Murray Street Bridge (# 36C-0108)
Seismic Retrofit Project

Natural Environment Study

Santa Cruz Yacht Harbor
City of Santa Cruz
Santa Cruz County, CA
Federal Project Number STPLX-5025 (048)
August 2010

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Summary

- The existing Murray Street Bridge (Bridge # 36C-0108) crosses the Santa Cruz Small Craft Harbor in the city of Santa Cruz, California. Due to the structure's seismic vulnerability, the City in conjunction with Caltrans has embarked upon development of retrofit design plans.

- The proposed project consists of a seismic retrofit of the existing Murray Street Bridge and additional minor modifications to replace deficient bridge barriers (widening shoulders to standard widths and replacement and improvement of sidewalks and railings). The seismic retrofit project will provide the bridge with additional vertical support and resistance to lateral seismic forces by installing additional pilings and supplemental structural elements. In order to provide sufficient area for construction operations, some boats, Harbor facilities, and commercial businesses will require temporary relocation.

- Federally-listed species known from or with the potential to inhabit the project Biological Study Area include steelhead, green sturgeon, and southern sea otter (*Enhydra lutris nereis*), as well as several species protected under the Migratory Bird Treaty Act and the Marine Mammal Protection Act. The Santa Cruz Small Craft Harbor is located within designated critical habitat for central California coast steelhead Distinct Population Segment (DPS) and the southern North American green sturgeon DPS. No federally or state listed plant species were observed in the botanical survey, and it is concluded that no native special status plant species occurs in the project area due to the highly disturbed nature of the entire area and the lack of suitable habitat. State-listed or State species of concern known from or with the potential to inhabit the project Biological Study Area include monarch butterfly and several special status bat species.

- The proposed Murray Street Bridge seismic retrofit project would result in a permanent alteration of 430 square feet critical habitat for steelhead and green sturgeon with installation of 24 30-inch steel casing piles within the Santa Cruz Small Craft Harbor to support and reinforce the bridge design. Although this alteration would be permanent, it would not appreciably diminish the value of critical habitat for both the survival and recovery of the species and is not likely to adversely modify designated steelhead or green sturgeon critical habitat as the pile installation would not result in obstruction to fish passage or migration, or eliminate significant estuarine habitat. No other permanent or cumulative impacts would result from the project.

- Potential adverse effects could result during construction activities, especially pile driving, which could, harm or harass steelhead, green sturgeon, and marine mammals in the open waters of the Santa Cruz Harbor and disrupt or diminish reproduction or cause nest abandonment in the bird rookery northwest of the project site. Construction activities could potentially impact birds nesting on the bridge as well as special-status bats that may use the existing bridge for roosting.

- With implementation of avoidance and minimization measures, the project is not likely to adversely affect federally listed steelhead and green sturgeon species. With implementation

of avoidance and minimization efforts, potential effects on the federal listed southern sea otter and marine mammals will be minimized; however, temporary harassment may occur. These measures include:

- Conducting in-water pile driving construction activity between July 1 and mid-November, outside the steelhead migration period, unless otherwise permitted by the National Marine Fisheries Service. This applies to all pile driving activity, including installation of permanent bridge piles, harbor berth replacement piles, and temporary piles for a construction trestle, if one is utilized, as well as removal of existing berth piles and removal of temporary trestle piles, if a construction trestle is erected. Criteria for extension of pile driving would include consideration of weather conditions. For example a low rainfall period in November and December could warrant extension to the beginning of January.

- Implementation of measures to reduce underwater sound pressure levels to the greatest extent feasible.

- Implementation of a marine mammal mitigation plan, including monitoring and establishment of a buffer-safety zone.

- Conducting preconstruction surveys to determine if nesting birds, bats, and marine mammals are present in the project area.

- Prior to breeding bird season, existing nests will be removed from the existing bridge and birds and bats subsequently excluded from nesting or roosting.

- Noise reduction practices should be implemented for all construction activities whenever possible to lessen disruption to wildlife.

- Construction of the proposed project would result in minor, temporary adverse impacts to EFH for Pacific coast salmon, coastal pelagic species, and Pacific coast groundfish through localized effects to water quality (e.g., increased turbidity, accidental spills of hazardous materials). Similarly, underwater sound pressures produced during pile driving activities would temporarily reduce the quality of EFH during construction activities. However, implementation of the proposed avoidance and minimization measures would reduce the likelihood, extent, and duration of these impacts. The proposed project would also result in the minor but permanent alteration of EFH through the construction of bridge support piles that would eliminate approximately 430 square feet of currently available habitat. However, existing conditions of fish habitat within Santa Cruz Harbor are considered highly disturbed and the area to be permanently occupied by piles is minimal compared to the remaining harbor waters.

- Some non-native, invasive plant species are found in the project vicinity, but none are within the work areas where soil and/or vegetation will be disturbed. There is no threat of spread of invasive species. In accordance with Executive Order 13112, in the event that any vegetation is removed during project activities, all vegetation will be disposed of at a

certified landfill to avoid the spread of invasive plants occurring on the project site. If a temporary barge is brought in for construction, all equipment will be inspected prior to entry into harbor waters to prevent potential introduction of invasive plant or animal species.

- No wetlands are present within the biological study area; therefore, in accordance with Executive Order 11990; no impacts to wetlands are anticipated. The tidal waters of the Santa Cruz Harbor are subject to Clean Water Act 404 and Rivers and Harbors Act Section 9 jurisdiction by the Army Corp of Engineers (ACOE) up to the high tide line. The City of Santa Cruz is responsible for obtaining all necessary permits and will initiate consultation with ACOE, DFG, RWQCB and CCC.

- Required project permits include:
  - Caltrans: Construction Authorization
  - U.S. Army Corps of Engineers: Section 404 Permit and Section 9 Permit
  - U.S. Coast Guard: Bridge Permit
  - California Coastal Commission: Approval of Coastal Development Permit
  - Regional Water Quality Control Board: Section 401 Water Quality Certification
  - California Department of Fish and Game: Potential 1601 Streambed Alteration Permit for work within the channel of the Yacht Harbor.
  - Public Utilities Commission: Potential approval for encroachment and/or work within or adjacent to the railroad right-of-way. (Approval from the Owner will be required.)
  - Santa Cruz Port District: Approval of temporary dock removal and replacement and use of Harbor lands for construction staging areas
  - County of Santa Cruz: Potential Encroachment Permit for work within County roadways

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List of Abbreviated Terms

ACOE	Army Corps of Engineers
Caltrans	California Department of Transportation
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRLF	California red-legged frog
dB	decibels
dbh	Diameter at breast height (~4 ft)
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
ESHA	Environmentally Sensitive Habitat Area
FHWA	Federal Highway Administration
ft	foot/feet
FWS	Fish and Wildlife Service
km	kilometer(s)
HBP	Highway Bridge Program
HBRR	Highway Bridge Replacement and Rehabilitation Program
KP	kilometer post
LCP	Local Coastal Program
m	meter(s)
MBTA	Migratory Bird Treaty Act
mi	mile(s)
MMPA	Marine Mammal Protection Act
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NPPA	Native Plant Protection Act
NTU	nephlometric turbidity units
PM	post mile
RWQCB	Regional Water Quality Control Board

UCSC	University of California Santa Cruz
USFWS	United States Fish and Wildlife Service
WBWG	Western Bat Working Group
WPT	western pond turtle

Chapter 1. Introduction

1.1. Project History

The existing Murray Street Bridge (Bridge # 36C-0108) crosses the Santa Cruz Small Craft Harbor in the City of Santa Cruz, California (Figure 1). Due to the structure's seismic vulnerability, the City in conjunction with Caltrans has embarked upon development of retrofit design plans. The City also received approval from Caltrans to rehabilitate the bridge, including replacement of the deficient bridge barriers under the federal Highway Bridge Program (HBP), formerly the Highway Bridge Replacement and Rehabilitation Program. In order to bring the bridge up to current standards, the narrow shoulders will be widened as part of the project.

1.2. Project Description

The proposed project is located at the eastern edge of the City of Santa Cruz in the County of Santa Cruz. The project area includes the Murray Street Bridge which spans the Santa Cruz Harbor, portions of lands within the Santa Cruz Port District harbor area, portions of the harbor waters, and the area along the Murray Street road right-of-way, west of Lake Avenue (Figure 2). The area north of bridge includes portions of harbor paths that would be temporarily disrupted during construction.

