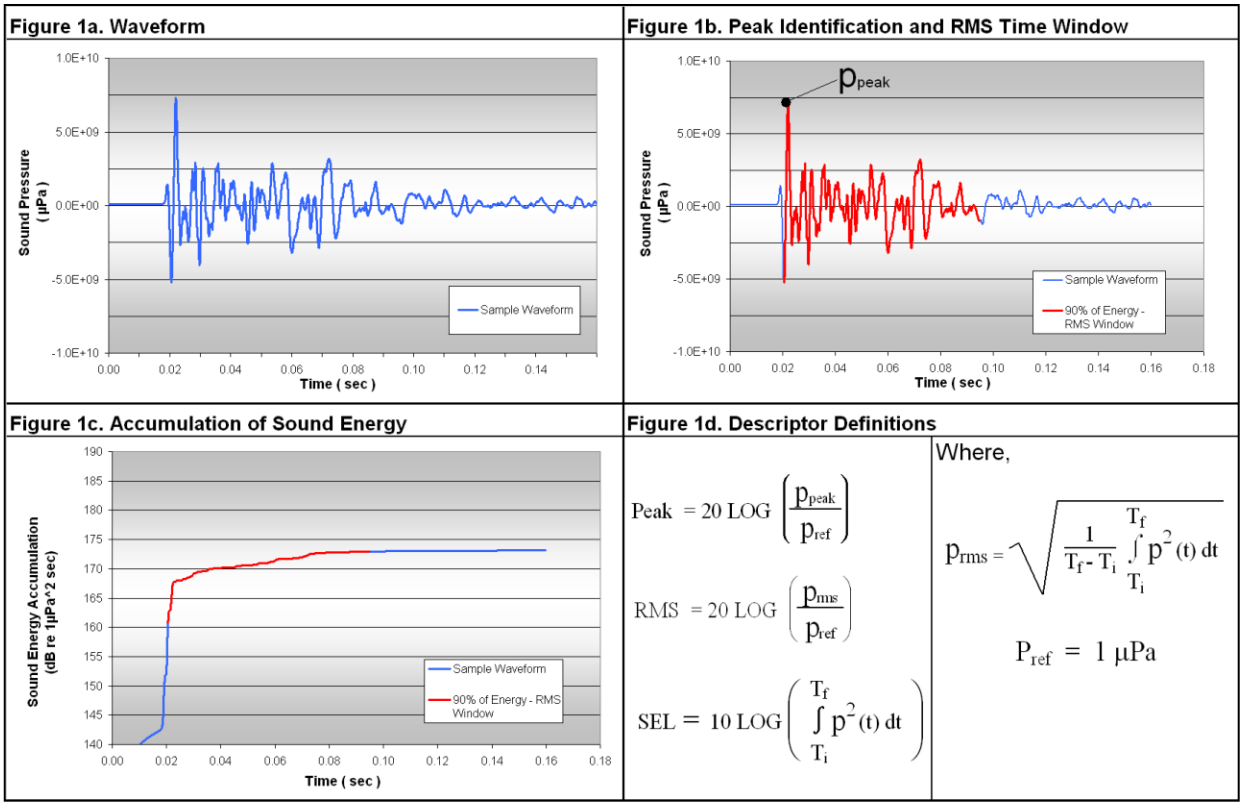


Figure 1 - Characteristics of an Underwater Pile Driving Pulse

Underwater Noise Levels from Construction

The primary type of activity that has the potential to elevate underwater noise levels is the installation of piles. The potential methods for installation of piles for this project includes vibrating and impact driving.

Pile driving in the water causes sound energy to radiate directly into the water by vibrating the pile between the surface of the water and the creek beds, and indirectly because of ground-born vibration at the creek beds. Airborne sound makes an unsubstantial contribution to underwater sound levels because of the attenuation at the air/water interface. Pile driving near the creeks would generate low-frequency ground-born vibration that can cause localized sound pressures in the water that are radiated from the creek beds. A minimum water depth is required to allow sound to propagate. For pile driving sounds, the minimum depth is one to two meters (m). Very low frequency (mostly <200 Hz) vibration caused by pile driving and blasting could propagate through the ground only and couple to the water at the creek beds.

The likelihood of pile driving causing high widespread sound levels is low, given the depth of the water and types and sizes of piles under consideration for this project. The water surface is a pressure release zone, where the sound pressure is very low. Underwater sound measurements have shown that levels are considerably lower in the top one meter. Levels are typically highest in the deepest portions of the water column. In deeper water (i.e., 10 meters or deeper), levels are

fairly uniform with depth except in the top two meters where they decrease with decreasing depth.

Islais Bridge Retrofit Assumptions and Impacts

It is expected that the primary pile types to be driven will be as follows:

Fender piles are expected to be 45 to 60 foot long timber or fiber-reinforced plastic (i.e. composite) piles. All the fender piles will be driven in the wetted channel of Islais Creek, in water approximately 30 feet deep.

1. Option A –; Vibrate the piles in the full depth
2. Option B –Impact drive the piles the full depth;
    - Pile driving hammers would be on the smaller size; this assessment assumes that a vibratory hammer similar to a American Pile Driving (APE) Model 200-6 and an impact hammer similar to an APE Model D30-32 diesel impact hammer, or a 3,000 pound drop hammer will be used.
    - Piles Installed Each Day/ Strikes per Day: Fender piles will be installed at the four corners of the existing bridge with the bulk of the piles located near the Control Tower on the north end of the bridge. It is assumed that all piles at each location could be installed in about 25 days. The approximate time to drive a single timber or composite pile with a vibratory hammer is anticipated to be less than two (2) minutes. If the piles are installed with either a drop hammer or diesel impact hammer, the number of strikes needed to install a timber pile would depend on the equipment the contractor is using; a heavy hammer will use fewer strikes. A rough guess is approximately 115 strikes per Pile.
    - Source levels were derived from the Caltrans Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving[4], and newer sources not yet added to the compendium.
    - Based on past timber pile driving projects a 30 log attenuation rate or drop off rate was used to calculate the distances from the source, for the composite piles a 16 Log attenuation rate or drop off rate was used. These attenuation rates were measured on three separate projects for both vibratory and impact installation of timber and composite piles.

[4] Caltrans. 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Final – November 2015.

Underwater Sound Thresholds

Underwater Sound Thresholds

Underwater sound effects to fish and marine mammals are discussed below. In this report, peak pressures and RMS sound pressure levels are expressed in decibels re 1 µPa. Sound exposure levels are expressed as dB re 1µPa^2-sec.

Fish

On June 12, 2008, NMFS; U.S. Fish and Wildlife Service; California, Oregon, and Washington Departments of Transportation; California Department of Fish and Game; and the U.S. Federal Highway Administration generally agreed in principal to interim criteria to protect fish from pile driving activities, as shown in ***Table 2***. Note that the peak pressure criteria of 206 dB was adopted (rather than 208 dB), as well as accumulated SEL criteria for fish smaller than 2 grams. NMFS interpretation of the interim criteria is described by Woodbury and Stadler (2009).[5] While not published, NMFS uses a zone where underwater sound levels exceed 150 dB RMS to be considered a potential effect area where underwater sounds may elicit behavior responses.