The proposed project consists of a seismic retrofit of the existing Murray Street Bridge, which spans the Santa Cruz Small Craft Harbor and additional minor modifications to replace deficient bridge barriers (widening shoulders to standard widths and replacement and improvement of sidewalks and railings). The seismic retrofit project will provide the bridge with additional vertical support and resistance to lateral seismic forces by installing additional pilings and supplemental structural elements. In order to provide sufficient area for construction operations, some boats, Harbor facilities, and commercial businesses will require temporary relocation.

Bridge Seismic Retrofit. The nine-span bridge is supported by two abutments (identified as Abutments 1 and 10, located at the western and eastern ends of the bridge, respectively) and 8 "bents" (identified as Bents 2 through 9, located at 60-foot intervals between the abutments). The seismic retrofit project consists of the following basic elements:

(1) Installation of concrete infill walls at Bents 2, 3, 4, and 9. These walls will span the voids between the existing concrete support columns and will be anchored to the columns with bonded dowels.

(2) Installation of shear keys and seat extenders at Abutment 1 and Bents 2 through 9.

(3) Retrofit of foundations with 16-inch diameter CISS (cast-in-steel-shell) piles at Bent 9 and Abutment 10. These piles will extend to depths of approximately –55 feet to –85 feet at Bent 9 and to depths of approximately –30 feet to –50 feet at Abutment 10.

(4) Retrofit abutment with two 96-inch CIDH piles behind Abutment 10 to a depth of -50 feet.

(5) Retrofit of both outriggers and bents with 30-inch diameter CISS piles at Bents 6, 7, and 8 and 30-inch diameter CIDH (cast-in-drilled-hole) piles at Bent 5. These piles will extend to depths of approximately -55 feet to -80 feet at Bent 5 and at approximately –85 feet to –110 feet at Bents 6-8.

(6) Installation of fenders to protect new piles.

Figure 3 provides a cross section showing the abutment and bents and proposed improvements. The installation of new piles at Abutment 10 and Bents 5 through 9 will include two piles on each side for a total of 24 piles. Both the CISS piles and the CIDH piles will be installed at 1:12 angles.

Additional Bridge Improvements. The project also includes replacement of deficient bridge barriers. In order to bring the bridge up to current standards, the narrow shoulders will be widened to provide standard 5-foot shoulders. The shoulder widening will consist of approximately an additional 2 feet on the north side of the bridge and 5-6 feet on the south side of the bridge. It is not anticipated that any work other than an overhang extension will be required on the north side widening. In addition, the construction of new bridge railings is required to conform to current codes. Roadway lane widths will remain the same as currently exists.

The proposed project will include the following improvements:

(1) Removal of existing curbs, sidewalks, and barrier railings on the bridge.

(2) Installation of new girders, road foundations, and road surfacing along the entire southern edge of the bridge, providing 5.5 feet of additional width. (The girders will be supported by the new 30-inch piles at Bents 5 through 8 and the 16-inch piles at Abutments 1 and 10 and at Bents 2, 3, 4, and 9.

(3) Installation of a new cantilevered extension along the entire northern edge of the bridge, providing approximately two feet of additional width. (This will not require additional foundation work.)

(4) Repaving of the bridge surface, and construction of a new 7-foot, 6-inch wide sidewalk on the south side of the bridge. Class 2 bike lanes will be provided in the roadway shoulders.

(5) Installation of new metal bridge railings on both the southern and northern sides of the bridge.

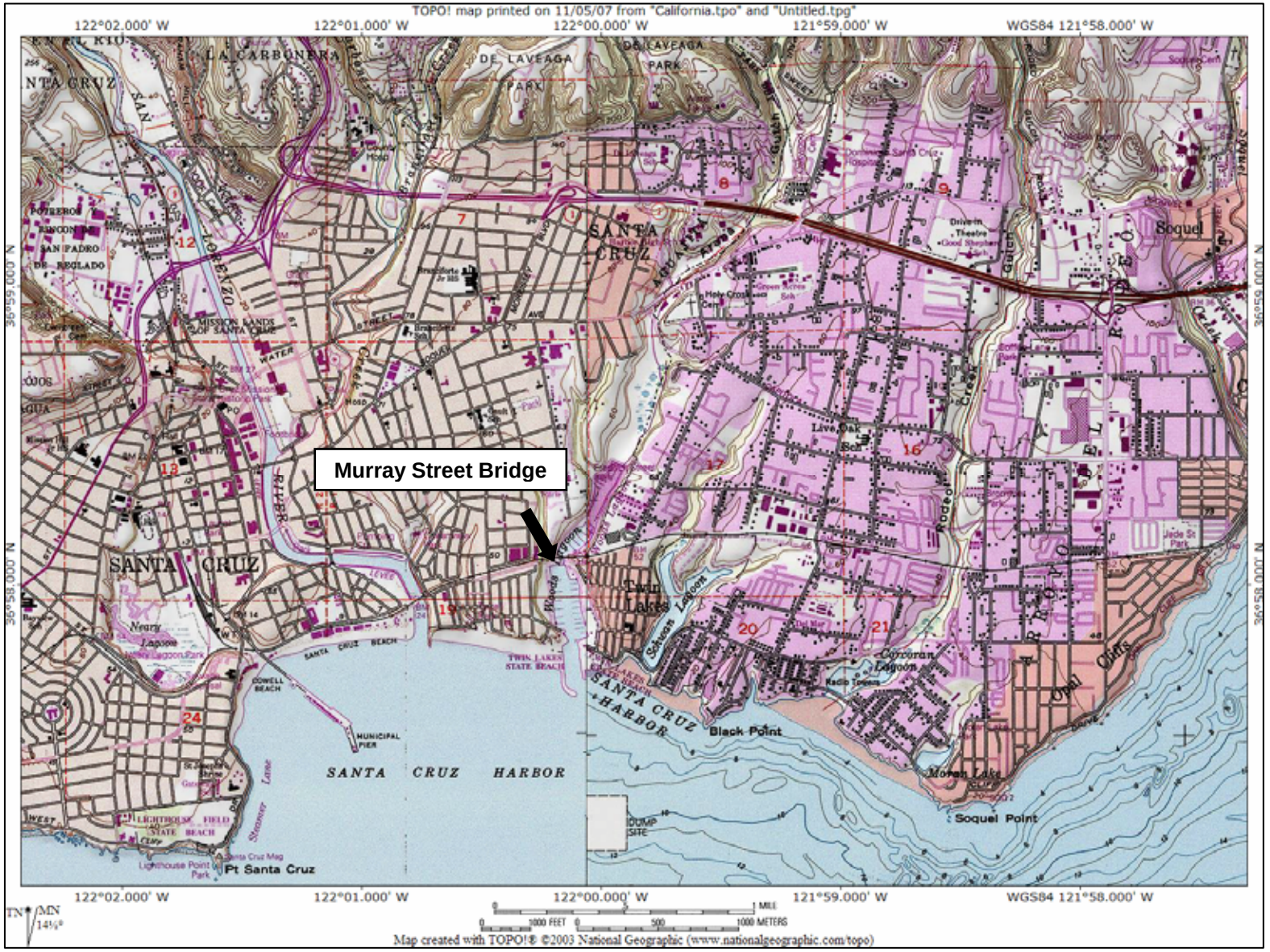
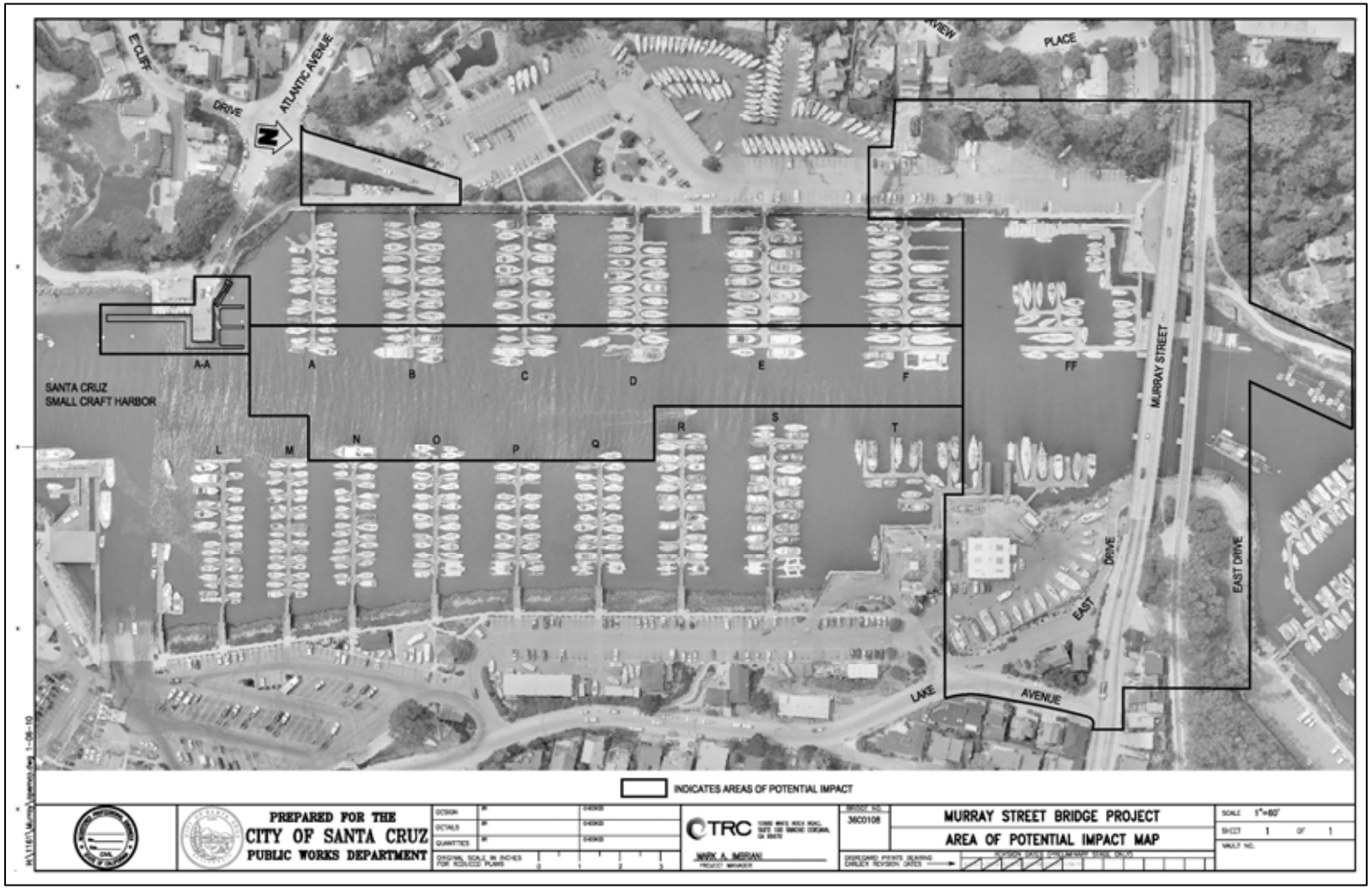