Table 2 - - FHWG and NMFS Criteria for Evaluating Underwater Noise-related Effects on Fish

Effect	Metric	Fish mass	Threshold
Onset of physical injury	Peak pressure	N/A	206 dB (re: 1 µPa)
	Accumulated Sound Exposure Level (SEL)	≥ 2 g	187 dB (re: 1µPa^2-sec)*
		< 2 g	183 dB (re: 1µPa^2-sec)*
Adverse behavioral effects	Root Mean Square pressure (RMS)	N/A	150 dB (re: 1 µPa)

* Based on piles strikes with single strike sound levels of 150 dB SEL re: 1µPa^2-sec or greater

Marine Mammals

Under the Marine Mammal Protection Act, NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as "Any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild." Level B harassment is defined as "Any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to migration, breathing, nursing, breeding, feeding or sheltering."

Current NMFS practice regarding exposure of marine mammals to high level sounds is that cetaceans and pinnipeds exposed to impulsive sounds of 180 and 190 dB RMS or greater, respectively, are considered to have been taken by Level A (i.e., injurious) harassment. Permanent Threshold Shift (PTS) in hearing to marine mammals is used to define injurious

[5] Stadler, J. and Woodbury, D. 2009. Assessing the effects to fishes from pile driving: Application of new hydroacoustic criteria. Proceedings of inter-noise 2009, Ottawa, Canada. August 23-26.

effects from sound exposure. Behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to sounds 160 dB RMS or greater for impulse sounds (e.g., impact pile driving) and 120 dB RMS for continuous noise (e.g., vibratory pile driving). The application of the 120 dB RMS threshold can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations. For continuous sounds, NMFS Northwest Region has provided guidance for reporting RMS sound pressure levels. RMS levels are based on a time-constant of 10 seconds; RMS levels should be averaged across the entire event. For impact pile driving, the overall RMS level should be characterized by integrating sound for each acoustic pulse across 90 percent of the acoustic energy in each pulse and averaging all the RMS for all pulses.

NMFS Northwest Region has defined the estimated auditory bandwidth for marine mammals.[6] For this project location, the functional hearing groups are low-frequency cetaceans (humpback and gray whales), high-frequency cetaceans (harbor porpoises), and pinnipeds (Stellar and California sea lions, harbor seals, and northern elephant seals). For pile driving, the majority of the acoustic energy is confined to frequencies below 2 kilohertz (kHz) and there is very little energy above 20 kHz. The underwater acoustic criteria for marine mammals are shown in ***Table 3***.

Table 3 - NMFS Criteria for Evaluating Underwater Noise-related Effects on Marine Mammals

Species	Underwater Noise Thresholds (dB re: 1µPa)				
	Vibratory Pile Driving Disturbance Threshold	Impact Pile Driving Disturbance Threshold	Marine Mammal Hearing Group	PTS SEl_{cum} Threshold (dB re $1\mu Pa^2$sec)	
				Impact	Vibratory
Cetaceans	120 dB RMS	160 dB RMS	Low-frequency Mid frequency High frequency	183 dB 185 dB 155 dB	199 dB 198 dB 173 dB
Pinnipeds	120 dB RMS	160 dB RMS	Phocid Otariid	185 dB 203 dB	201 dB 219 dB

[6] Note that NMFS Southwest Region has not provided guidance for measuring sound levels from pile driving, so guidance from the Northwest Region is used in this assessment.

The marine mammal hearing groups have been defined by NOAA and are shown in ***Table 4***.

Table 4 - Adopted Underwater Acoustic Criteria for Marine Mammals[7]

Marine Mammal Hearing Groups	
Low-frequency (LF) cetaceans	Baleen whales
Mid frequency (MF) cetaceans	Dolphins, toothed whales, beaked whales, bottlenose whales
High frequency (HF) cetaceans	True porpoises, *Kogia*, river dolphins, cehalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid (PW) pinnipeds	True seals
Otariid (OW) pinnipeds	Sea lions and fur seals

Naval Station Norfolk

Nine (9) timber piles were installed using a vibratory hammer, the timber piles were replacement of fender piles. ***Table 5*** These pile installation events were very short, ranging from 18 seconds to 65 seconds. The measured noise levels for the last three piles installed were higher than the previous piles installed. During the installation of these piles, the vibratory hammer began to smoke, which indicated that there was more resistance to the piles being installed. There may have been either some underwater obstructions or a different type of substrate. At this time, it is unknown what actually caused the increase in noise levels.

Table 5: Data Summary of RMS Vibratory Driving Levels for Timber piles Measured at 29 feet (9 meters) to 75 feet (23 meters) (dB re: 1µPa)

Distance	**Date**	**Duration (mm:ss)**	**10-second RMS**	
			Range	**Average**
23	10/27/2014	1:05	136-139	138
19	10/27/2014	1:22	137-142	139
17	10/27/2014	0:37	137-138	138
13	10/27/2014	0:41	145-159	149
11	10/27/2014	0:26	163-164	163
10	10/27/2014	0:18	162-162	162
12	10/27/2014	0:31	163-163	163
10	10/27/2014	0:34	163-166	165
9	10/27/2014	0:24	165-156	165

[7] NOAA NMFS Technical Guidance for Assessing the Effects of Anthropogenic Noise on Marine Mammal Hearing. August 30, 2016

Ballena Bay and Port of Benicia

Measurements were made during the the driving of timber piles to secure pleasure craft at the Ballena Bay Marina in Alameda, California. During the construction of the Ballena Bay project four (4) timber piles were driven in water about 2 to 4 meters (6.5 to 13 feet) deep. A 3,000-pound drop hammer was used to drive the piles. Measurements were taken at 10 meters (33 feet) and 20 meters (66 feet) from the piles, as shown in ***Table 6***. At the port of Benicia measurements were made during the driving of five (5) timber fender piles. The water depth was approximately 11 meters (36 feet) and the measurements were made at 10 meters (33 feet) from the piles.

Table 6 – Measurement Data from Piles driven at Ballena Bay Project and Port of Benicia

Distance from Pile	Pile Type	Peak	RMS		One Second SEL	
		Maximum	Average	Range	Average	Range
Ballena Bay 3,000 Pound Drop Hammer						
10 meter	Timber	191	165	153-176	Not measured	
20 meter	Timber	181	160	152-170	Not Measured	
Port of Benicia 3,000 Pound Drop Hammer						
10 meter	Timber	180	159	150-170	146	139-158

State Route (SR) 37

Underwater sound measurements were performed on January 14, 2008, during the installation of four 0.3-meter (13- inch) diameter reinforced plastic composite piles to be used as fenders for the Route 37 Napa River Bridge in Solano County, California. The measurements were made at distances of 10 and 20 meters (33 and 65 feet) from the piles at a depth of about 3 meters (10 feet) below the water surface. Water depth was about 10 meters (33 feet). The peak sound pressures and the RMS levels were monitored continuously during the driving event. SEL levels were monitored but not continuously. The levels measured at both positions are shown in ***Table 7***. The piles driven had a steel driving shoe attached and were approximately 85 feet long. The piles were driven with an ICE-60 diesel-powered hammer.

Table 7 – Measurement Data from Piles driven at SR 37 Fender Repair Project

Distance from Pile	Pile Type	Peak	RMS		One Second SEL	
		Maximum	Average	Range	Average	Range
Piles were driven with a ICE- 60 diesel impact hammer						
10 meter	Plastic/composite	173	153	142-159	Not measured	
20 meter		172	151	141-157	Not Measured	

Orwood Bridge Replacement Project - The Contra Costa County Public Works Department is replacing Orwood Bridge in Orwood, California. As part of the construction project, noise levels were measured for one 72-inch Cast in drilled hole (CIDH) pile used to support the new bridge structure. The CIDH piles consist of a drilled hole containing a reinforced concrete pile section constructed within a temporary steel casing. As the casing is advanced, the inside sediment/soils were simultaneously removed with the use of a grab-style bucket. Measurements were made at three locations; the results are listed in ***Table 8***. The peak levels were dominated by work on the casing

when connecting two sections together, the levels were approximately 10 dB lower when the drilling and excavation work was being undertaken.

Table 8 – Measurement Data for 72-inch CIDH at Orwood Creek Bridge

Pile	Distance	Peak		RMS		SEL	
		dB re: 1µPa		dB re: 1µPa		dB re: 1µPa	
		Mean	Range	Mean	Range	Mean	Range
Bent 2	10 meters	134	119-174	122	106-155	122	108-150
	30 meters	129	115-163	113	94-142	114	102-140
	135 meters	129	125-155	104	94-133	97	89-124

Adjustment to Data

No adjustments were made for the Timber or composite piles. ***Table – 9*** shows the source levels used in this analysis.

Table 9 – Data used in analysis

Distances	Hammer Type	Peak	RMS	SEL
Timber Piles				
10 meters [1]	Drop Hammer	191	165	151
10 meters [2]	Vibratory	175	161	161
Composite Piles				
10 meters [3]	Diesel Hammer	173	159	148[4]

Source: 1 – Port of Benicia and Ballena Bay projects
2 – Naval Station Norfolk
3 – State Route 37 Napa River Bridge Fender Pile Replacement Project
4 – SEL data Estimated from post analysis of of measured data

Underwater Sound Generating Activities

The primary sources of underwater sound would be from the driving of round composite or timber piles to replace the fender system around the existing abutments, with the bulk of them protecting the Control Tower on the north end of the bridge. All the piles would be driven in the creek channel. There will be approximately 250 composite/timber piles that are 14-meter (45-foot) long installed with either a diesel impact hammer, 3,000 lb. drop hammer, or a vibratory hammer. The large diameter piles being used for the Control Tower are CIDH piles and the steel shells used for the outer shell of the piles will not be driven in rather they will be lowered into the channel and allowed to sink under their own weight and not driven with any mechanical means (impact or vibratory driving).

Prediction of Underwater Noise Levels from Construction

Pile driving of the timber or composite fender piles in the creek could result in high underwater sound levels. This project includes replacing 250 fender piles along the two abutments and Control Tower for the bridge. Pile driving will be required for these fender piles. All pile driving will be done in the creek channel in a water depth of approximately 10 meters (33 feet).

Sounds from similar size fender piles have been measured and the data from these projects was used to estimate the impact zones for this project. Data measured at the SR 37 Fender Repair Project, the Fender repair project at the Naval Station Norfolk, and the Ballena Bay and Port of Benicia Projects, included timber and composite piles similar to the size of diameter piles being driven on water in similar depth water.

Noise from installation of the CIDH piles will be minimal, assuming that there will be no impact or vibratory pile driving. The primary noise associated with the installation of the CIDH piles will be the noise from the excavation of the material from the inside of the casing. Data measured during the installation of 72-inch CIDH piles for the Orwood Bridge Replacement Project was used.

Prediction of Noise from Project Pile Driving

Noise predictions were calculated using the NMFS spreadsheet for fish developed in 2012 and a separate NMFS spreadsheet for marine mammals, developed in July 2016.

Pile driving is expected for installing a fender system at each end of the bridge abutments. Noise impacts are discussed specifically for each area of pile driving. ***Table 10*** shows the distances to the various fish criteria, based on computations made using the NMFS calculator with the timber pile near-source levels described above and pile driving durations. A transmission loss coefficient of 30 was used for the vibratory driven timber fender piles and a transmission loss coefficient of 20 was used for the timber piles installed with a drop hammer and a transmission loss coefficient of 16 was used for the composite piles installed with a diesel impact hammer. The calculations are shown in Attachment 1.

Table 10 – Calculated Area of Impact for Fish

Description of work	Pile Type	Estimated Length		Distance to Fish Thresholds (m)			
				Cumulative SEL		206 dB Peak Threshold	150 dB RMS Threshold
		Vibratory driving	Impact driving	187 dB [1]	183 dB [1]		
Option A - Fender Piles Impact Driven with Drop Hammer	Timber Piles	0	85	<10	<10	<10	56
Fender Piles Impact Driven with Diesel Hammer	Composite Piles	0	85	<10	<10	<10	40
Option B - Fender Piles Vibratory Driven	Timber or Composite Piles	85	0	--[2]	--[2]	<10	23

[1] This calculation assumes that single strike SELs < 150 dB does not accumulate to cause injury (Effective Quiet).
[2] SEL is currently not used in the evaluation of vibratory pile driving sounds

The NMFS spreadsheet tool was used to compute the distances for onset of Permanent Threshold Shift (PTS) hearing effects for the various marine mammal hearing groups that could be near the project. Similar to the NMFS calculator used for assessing fish impacts, this calculator makes predictions using the near source levels, driving durations and weighted frequency adjustments for the sound types. Effects from impact driving were based on the IMPACT Pile Driving tab. Sounds for vibratory driving were based on the NON-IMPULSE-STAT-CONT tab. ***Table 11*** shows the distances to the various marine mammal criteria, based on computations made using the NMFS calculator with the fender pile near-source levels described above and pile driving durations.

Table 11 – Calculated Area of Impact for Marine Mammals

Description of work	Pile Type	Distance to Marine Mammal (m)					
		Cumulative SEL				160 dB RMS Threshold	120 dB RMS Threshold
		185 dB	203 dB	198 dB	219 dB		
Option A - Fender Piles Impact Driven	Timber Piles	-<10	-<10	--	--	18	--
Fender Piles Impact Driven with Diesel Hammer	Composite Piles	-<10	-<10	--	--	<10	--
Option B - Fender Piles Vibratory Driven	Timber or Composite Piles	--	--	<10	<10	--	233
CIDH Piles	Drilled Hole 60" – 72"	--	--	<10	<10	--	15

There will be four separate locations where fender piles will be replaced, one at each corner of the existing bridge (see Figures 2 and 3). All piles will be driven in the wetted portion of the creek bed in water up to 34 feet in depth. Based on the pile length of 85 feet for the fender piles used on the SR 37 Fender Pile Repair Project in which the water depth was similar, a pile length of 85 feet was used for this assessment.

This assessment assumes that there would be between 1100 and 1200 pile strikes per day at each fender system location over a 25 day period. With the Composite/Plastic piles being driven with a small diesel impact hammer, the single strike SEL is anticipated to be less than 150 dB re 1µPa and as such would not accumulate to cause injury to fish in the creek. There would be no exceedance of either the 187 dB or 183 dB re $1\mu Pa^2$-sec adopted cumulative SEL criteria and no mitigation would be required. With Timber piles driven with a 3,000 lb. drop hammer the single strike SEL would be approximately 151 dB re 1µPa The distance to both the 187 dB and 183 dB re $1\mu Pa^2$-sec adopted cumulative SEL criteria would be less than 10 meters and as such no mitigation would be recommended.