Figure 1. Vicinity of the Murray Street Bridge (# 36C-0108) in the City of Santa Cruz, County of Santa Cruz, CA.



Source: TRC Engineers

Figure 2. Aerial Photo of Area Surrounding the Murray Street Bridge *(# 36C-0108)* and Area of Potential Impact, in the City of Santa Cruz, County of Santa Cruz, CA.

Harbor Berth Removal and Replacement . A total of 12 recreational boat berths will be removed during construction, which includes removal of 2 berths from dock T with replacement at end of Phase 2 and removal of 10 berths from dock FF. To accommodate the removed berths, 11 new berths will be constructed on the west side of the harbor at Docks A through F. A temporary dock FF--with fewer berths—will be constructed at the southern end of the dock, which will accommodate 6 boats during construction. (Affected portions of Dock FF will be restored at the end of Phase 4.) Additionally, the berth for the commercial "Chardonnay" boat will be temporarily unavailable for a period of approximately two weeks during Phase 4 construction.

Although design plans have not yet been completed for the reinstalled berths, it is expected that the docks would be plastic, wood or concrete over polyethylene floats and would be anchored with pilings. Piles would be drilled into the harbor floor by mechanical hammer. Estimates provided by the Santa Cruz Port District indicate that the removal of berths will require the removal of 23 pilings. A total of 35 berth pilings will be installed for the new berths at docks A through F and replacement berths at the docks T and FF (see Table 1 for schedule). There would be no dredging or placement of fill in Harbor waters with reinstallation of docks and both berths.

1.2.1. Description of Construction Activities.

Construction Schedule and Phasing. The Murray Street Bridge Retrofit project is tentatively proposed for construction in five partially overlapping phases. Generally, work will begin on the eastern side of the Harbor and progress to the western side. The timing of each phase and a brief description of work to be performed during each phase is provided in Table 1. Overall, the seismic retrofit work will be executed over a period of approximately 18 months within four construction phases as described in Table 1. The additional bridge improvements will be constructed over a period of approximately 6 months as part of Phase 5 of the construction. Due to need for large construction equipment and harbor access, as described in Table 1, there will be traffic control on Murray Street to include various measures such as temporary lane closures, temporary one-way traffic movement, and detours.

Construction Methods and Equipment. The proposed project includes the following construction activities and associated equipment.

- Demolition and Harbor Berth Removal/Replacement: The primary demolition activities include the removal of pilings at Bent 6, the temporary removal of the gangway under Bent 4, the removal of existing sidewalks and railings along the entire length of the bridge, the removal of pavement at both ends of the bridge, and the temporary removal of two berths at Dock T and 10 berths at the FF dock; approximately 17 piles will be removed.. To accommodate removed boat berths, 11 new berths will be constructed on the west side of harbor with 12 associated piles, and 6 temporary berths with 6 piles will be relocated at Dock FF.

  Equipment: Demolition will require the use of equipment such as cranes, excavators, front-end loaders, dump trucks, concrete saws, and jackhammers. The dock piles will either be driven in with a vibratory pile driver or a pile driver if needed.

- Work Platforms within the Waterway: Work within the waterway will require either the use of barges or construction of trestles to provide work platforms. If barges are utilized, prefabricated modular units may be brought to the site and locked together. This type of platform can be installed, reconfigured, and removed relatively quickly, but the system is not suitable for areas that are too narrow to accommodate the modules. For example, footings from the Union Pacific Railroad Bridge to the north and footings from the Murray Street Bridge appear too close together to allow use of a modular barge between footings. In these areas, a trestle likely will need to be constructed.

  Construction of a trestle could vary depending on materials available to contractors. One possible trestle configuration would be 60-foot long steel girders over the Harbor navigation channel. The spans would be supported on falsework bents, perhaps constructed of steel piles which are a fairly common falsework material. Piles would be driven in the water by a crane sitting over the land. Preliminary estimates by the project engineer indicate that up to 120 12-inch steel beams would be required for a trestle spanning the bridge; vibratory drivers would be used. Approximately 6-8 of these small size piles could be installed per day. All piles would be removed at the end of construction. The trestle could be made of "Bailey Bridge" panels that can be used to provide bents or towers. The deck might be made of heavy timbers or open-grid panels with a safety railing to keep people and materials on the deck..

- Pile Installation within the Waterway: The CISS piles at Bents 5 through 8 will be installed within the waterway by driving 30-inch steel casings either to refusal at rock or into a shaft drilled within rock (depending on the location). The shaft and/or casing will be dewatered and concrete will be poured into the casings, which will be left in place. The 30-inch CIDH piles at Bent 5 will also be constructed by pouring concrete into permanent steel casings; dewatering is not expected to be achievable at this location, and a "wet" installation is planned.

  The installation of new piles at Bents 5 through 8 will include two piles on each side for a total of 16 piles. Both the CISS piles and the CIDH piles will be installed at 1:12 angles. Overall the installation of piles is expected to take approximately 2 days for each pile for a total of 32 days. The pile driving is not expected to occur concurrently.

  The design calls for Cast-In-Steel-Shell Concrete (CISS) in which the shell is driven into the ground by a pile driven where the pile hammer is moved away and an auger is twisted into the shell to remove the native material from within the shell. When the auger is full, it is raised up above the top of the shell and the entire crane boom and drilling equipment is rotated to the left or right away from the hole, lowered back to just above the deck, and then the auger is spun to remove the materials from the auger. The spoils would be deposited in a truck or trucks on the trestle, Harbor lands or Murray Street, which may entail deposition into a steel box that is lifted to the trucks. The materials are not expected to be hazardous, and the contractor is responsible for disposal at an approved disposal site.

  Equipment: The installation of these piles requires the use of a crane(s), a drilling rig, a pile driver, excavation and earthmoving equipment, concrete trucks and pumps, concrete vibrators, supply trucks, welding equipment, and other machinery. The piles will either be driven in with a pile driver or a vibrator.

- Pile and Anchor Installation outside the Waterway: The CISS piles at Bent 9 and Abutment 10 will be installed by driving 16-inch steel casing to depths of approximately –30 to –85 feet and filling them with concrete. These piles will be installed perpendicular to the ground surface. The 96-inch diameter anchor pile for Abutment 10 will require excavation and installation of a temporary steel casing, which will be filled with concrete. The anchor pile excavation will be dewatered by pumping, if necessary.