The distance to the PTS hearing impact zones would be less than 10 meters for any means of installing the fender piles. The distance to the 120 dB RMS harassment zone during the vibratory

pile driving of the fender piles would be approximately 235 meters, and the distance to the 160 dB RMS harassment zone during the Impact pile driving of the fender piles would be approximately 20 meters. Based on the sound levels from vibratory installation they would not have an adverse impact to the fish or marine mammal species.

Figure 4 shows the limits of the 150 dB fish behavior zone for impact pile driving. Attachment 1 shows the calculations used to assess the impacts.

CIDH Pile Installation –

Based on previous measurements at 10 meters (33 feet) the one-second SEL is less than 150 dB, the Peak levels were well below 206 dB and the average RMS values were less than 150 dB. According the NMFS, a one-second or single strike SEL below 150 dB does not accumulate to cause injury to fish. Therefore, the underwater noise levels expected from installing the CIDH piles will not exceed the adopted criteria for injury to fish.

During the installation of the CIDH piles the distance to the PTS hearing impact zones would be less than 10 meters for any means of installing the fender piles. The distance to the 120 dB RMS harassment zone during the vibratory pile driving of the fender piles would be approximately 15 meters.

Based on the sound levels from vibratory installation they would not have an adverse impact to the fish or marine mammal species.

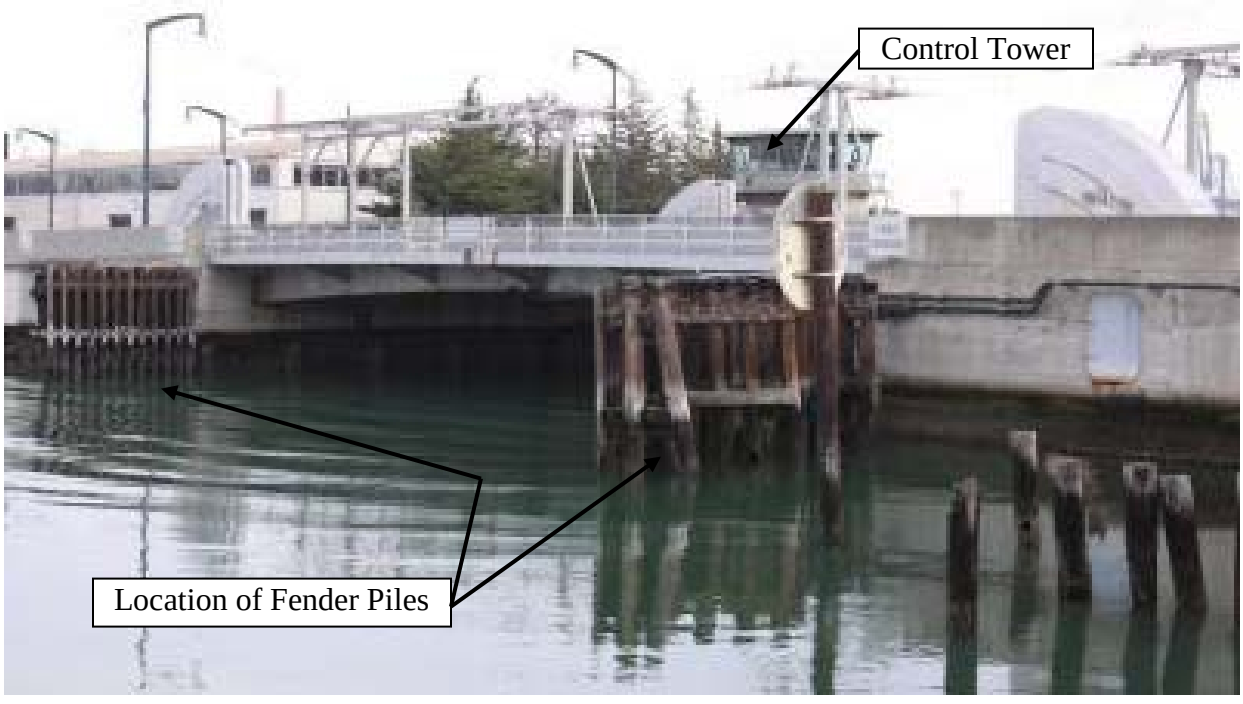


Figure 2 - Fender Pile Locations on the west side of the bridge

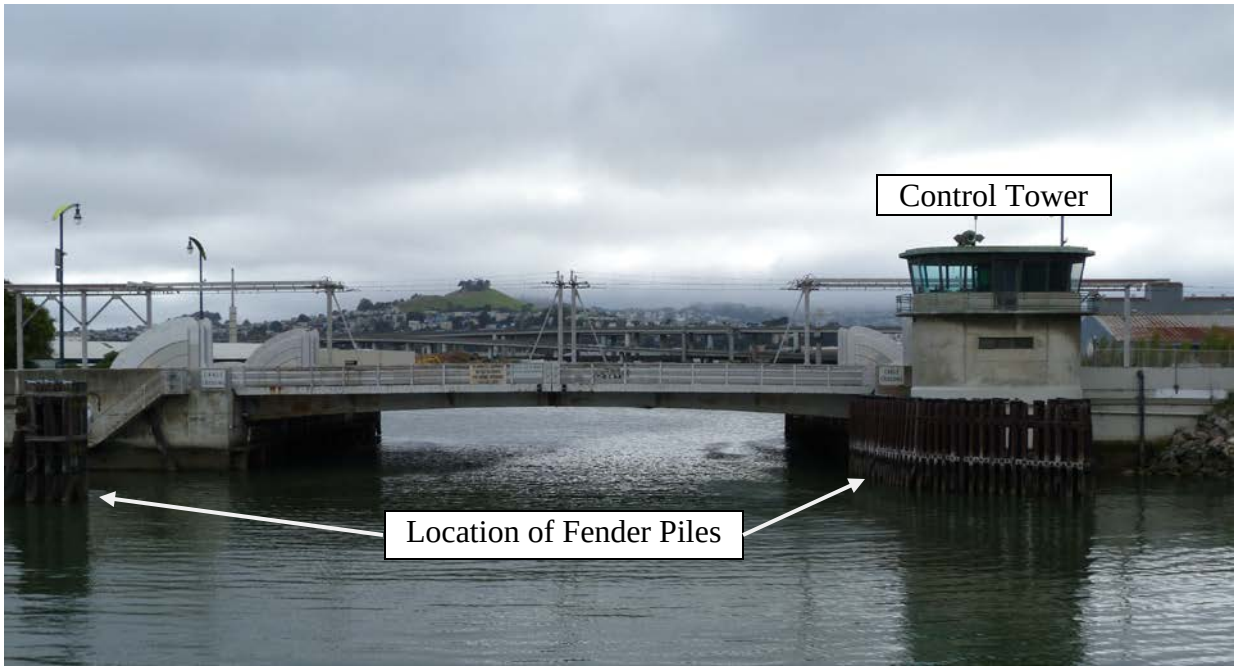
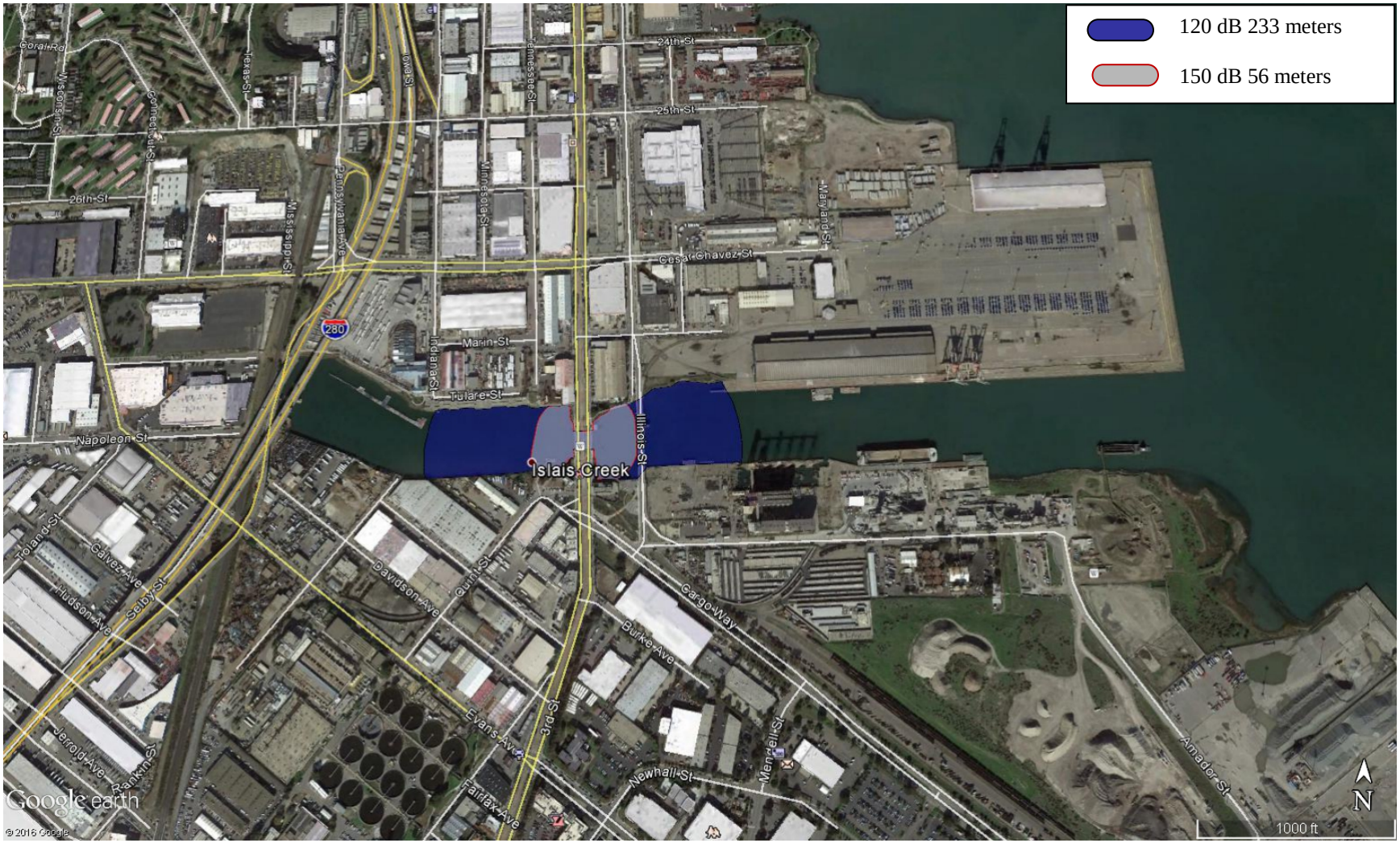


Figure 3 - Fender Piles on the East side of the Bridge

Figure 4 – Islais Bridge Timber Fender Pile - 150 dB RMS Fish Harassment Zone and the 120 dB RMS Marine Mammal Harassment zone.



Attachment 1
Impact Assessment Calculations

Timber Piles Driven with 3,000 Drop Hammer

Project Title	Islais Bridge Retrofit
Pile Information (size, Type, Number, Pile strikes, Etc.)	250 14-inch diameter Timber Piles 85 feet long. Estimate 10 piles per day, Estimate ±25 days of pile driving.

Timber Piles	Acoustic Metric					
	Peak	RMS	SEL	Effective Quiet		
Measured single strike level (dB)	191	165	151	150		
Distance (m)	10	10	10			
Estimated number of strikes	1100	Assumes 110 blows per pile w/3,000lb drop hamme				
Cumulative SEL at measured distance						
181						
	Distance (m) to threshold					
Cumulative SEL at measured	**Peak**	**RMS**			**Cumulative SEL****	
(15 if unknown)	206	160	150	120	187	183
20	2	18	56	NA	5	8

** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet).

Source of Estimate
The Peak, One Second SEL, and RMS values were derived from the Caltrans Compendium (Nov. 2015). The project selected for this analysis was The Ballena Bay and the Port Benicia Project
Measurements were made at distances from 4m to 80m
Unattenuated sound pressure levels for piles driven in water 4 meters (13 feet) deep
Timber Piles
These criteria most closely matched the current project's conditions:
Piles were driven in the water
the water depth is shallower than the project site (4 meters vs 9 meters)
Piles are the same size
No adjustment were made; The calculated Transmission Loss Constant calculated for the data at the Ballemna Bay Project was 30.
Values used from the Caltrans Compendium Table 1.2-3 (Page 4 of 4) (page 3 of 3)Summary of Sound Measurements for Marine Pile Driving -November 2015

Plastic Pile driven with a ICE-60 Diesel Impact Hammer

Project Title	Islais Bridge Retrofit
Pile Information (size, Type, Number, Pile strikes, Etc.)	250 14-inch diameter Plastic/Composite Piles 85 feet long. Estimate 10 piles per day, Estimate ±25 days of pile driving.

Timber Piles	Acoustic Metric			
	Peak	RMS	SEL	Effective Quiet
Measured single strike level (dB)	173	159	148	150
Distance (m)	10	10	10	

Estimated number of strikes	1200	Assumes 120 blows per pile w/small diesel hamme

Cumulative SEL at measured distance
179

Distance (m) to threshold

Cumulative SEL at measured distance	Peak	RMS			Cumulative SEL**	
(15 if unknown)	206	160	150	120	187	183
15	0	9	40	NA	3	5

** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury

Source of Estimate

The Peak, One Second SEL, and RMS values were derived from the Caltrans Compendium (Nov. 2015). The project selected for this analysis was The SR 37 Fender Pile Repair Project on the Napa

Measurements were made at distances of 10m and 20m

Unattenuated sound pressure levels for piles driven in water 10 meters (33 feet) deep

Plastic composite Piles

These criteria most closely matched the current project's conditions:

Piles were driven in the water

the water depth is approximates the depth at the project site (10 meters vs 9 meters)

Piles are the same size

No adjustment were made; The calculated Transmission Loss Constant calculated for the data at the SR 37 Fender Pile Project was 16Log(dist).