  The installation of new piles at Bent 9 and Abutment 10 include two piles on each side for a total of 8 piles. Overall the installation of piles is expected to take approximately 2 days for each pile for a total of 16 days. The pile driving is not expected to occur concurrently.

  Equipment: The installation of these piles will require the use of excavation equipment, soil tamper equipment, and the other construction equipment described above for installing piles within the waterway.

- Construction of Concrete Pile Caps, Infill Walls, Shear Keys, Bent Caps, etc.: This part of the project will include the installation and construction of various project features below the bridge roadway surface and above the piles. Sheet piling will be placed around the piles, the area dewatered and pile caps formed. Wooden forming supported from the piling would be placed for the pile caps. Wooden forming will be placed on existing footings to place infill walls. Forms would be placed atop pile caps for columns, and attached to the tops of columns for bent caps and shear keys.

  Equipment: Equipment required for this part of the project would include a crane to place sheet piling, a pump for dewatering, light duty equipment to place wooden forming, concrete trucks and a concrete pump to place concrete, welding equipment, supply trucks and other machinery/equipment.

- Superstructure Construction: This part of the project will include the installation of new girders on the southern edge of the bridge, the installation of a cantilevered extension along the northern edge of the bridge, and the construction of barrier railings.

  Equipment: Equipment required for this part of the project would include a crane, concrete trucks and pumps, paving equipment, trucks to haul supplies, welding equipment, and other machinery.

- Roadway Approach Construction: Excavation of existing road approaches will be performed. Gravel base and asphalt concrete will be placed to match the new widened bridge deck. The roadway approach work will be limited to less than 200 feet from each end of the bridge. Sidewalks, guardrails and streetlights will be constructed.

  Equipment: Equipment used will be typical paving equipment including graders, loaders, bulldozers, sheep's-foot rollers, dump trucks, and a paving machine.

Contractor Staging. Contractor staging activities for Phases 1 and 2 of the project will take place in an approximately 8,000 square-foot portion of an existing boat yard beneath the eastern edge of the bridge. At the end of Phase 2, the boat yard will be restored. Contractor staging activities for Phases 3, 4, and 5 of the project will take place in the northern portion (approximately 11,000 square feet) of a parking lot situated at the western edge of the bridge.

Adjacent existing offices, bathroom facilities, and storage areas will be relocated, as described below. This staging area will be used through the end of Stage 5, when original facilities will be restored.

Temporary Harbor Facility Relocation. The temporary use of portions of the eastern harbor boat yard and the western parking lot for contractor staging as described above, in combination with provision of construction access to the bridge from the waterway, will result in temporary disruptions of harbor activities including boat berths, boat storage, buildings, and businesses. As discussed above, 12 recreational boat berths will be removed and replaced. The contractor staging area on the east side of the Harbor will require that nine boats in the boat yard be temporarily relocated to boat storage for approximately four months. On the west side, 60 rowing boats stored under the existing Murray Street bridge will be temporarily relocated to a recently constructed on land dry boat storage facility near docks A and B. An additional 200± square feet of storage area would be constructed to accommodate the temporary row boat storage. Row boats stored under Span 2 and UCSC Rowing Facility boats under Span 1 will be temporarily relocated to the US Coast Guard parking lot and fenced.

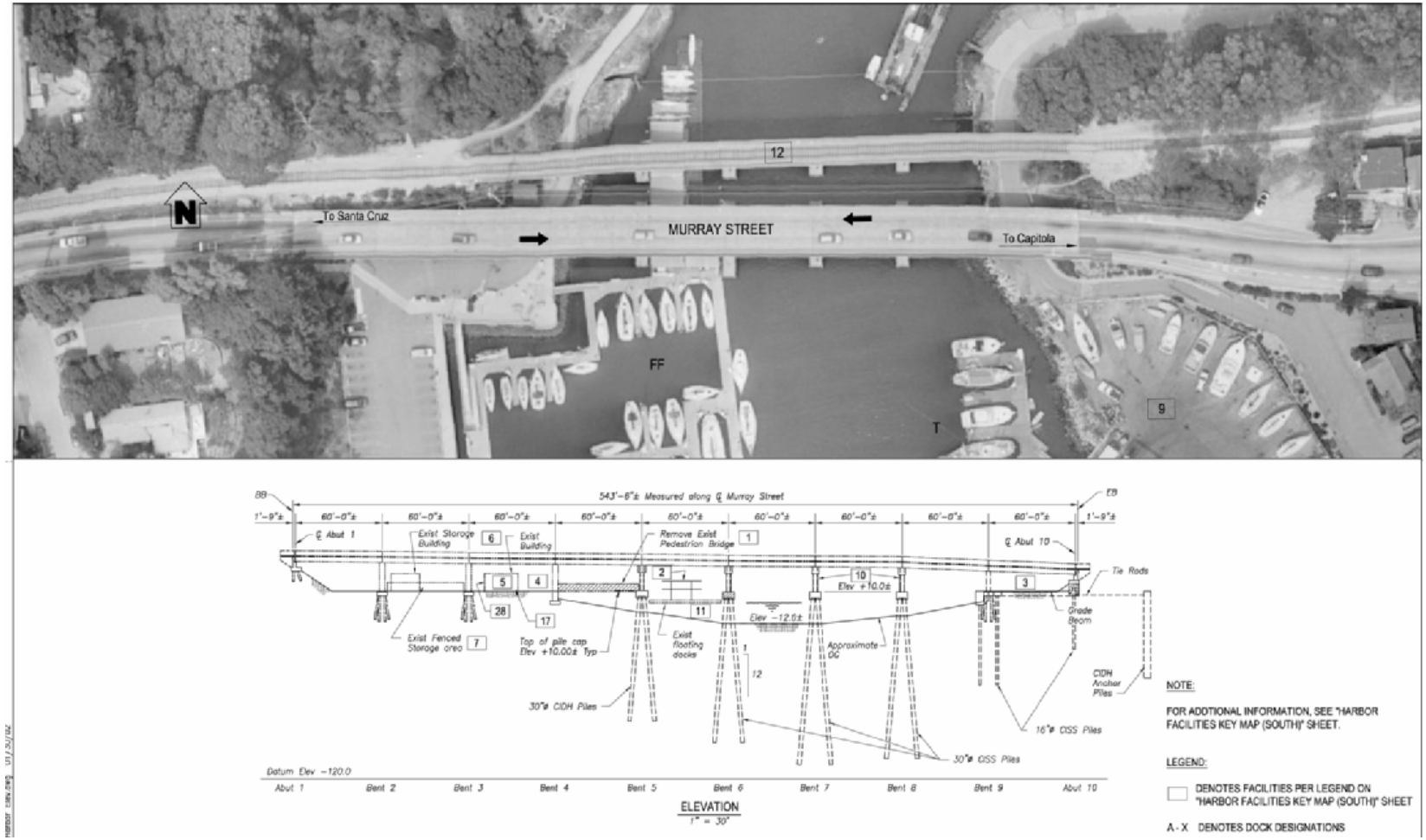
Existing offices, bathroom facilities, and storage areas located north of the western staging area (and within the City's right-of-way) will be displaced during Phases 3, 4, and 5 of the project. These facilities include: the UCSC storage building, the Lighthall Yacht Charters office, rowing equipment storage, the Santa Cruz Rowing Club Oar House, the Chardonnay Sailing Charters office, the Pacific Yachting Sailing School Charters office, and men's and women's restrooms. The buildings will be protected during construction, and a temporary 600 square foot facility (modular) will be installed on the US Coast Guard parking area for a period of approximately six months, which will temporarily house these businesses. An existing memorial bench and plaque will be removed, properly stored, and reinstalled in the West Harbor upon completion of construction.

An existing pedestrian path is located adjacent to the project site on both the east and west sides of the harbor, which is used by pedestrians, bicyclists and kayakers. The path is located on lands owned by the Santa Cruz Port District, and use and management is under the Port District's jurisdiction. The existing path would be temporarily blocked during some periods of construction due to construction staging activities during Phases 1 and 2 on the east side and during Phases 3,4, and 5 on the west side. The northern limits of these paths are shown in the area north of the bridge on Figure 2. The City intends to keep trails open during non-construction periods. However, there will be periods when construction staging on either side of the harbor will require temporary path closure due to safety during construction equipment use and when the stairway on the west side is replaced. A detour plan has been prepared.