Values used from the Caltrans Compendium Table 1.2-3A (Page 2 of 2) Summary of Sound

Timber Piles Driven with Vibratory Hammer

Project Title	Islais Bridge Retrofit
Pile Information (size, Type, Number, Pile strikes, Etc.)	250 14-inch diameter Timber Piles 85 feet long. Estimate 10 piles per day, Estimate ±25 days of pile driving.

Timber Piles	Acoustic Metric			
	Peak	RMS	SEL	Effective Quiet
Measured single strike level (dB)	175	161	161	150
Distance (m)	10	10	10	
Estimated number of strikes	1200	Assumes 120 seconds per pile		
Cumulative SEL at measured distance				
192				

Distance (m) to threshold

Transmission loss constant	Peak	RMS			Cumulative SEL**	
(15 if unknown)	206	160	150	120	187	183
30	1	NA	23	233	NA	NA

** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet).

Source of Estimate

The Peak, One Second SEL, and RMS values were derived from the Caltrans Compendium (Nov. 2015). The project selected for this analysis was The Fender pile project at the Naval base in Norfolk, Virginia

Measurements were made at distances from 4m to 80m

Timber piles

These criteria most closely matched the current project's conditions:

Piles were driven in the water

the water depth is shallower than the project site (4 meters vs 9 meters)

Piles are the same size

No adjustment were made; The calculated Transmission Loss Constant calculated for the data at the Naval Station Norfolk was 34, this was adjusted down to 30 to give a reasonable conservative approach.

Values used from the Caltrans Compendium Table 1.2-3 Addendum 3 (Part 2 of 2) Summary of Sound Measurements for Marine Pile Driving -November 2015

Impact driving Timber Fender Piles

$SEL_{cum} = SEL_{ss} + 10$ Log (# strikes)	181.8
Source Level (Single Strike/shot SEL)	151
Number of strikes in 1 h OR Number of strikes per pile	120
Activity Duration (h) within 24-h period OR Number of piles per day	10
Propagation (xLogR)	20
Distance of single strike SEL measurement (meters)	10

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**8.7**	**0.7**	**9.9**	**5.4**	**0.8**

Impact Driving Composite Fender Piles

$SEL_{cum} = SEL_{ss} + 10$ Log (# strikes)	178.8
Source Level (Single Strike/shot SEL)	148
Number of strikes in 1 h OR Number of strikes per pile	120
Activity Duration (h) within 24-h period OR Number of piles per day	10
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**5.2**	**0.2**	**6.2**	**2.8**	**0.2**

Vibratory Driving Fender Piles

Source Level (Single Ping/Pulse SEL)	161
Activity Duration (hours) within 24-h period	0.33
Number pulses in 1-h period	99000
Number of pulses in 24-h	32670
10 Log (number of pulses)	45.14
Propagation (xLogR)	30

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**1.7**	**0.5**	**2.1**	**1.3**	**0.4**

Appendix H National Marine Fisheries Service 2017 Endangered Species Act Section 7(a)(2) Concurrence Letter and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Islais Creek Bridge Rehabilitation Project (BRLO-5934(168)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

July 31, 2017 **Refer to NMFS No:** WCR-2017-6760

Karen Reichardt
Acting Environmental Branch Chief
California Department of Transportation, District 4
Office of Local Assistance
111 Grand Avenue, MS-10B
Oakland, California 94623-0660

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Islais Creek Bridge Rehabilitation Project (BRLO-5934(168))

Dear Ms. Reichardt:

On April 5, 2017, NOAA's National Marine Fisheries Service (NMFS) received California Department of Transportation's (Caltrans)[1] request for a written concurrence that Caltrans' proposed Islais Creek Bridge Rehabilitation Project in the City and County of San Francisco, California is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparations of letters of concurrence.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the

[1] Effective October 1, 2012, Caltrans will be acting as the lead agency as per the Memorandum of Understanding (MOU) between the Federal Highway Administration (FHWA) and Caltrans pursuant to the Moving Ahead for Progress in the 21st Century Act (MAP-21). This law allows the Secretary of Transportation to assign, and Caltrans to assume, responsibility for the environmental review, consultation, or other actions required under any environmental law with respect to one or more highway projects within the state of California. The MOU is an extension of previous agreements between FHWA and Caltrans in 2007 and 2010, under a similar law. Therefore, Caltrans is considered the federal action agency for ESA consultations with NMFS for federally funded projects involving FHWA.

Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Public Consultation Tracking System (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts).[2] A complete record of this consultation is on file at NMFS North Central Coast Office, Santa Rosa, California.

Proposed Action and Action Area

Caltrans and San Francisco Public Works are proposing rehabilitation and seismic upgrades at the Islais Creek Bridge, which carries Third Street (north-south orientation) over the Islais Creek Channel (Channel) in the City and County of San Francisco. Built in 1949, Islais Creek Bridge is a steel, double-leaf, drawbridge with counterweight, measuring approximately 100 feet wide and spanning 114 feet over the channel. The bridge carries both vehicular and light rail traffic. The rehabilitation work and seismic upgrades for the proposed project include replacing bridge leaves and the fender pile system, upgrading the control tower, and installing a new submarine power cable. Additionally, proposed work includes the improvement and replacement of bridge railings and sidewalks in order to comply with the Americans with Disabilities Act (ADA).

Replacement of bridge leaves. Temporary scaffolding or debris containment systems on the superstructure of the bridge will be used as needed to replace the bridge leaves, but will not require the placement of any piles or other materials below the waterline. The bridge will be taken out as a single unit and floated out on barges, dismantled, and transported off-site. The new leaves will be manufactured off-site, transported by barge back to the bridge site, and floated in by barge for final assembly and installation.

Repair and replacement of fender pile system. The existing creosote treated wood piles, up to 220 in number, will be removed in their entirety and any broken piles will be cut at the mudline. Approximately 250 14-inch diameter composite piles will replace the existing fender system, and be installed adjacent to the existing piles. All pile removal and installation will be done using a barge-mounted crane equipped with a vibratory hammer. Divers may be used to assist in clearing material to expose broken piles for removal. A silt-curtain will be installed to minimize turbidity during pile removal. Pile removal and installation will be limited to the period between June 1 and November 30, and take approximately one month.

Control Tower upgrade. Repair and upgrade of the control tower includes the removal of existing concrete piles, and the installation of four 5-foot diameter cast-in-drilled-hole (CIDH) piles and a concrete wall to increase lateral strength. CIDH piles will be installed by first setting a temporary steel casing, which is set into the substrate using gravity. Sediment will be removed from within the casing using a grab bucket and all sediments will be contained with no discharge to Islais Creek. Concrete is then set within the casing and the portion of the casing above the mudline will be removed. Once the CIDH piles are constructed, the concrete wall will be installed creating a watertight form that extends into the mudline, which is then filled with concrete. All in-water work to construct the CIDH piles and wall will be accomplished using best management practices (BMPs) to minimize bottom sediment disturbance and to ensure that concrete and cure and drilling

[2] Once on the PCTS homepage, use the following PCTS tracking number within the Quick Search column: WCR-2017-6760.

fluid remains contained and not allow to contact the water. Work will be done at low-tide from an anchored barge with diver support, if necessary.

Submarine cable. An existing submarine cable supplies power to the south abutment machine room from the north abutment machine room. The replacement cable would be placed adjacent to the existing cable, on top of the Channel bed surface, and covered with a 2,250 square foot rock blanket on top for protection from scour. The rock blanket consists of interconnected, pre-fabricated 5 to 18-inch thick concrete blocks, which are interwoven with high strength cables. The existing submarine cable is damaged and covered with sediment; it will be disconnected from power and left in place to avoid disturbing the substrate.

Replacement of bridge sidewalk and railing. The existing bridge sidewalk surface (6 to 7 feet wide on each side of the bridge for a total area of 1,380 square feet) consists of grated material that does not meet the ADA or the City and County of San Francisco requirements due to gaps and vertical displacements greater than ½ inch. The bridge rails also do not meet the ADA or City and County of San Francisco requirement of gaps less than 4 inches. Replacement of the bridge sidewalks and railings will include installation of a smooth surface sidewalk with a fiber reinforced polymer deck (no light transmittance) and additional cable installation to reduce railing gaps and increase rail height.

Construction will take 16 months to complete, and portions of the project above mean higher high water may occur year round. In-water work will be limited to two six-month long periods between June 1 and November 30, with control tower foundation work being completed in the first year and the fender replacement and cable installation occurring in the second year .

Caltrans outlined and described avoidance and minimization measures that will be implemented to protect ESA-listed species, their habitat and EFH before, during, and after construction. These measures include:

- Piles will be removed and installed using a vibratory hammer to minimize sound impacts;
- During pile removal and installation of new concrete piles at the control tower and replacement of the fender system, a silt curtain will be installed to minimize turbidity;
- During the installation of CIDH concrete piles, a casing will be used to contain any drilling fluid or water that has come into contact with wet cement. The casing will either be fitted with a watertight rubber seal or embedded in the bed of the Channel;
- Vehicle, barge, and equipment staging will not occur in vegetated areas;
- The project's contractor will prepare an emergency response and cleanup plan prior to beginning work at the site. The plan will detail the methods to be used to contain and clean up spills of petroleum products or hazardous materials in the work area;
- No discharges of pollutants from vehicle and equipment cleaning are allowed into the storm drain or watercourses;
- Vehicle and equipment fueling and maintenance operations must be at least 50 feet away from watercourses;
- Concrete wastes collected in washouts and water from curing operations will be collected and disposed of, and will not be allowed into Islais Creek Channel;

- Dust control measures will be implemented, including the covering of temporary stockpiles when required by weather conditions; Coir rolls will be installed along or at the base of slopes during construction to capture sediment, and temporary organic hydro-mulching will be applied to any unfinished disturbed and graded areas.

The action area includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). For this proposed project, the action area consists of an approximately 65-acre area in Islais Creek and adjacent upland staging areas. Within the action area, approximately 14.27 acres is subtidal habitat encompassing and expanding outward from the Islais Creek Bridge.

Subtidal habitat in the action area was historically a tidal inlet at the mouth of Islais Creek, which flows from Twin Peaks, draining approximately 3,000 acres before reaching the Bay. The Channel width in the action area is approximately 150 feet at lower low water. Water depth ranges from three to nine feet at high tide and parts of the Channel may be dry during lower low tides. Most of the upland runoff that once emptied into the Channel is redirected to a waste water treatment plant, and water within the Channel is primarily estuarine. The upland area surrounding the Channel is highly urbanized.

There are no interrelated or interdependent activities associated with the proposed action.

Action Agency's Effects Determination
Caltrans has determined that the project may affect, but is not likely to adversely affect (NLAA) listed species and their critical habitat. Caltrans' determination is based on the unlikelihood of listed species being present in the action area between late spring and early fall, and the incorporation of measures to avoid and minimize effects.

Available information indicates the following listed species (Distinct Population Segments [DPS] and critical habitat under the jurisdiction of NMFS may be affected by the proposed project:

Central California Coast steelhead DPS (*Oncorhynchus mykiss*)
threatened (71 FR 834; January 5, 2006)
critical habitat (70 FR 52488; September 2, 2005);

North American green sturgeon southern DPS (*Acipenser medirostris*)
threatened (71 FR 17757; April 7, 2006)
critical habitat (74 FR 52300; October 9, 2009).

The life history of steelhead is summarized in Busby *et al.* (1996). Central California Coast (CCC) steelhead use San Francisco Bay as a migration corridor and pass through the greater San Francisco Bay on their way to the ocean to rear as juveniles or to upstream areas to spawn as adults. Their migrations generally take place in the winter and spring months.

The life history of threatened green sturgeon in California is summarized in Adams *et al.* (2002) and NMFS (2005). The southern DPS of North American green sturgeon spawn in the deep turbulent sections of the upper reaches of the Sacramento River. As juvenile green sturgeon age,

they migrate downstream and live in the lower delta and bays, spending from three to four years there before entering the ocean. Green sturgeon likely optimize their growth opportunities in summer by foraging in the relatively warm waters of estuaries (Moser and Lindley 2007). Green sturgeon forage on benthic prey items throughout the estuary, notably shallow tidal flats dominated by burrowing shrimp and other benthic prey items (Dumbauld *et al.* 2008). Green sturgeon juveniles, subadults, and adults (pre-and post-spawning) are present in San Francisco Bay at various times throughout the entire year.

Regarding EFH, Caltrans has determined that the proposed project would have an adverse effect on EFH, however when work occurs, Caltrans concluded fish species utilizing the area should be able to find ample and suitable foraging areas in and along the adjacent area. Post-construction, fish species may return to feed, therefore Caltrans finds that the adverse effects will not substantially alter the value of EFH in the action area. The project area is located within an area identified as EFH for various life stages of fish species managed within the Pacific Coast Salmon Fishery Management Plan (FMP), the Pacific Groundfish FMP, and the Coastal Pelagic FMP. The project area is also within an area designated as Habitat Areas of Particular Concern (HAPC) for various federally-managed fish species within the Pacific Groundfish FMP and Pacific Coast Salmon FMP. HAPC are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. As defined in the Pacific Groundfish and Salmon FMPs, San Francisco Bay, including the project area, is identified as estuary HAPC.

Consultation History

By letter dated April 5, 2017, Caltrans requested initiation of informal consultation with NMFS and provided a biological assessment dated March 2017. Email correspondence between NMFS and Caltrans occurred between May and July 2017. During this time Caltrans provided additional clarifying information on the type of materials and equipment proposed for construction and removal of existing piles. Sufficient information was provided to NMFS for the initiation of consultation on July 17, 2017.

Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

The effects of the proposed action are reasonably likely to include temporary increases in underwater sound, temporary increases in turbidity and degradation of water quality, increased shading of aquatic habitat, and disturbance of benthic habitat. By restricting in-water work activities period between June 1 and November 30, the proposed work schedule avoids the primary

migration periods of CCC steelhead. Thus, NMFS anticipates CCC steelhead are unlikely to be present in the action area during in-water construction. As presented below, impacts associated with the proposed work will be temporary and fully dissipate when construction activities cease; therefore, any construction-related effects to listed anadromous salmonids are anticipated to be discountable.