In addition, as indicated above, traffic on Murray/Eaton will be subject to temporary controls. A portion of Lake Avenue may be also be subject to temporary traffic controls during setup of the construction staging area on the east side of the Harbor. The existing pedestrian path on both sides of the Harbor, the western concrete stairway, and the access ramp to Dock FF also will be closed during certain phases of construction. Approximately 30-50 Harbor parking spaces (for permit users) on the west side of the Harbor will be temporarily unavailable when the construction staging area is setup in that location.

Railroad Right-of-Way Encroachment. The Union Pacific Railroad (UPRR) maintains a bridge and track located approximately 20 to 30 feet north of the Murray Street Bridge (as measured from edge of deck to edge of deck, with the distance increasing west to east). Construction on the northern side of the bridge will require railroad flaggers for the protection of workmen and railroad traffic. The Union Pacific Railroad tracks and right-of-way border Murray Street on the north and are within the Area of Potential Impact. It appears that a northwestern sliver of Murray Street is within the railroad right-of-way. Any encroachment into the right-of-way during project construction will need to be coordinated with and approved by Union Pacific and potentially the California Public Utilities Commission.

Figure 3. Cross Section of the Murray Street Bridge *(# 36C-0108)* in the City of Santa Cruz, County of Santa Cruz,



SOURCE: TRC Engineers

Table 1. Murray Street Bridge Retrofit Project: Construction Phasing & Approximate Schedule.

Work Tasks	Effects on Harbor and Road Operations
Phase 1: Construction in East Zone	
2 months (May-July)[1]	
* Temporarily relocate overhead utilities north of bridge * Prepare construction staging area (8,000 sq.ft.) at harbor boat yard * Retrofit Bent 9 & Abutment 10; install anchor piles * Erect Girder Span 9 * Remove existing south rail	* Install traffic control system with alternating 1-way traffic * Close Murray for 7 days for driving anchor piles * Temporary relocation (dry storage) of 9 dry-docked boats from boat yard * Traffic controls along Lake Avenue during construction staging area setup * Close east walkway under bridge * Close bridge sidewalk
Phase 2: Construction in Eastern Waterway	
5 months (July-December)	
* Construct new berths (8) at ends of docks A through F * Remove berths (12) at docks T and FF * Construct work platform(s) (trestle or barge) for Stage 2 work [2] * Retrofit Bents 7 & 8 (includes installing anchor piles at Bents 7 & 8) * Erect Girder Spans 7 & 8 and construct Deck Spans 7, 8, & 9 * Construct north and south rails (optional) [3] * Restore boat yard; reopen pedestrian path * Remove east work platform * Replace berths (2) at Dock T upon construction in the eastern waterway and only between July and mid-November	* Temporary relocation of 2 boats from Dock T to AA or new dock N-Q * Temporary closure of East Drive & part of harbor boat yard * Availability of only one boat channel under the bridge for 6 non-consecutive half-days
Phase 3: Construction in West Zone	
6 months (December-May)	
* Install row boat storage at docks A/B & USCG area * Install temporary building at USCG area * Temporarily relocate existing offices and row boats to above [2] * Close portion of western parking lot [2] * Construct temporary access ramp to Dock FF * Retrofit Abutment 1 and Bents 2, 3, & 4 * Erect Girder Spans 1, 2, & 3 [and construct Deck Spans 1, 2, & 3]	* Closure of West Path, western concrete stairway and access ramp to Dock FF * Temporary relocation of affected facilities (offices, storage, restrooms, etc.)

Phase 4: Construction in Western Waterway

5 months (May-October)

* Construct modifications to Dock FF; move 7 boats to new Dock FF
* Construct work platform(s) (trestle or barge) for Stage 4 work
* Retrofit Bents 5 & 6 (including installation of anchor piles)
* Erect Girder Spans 4, 5, & 6 [and construct Deck Spans 4, 5, & 6]
* Construct north and south rails [3]
* Remove work platform(s)
* Closure of West Path, western concrete stairway and access ramp to Dock FF
* Temporary relocation of affected facilities (offices, storage, restrooms, etc.)
* Temporary relocation of 8 boats from Dock FF
* Availability of only one boat channel under the bridge for 6 non-consecutive half-days

Phase 5: Construction of Superstructure and Barrier Rails

[no timing provided]

* Remove sidewalks & temporary barrier rails
* Construct new barrier rails
* Restore Dock FF, parking lot, existing offices and related facilities
* Restore all remaining facilities to original condition
* Repair deck

Footnotes:

[1] Note that construction phases overlap; the sum of the construction periods specified is therefore greater than the total period indicated by start and finish dates.

[2] These tasks could be initiated and/or completed during the prior stage.

[3] [These tasks could be completed either in Phase 2 or 4.

[4] Temporary closure of Murray Street bridge roadway to all traffic is possible during any phase for a short duration. The alternating one-way traffic with sign control will occur during the construction, but not during the full duration of construction activities.

Chapter 2. Study Methods

2.1. Regulatory Requirements

Local, State, and Federal regulations have been enacted to provide for the protection and management of sensitive biological and wetland resources. At the federal level, the U.S. Fish and Wildlife Service (USFWS) is responsible for protection of terrestrial and freshwater organisms through implementation of the federal Endangered Species Act and the Migratory Bird Treaty Act. Also at the Federal level the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) is responsible for protection of anadromous (migratory) fish, marine wildlife, and marine mammals. The U.S. Army Corps of Engineers (ACOE) has primary responsibility for protecting wetlands and jurisdictional "other waters of the U.S." under Section 404 of the Clean Water Act. At the State level, the California Department of Fish and Game (CDFG) is responsible for administration of the California Endangered Species Act, and for protection of streams and water bodies through the Streambed Alteration Agreement process under Section 1600 of the California Fish and Game Code. Certification from the California Regional Water Quality Control Board (RWQCB) is also required when a proposed activity may result in discharge into navigable waters, pursuant to Section 401 of the Clean Water Act and the U.S. Environmental Protection Agency (EPA) Section 404(b) (1) Guidelines.

Federal Regulations

Federal Endangered Species Act. The federal Endangered Species Act (ESA) of 1973 (Title 16 United States Code, Section 1531 *et seq*., as amended) prohibits federal agencies from authorizing, permitting or funding any action that would result in biological jeopardy to a species listed as Threatened or Endangered under the ESA. Listed species are taxa for which proposed and final rules have been published in Federal Register (USFWS 2008a, b, c, d, e).

The U.S. Fish and Wildlife Service's (Service) responsibilities include administering the Act, including Sections 7, 9, and 10. Section 9 of the Act, prohibits the take of animal species that are federally listed as Endangered or Threatened. Section 3(18) of the Act defines "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Service regulations (50 CFR 17.3) define "harm" to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. "Harassment" is defined by the Service as an intentional or negligent action that creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Exemptions to the prohibitions against take may be obtained through coordination with the Service in two ways: 1) through interagency consultation for projects with federal involvement (i.e., funded, authorized, or carried out by a Federal agency) pursuant to Section 7; or 2) through the issuance of an incidental take permit under Section 10(a)(1)(B) of the Act. The Act or its implementing regulations do not prohibit take of listed plant species. However, federal agencies cannot undertake activities that would jeopardize the continued

existence of a threatened or endangered plant or animal species. In addition, the removal of threatened or endangered plants may be a violation of the Act under certain circumstances, if the action is not in compliance with state law.

If "Critical Habitat" is determined and published in the Federal Register as a formal rule, that designated critical habitat (plant or animal) receives protection under Section 7 of the Act through the prohibition of destruction or adverse modification of critical habitat by actions carried out, funded, or authorized by a Federal agency (i.e., Federal Highway Administration [FHWA] funding). Consultation under Section 7 does not apply to activities on private or other non-federal lands that do not involve a Federal nexus. Therefore, the critical habitat designation would not afford any additional regulatory protections under the Act with regard to those activities.

Essential Fish Habitat. In October 1996, Congress passed the Sustainable Fisheries Act (Public Law 104-297) which amended the habitat provisions of the Magnuson Act. The renamed Magnuson-Stevens Act calls for direct action to stop or reverse the continued loss of fish habitats. Toward this end, Congress mandated the identification of habitats essential to managed species and measures to conserve and enhance this habitat. Congress defined "Essential Fish Habitat" (EFH) for federally managed fish species as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (National Marine Fisheries Service, July 2008). Habitat Areas of Particular Concern (HAPC) are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation. Councils may designate a specific habitat area as an HAPC based on one or more of the following reasons:

- Importance of the ecological function provided by the habitat
- Extent to which the habitat is sensitive to human-induced environmental degradation
- Whether, and to what extent, development activities are, or will be, stressing the habitat type
- Rarity of the habitat type

The HAPC designation does not confer additional protection or restrictions upon an area, but can help prioritize conservation efforts. Healthy populations of fish require not only the relatively small habitats identified as HAPCs, but also other areas that provide suitable habitat functions. HAPCs alone will not suffice in supporting the larger numbers of fish needed to maintain sustainable fisheries and a healthy ecosystem.

Migratory Bird Treaty Act. All migratory birds and their nests are federally protected under the Migratory Bird Treaty Act of 1918 (MBTA) (Title 16 United States Code, Section 703-712 as amended; 50 Code of Federal Regulations Section 21; and 50 Code of Federal Regulations Section 13) and by CDFG codes that support the act. The MBTA makes it unlawful to "take" (e.g., pursue, kill, harm, harass) any migratory bird or raptor listed in the 50 Code of Federal Regulations Section 10, including nests, eggs, or products.

While not all migratory birds meet criteria for listing under *California Environmental Quality Act* (*CEQA) Guideline*, Section 15380 (see next section below), the project would be required to comply with all applicable provisions of the MBTA.

Marine Mammal Protection Act. All marine mammals are protected under the Marine Mammal Protection Act (MMPA) (Title 16 United States Code, §§ 1361-1421h, October 21, 1972, as amended 1973, 1976-1978, 1980-1982, 1984, 1986, 1988, 1990, 1992-1994 and 1996). The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.

Executive Order 13112 - Invasive Species. This order enlists federal agencies to prevent the introduction of invasive species, provide for their control and minimize the economic, ecological, and human health impacts that invasive species cause. In addition, federal agencies are required, when feasible, to restore native species and ecosystems and promote public awareness about invasive species.

Wetlands and Waters of the U.S. Although definitions vary to some degree, wetlands are generally considered to be areas that are periodically or permanently inundated by surface or groundwater, and that support vegetation adapted to life in saturated soil. Wetlands are recognized as important features on a regional and national level due to their high inherent value to fish and wildlife, use as storage areas for storm and flood waters, and water recharge, filtration, and purification functions. Technical standards for delineating wetlands have been developed by the ACOE and the USFWS, and generally define wetlands through consideration of three criteria: hydrology, soils, and vegetation. The following sections describe both federal and state regulatory programs that include protection of "Wetlands and Waters of the U.S." The State regulatory program is described under State Regulations, Clean Water Act Section 404.

Clean Water Act, Section 404. Under Section 404 of the Clean Water Act, the ACOE is responsible for regulating the discharge of fill material into waters of the United States. The term "waters" includes wetlands and non-wetland bodies of water that meet specific criteria as defined in the Code of Federal Regulations. All three of the identified technical criteria (related to hydrology, soils, and vegetation) must be met for an area to be identified as a wetland under ACOE jurisdiction, unless the area has been modified by human activity. In general, a permit must be obtained before fill can be placed in wetlands or other waters of the U.S. The type of permit depends on the amount of acreage and the purpose of the proposed fill, subject to discretion of the ACOE.

The Rivers and Harbors Act of 1899 prohibits the dumping of refuse into navigable waters or the creation of any navigational obstruction, and it regulates the construction of wharves, piers, jetties, bulkheads, and similar structures in ports, rivers, canals, or other areas used for navigation. Section 9 of the Act prohibits the construction of any bridge, dam, dike or causeway over or in navigable waterways of the U.S. without federal approval, whereas Section 10 regulates the construction of wharves, piers, jetties, bulkheads, and similar structures in ports, harbors, rivers, canals, or other areas used for navigation. Although the Clean Water Act now predominates in the regulation of surface water pollution, the Rivers and Harbors Act provides supplemental jurisdiction for addressing certain kinds of water pollution, and especially for dredge and fill activities. As with the Clean Water Act, discharges of refuse or fill material, or

construction activities in waterways, require a permit. The permitting agency is the Army Corps of Engineers.

Executive Order 11990 mandates that Federal or Federally assisted projects and programs minimize the destruction, loss or degradation of wetlands and avoid new construction in wetlands, taking into account public health and safety, maintenance of natural systems, and other public interests.

State Regulations

Section 1600 of the Fish and Game Code. Jurisdictional authority of the CDFG over wetland areas is established under Section 1600 of the Fish and Game Code, which pertains to activities that would disrupt the natural flow or alter the channel, bed, or bank of any lake, river, or stream. The Fish and Game Code stipulates that it is unlawful to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake without notifying the CDFG, incorporating necessary mitigation, and obtaining a Streambed Alteration Agreement. The Wetlands Resources Policy of the CDFG states that the Fish and Game Commission will strongly discourage development in or conversion of wetlands, unless, at a minimum, project mitigation assures that there will be no net loss of either wetland habitat values or acreage. The CDFG is also responsible for commenting on projects requiring ACOE permits under the Fish and Wildlife Coordination Act of 1958.

California Coastal Act. The California Coastal Commission (CCC) also regulates wetlands within the coastal zone under the California Coastal Act. Criteria for delineating wetlands potentially subject to regulation by the CCC are similar to those for delineating wetlands potentially subject to ACOE jurisdiction, with one important exception. Following the California Department of Fish and Game criteria, the CCC requires that an area need only have a positive indicator for one of the three technical criteria (hydrology, soil, or vegetation) in order to be defined as a wetland (CDFG Environmental Services Division 1987, CCC 1994).

Section 401 of the Clean Water Act. The RWQCB is responsible for upholding State water quality standards. Pursuant to Section 401 of the Clean Water Act, projects that apply for an ACOE permit for discharge of dredge or fill material and projects that qualify for a Nationwide Permit must obtain water quality certification from the RWQCB. The RWQCB is also responsible for regulating fill of hydrologically isolated wetlands under the Porter-Cologne Water Quality Control Act.

California Endangered Species Act. The 1984 California Endangered Species Act (CESA) (Fish and Game Code, Section 2050-2098) prohibits the "take" of State-listed threatened and endangered species. Together with the 1977 Native Plant Protection Act (NPPA), the CESA authorizes the California Fish and Game Commission to designate Endangered and Threatened species and to regulate the taking of these species. The Habitat Conservation Planning Branch of the CDFG administers the State's rare species program. The CDFG maintains lists of designated Endangered, Threatened and Rare plant and animal species (CDFG 2007a, b). Listed species either were designated under the NPPA or designated by the Fish and Game Commission. In addition to recognizing three levels of endangerment, the CDFG can afford interim protection to candidate species while the Fish and Game Commission is reviewing them.

California Native Plant Protection Act. Project permitting and approval require compliance with the 1977 California Native Plant Protection Act (NPPA) (Fish and Game Code, Section 2050-2098). In addition to the Endangered and Threatened categories established by CESA, the NPPA establishes a rare category for plant species only. It authorizes the California Fish and Game Commission to designate Endangered, Threatened, and Rare plant species and to regulate the taking of these species.

Species of Special Concern. In addition to lists of designated Endangered, Threatened, and Rare plant and animal species, the CDFG maintains a list of animal "Species of Special Concern" (CDFG 2006b), most of which are species whose breeding populations in California may face extirpation.[1] Although these species have no legal status under the CESA, the CDFG recommends considering these species during analysis of proposed project impacts to protect declining populations, and to avoid the need to list them as Threatened or Endangered in the future. These species may "be considered rare or endangered [under CEQA] if the species can be shown to meet the criteria."

CEQA Guidelines Section 15380. Based on provisions of Section 15380 of the *CEQA Guidelines*, plants and animals with the following protected status must be addressed in CEQA documents on proposed development projects: federally listed Endangered or Threatened species under the ESA, federal Proposed and Candidate species, and species listed by the State as Endangered, Threatened, or Rare under the CESA or NPPA.

In addition, under Section 15380(d) of the *CEQA Guidelines*, a species not included on any list recognized by the State "shall nevertheless be considered rare or endangered if the species can be shown to meet the criteria" for listing. The CDFG, USFWS and U.S. Forest Service all maintain independent lists of species with designated conservation status that meet the *CEQA Guidelines* criterion for consideration. Based on provisions of Section 15380(d) of the *CEQA Guidelines*, the lead agency and the CDFG, in making a determination of impact significance, must treat non-listed plant and animal species as equivalent to listed species if the non-listed species satisfy the minimum biological criteria for listing.