The proposed project includes the use of a vibratory hammer to remove 220 existing wooden piles and install 250 14-inch diameter composite piles. Studies assessing sound levels associated with vibratory hammer activities have been performed for pile installation projects in San Francisco Bay. Based on hydroacoustic data collected previously from projects using vibratory hammers to install piles (Buehler *et al*, 2015), sound pressure levels generated by this project's activities to remove and install piles would not present a risk of physical injury or mortality to sturgeon. Pile driving activities could result in noise that may startle fish and result in temporary dispersion from the action area. If fish were to react behaviorally to the sound produced by construction activities, adequate water depths and area within the open waters of adjacent San Francisco Bay would be expected to provide fish sufficient area to disperse. Thus, the effects of underwater sound levels associated with the use of a vibratory hammer and in-water disturbance during pile driving activities are expected to be insignificant to green sturgeon.

Disturbance of bottom sediments during project construction will cause degradation of water quality in the form of increased turbidity, which can affect fish in a variety of ways. High levels of turbidity can affect listed fish species by disrupting normal feeding behavior, reducing growth rates, increasing stress levels, and reducing respiratory functions. If sediment loads remain high for an extended period of time, the primary productivity of an aquatic area may be reduced (Cloern 1987) and fish may suffer reduced feeding ability and be prone to fish gill injury (Benfield and Minello 1996, Nightingale and Simenstad 2001). For this project, increased levels of suspended sediment and turbidity are expected to occur during the removal and installation of piles, and during the placement of the submarine cable and its associated protective blanket. Silt curtains will be utilized during these construction activities to minimize turbidity. Turbidity impacts associated with the pile removal and installation are expected to be temporary and localized. Similarly, during placement of the CIDH piles, turbidity will be minimized by setting the steel casing using gravity; all concrete setting will occur within the casing, avoiding further disturbance to the sediment. Furthermore, green sturgeon are adapted to living in estuaries with fine sediment bottoms and are tolerant of high levels of turbidity. Specifically, they are tolerant of levels of turbidity that exceed levels expected to result from the project's proposed activities. For these reasons, the potential effects of minor and localized areas of elevated turbidity associated with this project are expected to be insignificant to green sturgeon.

The action area is located within designated critical habitat for CCC steelhead and the southern DPS of green sturgeon. The designations of critical habitat for CCC steelhead and green sturgeon uses the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7214) replace this term with physical or biological features (PBFs). Regardless of whether the original designation identified primary constituent elements, physical or biological features, or essential features, the shift in terminology does not change the approach used in conducting our analysis. In this LOC, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The PBFs of designated critical habitat for CCC steelhead include estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. For the southern DPS of green sturgeon, the PBFs of designated critical habitat in estuarine areas include food resources, water flow, water quality, migratory corridor, water depth, and sediment quality.

The proposed removal of approximately 220 creosote pilings will eliminate an ongoing source of contamination. Polycyclic aromatic hydrocarbons (PAHs) leach from creosote-treated wood into the environment. PAHs are known to cause cancer, reproductive anomalies, and immune dysfunction in fishes. For these reasons, the removal of creosote pilings is expected to benefit critical habitat in the action area for listed salmonids and green sturgeon.

The project's modifications to the Islais Creek Bridge are anticipated to result in a net increase in overwater shading of 1,380 square feet. Shading is known to reduce growth of submerged aquatic vegetation, decrease primary productivity, alter predator-prey interactions, change invertebrate assemblages, and reduce the density of benthic invertebrates (Helfman 1981; Glasby 1999; Struck *et al.* 2004; Stutes *et al.* 2006). For this project, the net increase in overwater shading is a result of the replacement of the grated walkways on either side of the bridge with solid reinforced polymer walkways. The north/south orientation of the bridge will minimize the amount of persist shading over the course of a diurnal cycle. As described above, the habitat in this area consists of a shallow intertidal area composed of rip-rap and soft sediment. Submerged aquatic vegetation is not currently found within this area nor elsewhere along Islais Creek Channel. Foraging habitat for listed fish is degraded due to the long-term industrialization of the area. Based on the orientation of the bridge, the highly modified condition of aquatic habitat along the Channel, and the industrial nature of the area, the small expansion of the Islais Creek Bridge is not expected to degrade PBFs of designated critical habitat in the action area.

During project activities critical habitat will be temporarily affected by degraded water quality (increased turbidity) and disturbance of the substrate. As discussed above, effects to water quality are expected to be insignificant. Project activities (pile installation and removal, submarine cable and rock blanket installation) are expected to disturb the substrate of Islais Creek Channel which may impact the benthic community, including some benthic invertebrates. Disturbances due to pile removal and installation are not expected to result in significant loss of benthic habitat as replacement piles are to be installed in the same location as those being removed. Following the installation of the submarine cable and rock blanket, it is expected that the area will fill in naturally with fine sediment and benthic organisms will re-colonize the area impacted by the rock blanket. Based on the above, the potential effects of this project are considered insignificant, and are not expected to result in either a net change to existing habitat values in the action area or result in adverse impacts to designated critical habitat.

Conclusion

Based on this analysis, NMFS concurs with Caltrans that the proposed action is not likely to adversely affect the subject listed species and designated critical habitats.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by Caltrans or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or if (3) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA portion of this consultation.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Under the MSA, this consultation is intended to promote the protection, conservation and enhancement of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10), and "adverse effect" means any impact which reduces either the quality or quantity of EFH (50 CFR 600.910(a)). Adverse effects may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

NMFS determined the proposed action would adversely affect EFH for the Pacific Groundfish FMP and the Coastal Pelagic FMP by increasing turbidity, shading, and disturbing benthic habitat. As discussed above, disturbance during construction activities may re-suspend bottom sediments into the water column. High levels of turbidity can reduce light penetration and lower the rate of photosynthesis for subaquatic vegetation (Dennison 1987), and may also, over time, reduce the primary productivity of an aquatic area (Cloern 1987). For this project, increased levels of suspended sediment are expected to be temporary as turbidity increase will subside once construction activities are complete. As described above, if fish are displaced by construction activities, suitable habitat for foraging will remain available adjacent to the project area during construction.

Removal of the existing grated walkway and replacement with a solid reinforced polymer walkway on either side of on Islais Creek Bridge will result in 1,380 square feet of additional overwater shading of benthic habitat in Islais Creek. As described above, the habitat in this portion of the Islais Creek Channel is composed of largely soft bottom/silt or mud, which may provide habitat to benthic invertebrates, but does not currently support aquatic vegetation. Persistent shading over the diurnal cycle will be minimized by the north/south orientation of the bridge.

Based on this analysis, NMFS has determined the proposed action would adversely affect EFH for various life stages of fish species managed under the Pacific Groundfish and Coastal Pelagic FMPs identified above; however, the proposed action contains adequate measures to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Therefore, NMFS has no practical EFH conservation recommendations to provide to avoid or reduce the magnitude of these effects. The

Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH (50 CFR 600.920(1)). This concludes the MSA portion of this consultation.

Please direct questions regarding this letter to Sara Azat, North Central Coast Office in Santa Rosa, California at (707) 575-6067, or via e-mail at sara.azat@noaa.gov.

Sincerely,

for Barry Thom

Barry A. Thom
Regional Administrator

cc: Dan Rivas, Caltrans, Oakland
Copy to ARN File # 151422WCR2017SR00127
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BHLO-5934 (169) Islais Creek Final NES

Final Audit Report 2023-08-15

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