California Native Plant Society Inventory of Rare and Endangered Vascular Plants of California. In general, the CDFG considers plant species on List 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) or List 2 (Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere) of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Tibor 2001, CNPS 2007) as qualifying for legal protection under CEQA. Species on CNPS List 3 (Plants About Which We Need More Information--A Review List) or List 4 (Plants of Limited Distribution – A Watch List) may, but generally do not, qualify for protection under CEQA.

Western Bat Working Group Listings. The CDFG maintains a list of bat species designated as "High Priority" by the Western Bat Working Group (WBWG). Species designated "High Priority" are defined as "imperiled or are at high risk of imperilment based on available

[1] "Extirpate" means to destroy completely; to pull up by the root; to exterminate (Merriam-Webster).

information on distribution, status, ecology and known threats" (CDFG 2006b). These species qualify for legal protection under Section 15380(d) of the *CEQA Guidelines*.

Sensitive Natural Communities. In addition to species-oriented management, protecting habitat on an ecosystem level is increasingly recognized as vital to the protection of natural diversity in the state. Ecosystem protection is considered the most effective means of providing long-term protection of ecologically viable habitat, and can include whole watersheds, ecosystems, and sensitive natural communities. Providing functional habitat connectivity between natural areas is essential to sustaining healthy wildlife populations and allowing for the continued dispersal of native plant and animal species.

Although sensitive natural communities have no legal protective status under the State or federal Endangered Species Acts, they are provided some level of protection under CEQA. The *CEQA Guidelines* identify potential impacts on a sensitive natural community as one of six significance criteria. As an example, a discretionary project that has a substantial adverse effect on any riparian habitat, native grassland, valley oak woodland, or other sensitive natural community would normally be considered to have a significant effect on the environment. Further loss of a sensitive natural community could be interpreted as substantially diminishing habitat, depending on the community's relative abundance, quality, and degree of past disturbance, and the anticipated impacts to the specific community type. Where determined to be significant under CEQA, the potential impact would require mitigation through avoidance, minimization of disturbance or loss, or some type of compensatory mitigation when unavoidable.

The California Natural Diversity Data Base (CNDDB) maintains a working list of "high priority" habitats for inventory (i.e., those habitats that are rare or endangered within the borders of California) (Holland 1986, CDFG 2003). CNDDB "high priority" habitats are generally considered sensitive habitats under CEQA.

Local Regulations

City of Santa Cruz City General Plan. In addition to protection provided by State and federal regulations, such as the Endangered Species Acts and Clean Water Act, the policies of the City of Santa Cruz recognize the importance of preserving sensitive biological and wetland resources and environmental quality through sustainable land use practices. Relevant policies and programs of the City of Santa Cruz General Plan are contained in the following General Plan elements: Environmental Quality (EQ), Land Use (L), Circulation (C), and Parks and Recreation (PR) (Santa Cruz 2003). These policies and goals are addressed in Section 4.1, Land Use.

Local Coastal Program and Environmentally Sensitive Habitat Area (ESHA). The California Coastal Act was created in 1972 with the adoption of Proposition 20. The Local Coastal Program (LCP) was later devised to implement the policies of the Coastal Act at the local level. The LCP applies to projects that encompass an area within approximately 1,000 yards of the coastline. In Santa Cruz, the LCP is integrated with the City of Santa Cruz General Plan (Santa Cruz 2003).

The California Coastal Act, Section 30240, addresses Environmentally Sensitive Habitat Areas (ESHAs) and states the following (California Coastal Act, Section 30240):

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Development within an ESHA must be resource-dependent as stated in Section 30240 of the Coastal Act. Any exceptions to compliance with Local Coastal Program policies are to be within the context of a resource management plan that is approved by the Coastal Commission.

Tree Protection and Preservation Ordinance. The City of Santa Cruz also provides for regulation of Heritage Trees and Shrubs through a Heritage Tree Ordinance (Chapter 9.56). The ordinance is intended to provide for the protection of trees on private property by controlling tree removal while allowing for reasonable enjoyment of private property rights and property development. The ordinance defines "heritage trees" and describes situations that require a tree removal permit, permit exceptions, and tree protection standards. A "heritage tree" is defined in several different ways in the ordinance, and a permit is typically required when the tree is to be cut down, destroyed, trimmed by topping or removed, or when trenching, grading, or filling is proposed within the dripline. The Heritage Tree Ordinance states the following:

Any tree, grove of trees, shrub or group of shrubs, growing on public or private property within the city limits of the city of Santa Cruz which meet(s) the following criteria shall have the "heritage" designation:

(a) Any tree which has a trunk with a circumference of forty-four inches (approximately fourteen inches in diameter or more), measured at fifty-four inches above existing grade;

(b) Any tree, grove of trees, shrub or group of shrubs which have historical significance, including but not limited to those which were/are:

(1) Planted as a commemorative; (2) Planted during a particularly significant historical era; or (3) Marking the spot of an historical event.

(c) Any tree, grove of trees, shrub or group of shrubs which have horticultural significance, including but not limited to those which are:

(1) Unusually beautiful or distinctive; (2) Old (determined by comparing the age of the tree or shrub in question with other trees or shrubs of its species within the city); (3) Distinctive specimen in size or structure for its species (determined by comparing the tree or shrub to average trees and shrubs of its species within the city); (4) A rare or unusual species for the Santa Cruz area (to be determined by the number of similar trees of the same species within

the city); (5) Providing a valuable habitat; or (6) Identified by the city council as having significant arboricultural value to the citizens of the city.

2.2. Studies Required

The project site was evaluated for potential impacts to listed species known to occur or with potential to occur, as well as wetlands, waters of the U.S. and sensitive habitats that were identified through literature and database review and review of existing biological documents addressing the project area and the vicinity. The "Biological Study Area" for the project was defined by the "Area of Potential Impact", including access, staging areas, roadways, and waterways, and where feasible, the addition of a buffer to address potential impacts (in particular, noise-related impacts) of 300 feet from the work area for nesting birds and of 500 feet for marine mammals. (See Figure 4 in Chapter 3.)

2.2.1. Botany

EcoSystems West botanists conducted a focused review of literature and special-status species databases in order to identify special-status plant species and sensitive habitat types with potential to occur in the Murray Street Bridge study area. Sources reviewed include USFWS (2008a), CNDDB occurrence records for the Santa Cruz USGS 7.5' quadrangle; county occurrence records and USGS quadrangle occurrence records in the CNPS *Inventory of Rare and Endangered Vascular Plants of California* (Tibor 2001; CNPS 2007) for the Santa Cruz quadrangle and the four quadrangles surrounding it; and local and regional floras (Thomas 1960, Munz and Keck 1973, Hickman 1993, Morgan et al. 2005).

Sources consulted for up-to-date agency status information include USFWS (2007 a,b,c) for federally listed species (including federal Proposed and Candidate species) and CDFG (2007) for State of California listed species. Special-status species also include species listed on List 1A (Plants Presumed Extinct in California), List 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere), or List 2 (Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere) of the CNPS *Inventory* (Tibor 2001; CNPS 2007). Also considered were species included on List 3 (Plants About Which We Need More Information -- A Review List) or List 4 (Plants of Limited Distribution -- A Watch List) of the CNPS *Inventory*.

EcoSystems West botanists also reviewed the CNDDB list of "high priority" habitats.

Following the review of available information, a botanical survey of the site was conducted on January 25, 2007. The entire terrestrial portion of the project area was surveyed thoroughly on foot. All vascular plant species growing without cultivation on the site and identifiable at the time the survey was conducted were identified to the extent necessary to determine whether or not they are special-status species. All habitat types (plant communities) within the project area were characterized based on physiognomy and dominant and characteristic species.

2.2.2. Wildlife

Prior to our site visit, EcoSystems West wildlife biologists reviewed CNDDB (2007) occurrence records of special-status wildlife species for the USGS 7.5 minute Santa Cruz quadrangle. In addition, we reviewed previous studies conducted near the Murray Street Bridge and other literature that contained sensitive wildlife species lists for Santa Cruz County. Sources consulted for up-to-date agency status information include USFWS (2008b, c, d, e) for federally listed species, and CDFG for state species listed as 'Threatened' or 'Endangered' or as 'Species of Special Concern' and those invertebrates globally and state ranked as extremely endangered or endangered by CNDDB (CDFG 2006, 2007b). The preliminary list of *revised CDFG mammal species of special concern* (CDFG 1996) was reviewed, as was the list of species considered 'High Priority' by the WBWG (1998). Jeffery Hagar, fishery biologist, reviewed existing documents and data regarding fish populations in the study area.

EcoSystems West wildlife biologists conducted field reconnaissance surveys of the site on December 20 and 22, 2006. The reconnaissance surveys were used to: 1) confirm the accuracy of available information on wildlife; and 2) provide a greater understanding of habitat values and the relationship of the site to surrounding land. Walking transects were made in the "area of potential impact" with a surrounding 300 ft buffer when possible. The survey was focused on Murray Street Bridge and on locations where sensitive resources were documented previously. The current condition of the habitat and/or any observations of wildlife activity were noted.

Day and nighttime reconnaissance bat surveys were conducted to determine if roosting bats were utilizing the Murray Street Bridge and surrounding area. Daytime surveys consisted of a visual examination of the bridge and surrounding trees for evidence of bat presence and identification of any features where bats could potentially roost. Potential bat roosting features in trees include senescent limbs, hollows, crevices, holes, and furrowed bark.

Two nighttime surveys were performed with simultaneous visual and acoustical monitoring of the bridge. Evening monitoring was conducted around sunset at the time of bat emergence; between 1640 to 1815 hours on December 20, 2006 and 1700 to 1930 hours on 22 December 2006.

An Anabat II bat detector was used to sample bat activity over the study area. The Anabat unit acoustically sampled bat species diversity and monitored levels of bat activity occurring in areas of interest. The Anabat acoustic monitoring system uses a bat detector to detect bat ultrasonic echolocation calls in the field and uses a zero-crossing unit to convert the detected signals into frequency/time graphs on a laptop computer. The graphs are then used together with reference knowledge of acoustic signatures of different species to identify calls to species level.

Ecosystems West conducted follow-up surveys for marine mammals in September and October 2009. The objective of the additional marine mammal surveys was to estimate the numbers of each of three species [California sea lion (*Zalophus californianus*), eastern Pacific harbor seal (*Phoca vitulina richardsi*), and southern sea otter (*Enhydra lutris nereis*)] using the area surrounding the Murray Street Bridge (Bridge) and to determine the type of use, especially

during the period of time when in-water construction activities are proposed for the Project. EcoSystems West conducted nineteen surveys between September 17 and October 21, for 45 minutes to 2 hours, depending on the number of biologists present (one or two) and the time of day (visibility). A full description of the survey methods is provided in the "Marine Mammal and Bird Mitigation Plan" included in Appendix B.

2.2.3. Wetlands and Other Waters of the U.S.

An EcoSystems West biologist conducted an assessment of potential wetlands and "other waters" of the U.S. subject to Section 404 of the Clean Water Act and Sections 9 and 10 of the Rivers and Harbors Act of 1899. The assessment was conducted using protocols outlined in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Valleys, Mountains and Coast Region* (Environmental Laboratory 2008). The wetland assessment was used to determine the presence or absence of wetland indicators used by the Corps in making a jurisdictional determination. The three criteria used to delineate wetlands are the presence of: (1) hydrophytic vegetation, (2) wetland hydrology, and (3) hydric soils. "Other waters" of the U.S. such as lakes and ponds, or convey water, such as streams, are also subject to Section 404 jurisdiction. Along the Central California coast, these other waters can include intermittent and ephemeral streams, as well as lakes, and rivers. Other waters are identified by the presence of an ordinary high water (OHW) mark, a defined river or stream bed, a bank, or by the absence of emergent vegetation in ponds or lakes. An OHW mark is defined as the natural line on the shore established by fluctuations of water. Tidal waters are those directly influenced by the ebb and flow of the tides. The limit of jurisdiction over tidal waters extends to the high tide line (HTL). Prior to conducting the wetland assessment field visit, EcoSystems West reviewed all relevant documents pertaining to this project including available aerial photographs and U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps for the site.

2.3. Personnel and Survey Dates

EcoSystems West senior botanist, Roy Buck, conducted a botanical survey of the project area on January 25, 2007. EcoSystems West wildlife biologists, Nick Fisher and Patty Clark, conducted reconnaissance wildlife surveys on December 20 and 22, 2006. EcoSystems West biologists, Kim Glinka and Erin McGinty, conducted follow-up surveys for marine mammals between September 17 and the October 21, 2009. EcoSystems West plant ecologist/wetland specialist, Justin Davilla, conducted a wetland assessment on November 24, 2009.

Review of listed fish species and fishery resources were provided initially by fishery biologist, Jeff Hagar in 2007 and 2008. Follow-up reviews and review of Essential Fish Habitat was provided by aquatic ecologist, Mike Podlech, in 2009,

2.4. Agency Coordination and Professional Contacts

To date, agency coordination and contacts include: Monica DeAngelis, NOAA-National Marine Fisheries Service , Southwest Region and Rick Smith and Brian Foss at the Santa Cruz Port District. Additionally, Camm Swift, a recognized tidewater goby expert, currently with Entrix, was contacted.

2.5. Limitations That May Influence Results

2.5.1. Botany

The botanical survey was conducted in January, at a time when not all plant species occurring or potentially occurring in the project area were identifiable. The survey was conducted at the time environmental review was initiated for the project, which preceded the spring flowering season by several months. Although the survey was conducted in January, before some special status species would have been identifiable, a detailed review of special status plants with potential to occur in the project area (Table 2 and Appendix A) supports the conclusion that no native special status plant species occurs in the project area due to the highly disturbed nature of the entire area and the lack of suitable habitat. (See section 3.2.1 for further discussion.) However, the January site visit did not reveal potential habitat for this or any other special status plant species. As a result,the biologists determined that no additional focused botanical surveys are necessary for the project area.

2.5.2. Wildlife

Wildlife surveys were conducted in December, at a time not suitable for determining the presence of breeding birds. In addition, survey timing was not suitable for detecting the seasonal migration of bats and/or the establishment of maternity colonies. Access was not available to the adjacent private property providing monarch butterfly (*Danaus plexippus*) roosting habitat, so temporary or winter roosting by the species could not be confirmed; nor have previous studies been conducted to determine the extent of occupation of this monarch habitat.

Chapter 3. Results: Environmental Setting

3.1. Description of the Existing Biological and Physical Conditions

The existing concrete Murray Street bridge structure, built in 1962, is approximately 544 feet long and 35 feet wide, with eight piers in the Santa Cruz Small Craft Harbor. The bridge structure carries two lanes of traffic, and has a sidewalk on the south side. The roadway is a portion of the Pacific Coast Bicycle Route, although there are only narrow bike lanes/shoulders on the bridge. The Union Pacific Railroad tracks and right-of-way border Murray Street on the north and are within the Area of Potential Impact. It appears that a northwestern sliver of Murray Street is within the railroad right-of-way (see Figure 5). The Santa Cruz Harbor is located directly beneath the bridge. The Harbor accommodates 920 boat berths that support both commercial and recreational boating activities. In the immediate project vicinity, the Santa Cruz Rowing Club boat storage and UCSC rowing berth facility are located underneath the bridge and immediately south of bridge, respectively, on the west side of the Harbor. There are two waterway openings beneath the bridge through which all boats berthed in the northern portion of the harbor must pass. These two openings are required for efficient operations in the harbor.

A pedestrian path/sidewalk loops around the Harbor from Aldos Restaurant on the west side to the Crow's Nest Restaurant commercial area on the east side. A portion of this path is located within the construction area on both sides (Figures 2 and 4). Bicyclists and other recreational users also occasionally use the path, although bicyclists mostly use the harbor service road and use the path/sidewalk where the service road does not exist. Residential uses generally surround the harbor area on all sides (Figures 2 and 4). The city-owned Arana Gulch greenbelt area is located to the north of the project area, outside of the proposed project construction zone (Figure 4).

3.1.1. Botany

Habitat types within the Study Area are presented in Figure 6. The land portion of the project area is mostly developed or heavily disturbed. Most of the area is occupied by parking lots, buildings, existing roads, a boat yard, landscaped areas, and small patches of heavily disturbed ground. Where these developed areas are vegetated, the vegetation is ruderal, consisting of mostly of planted landscaping species or weedy and/or invasive non-native species. Characteristic species include the shrub French broom (*Genista monspessulana*), the large tufted grass pampas grass (*Cortaderia* sp.), the mat-forming succulent species ice plant (*Carpobrotus edulis*), and a variety of smaller weedy grasses and herbs, including rattlesnake grass (*Briza maxima*), Bermuda-buttercup (*Oxalis pes-caprae*), common chickweed (*Stellaria media*), and many others. The native herb miner's-lettuce (*Claytonia perfoliata*) is locally abundant in highly disturbed areas, especially in the vicinity of the eastern ends of the existing bridges. Some non-native, invasive plant species are found in the project vicinity, but none are within the work areas where soil and/or vegetation will be disturbed.

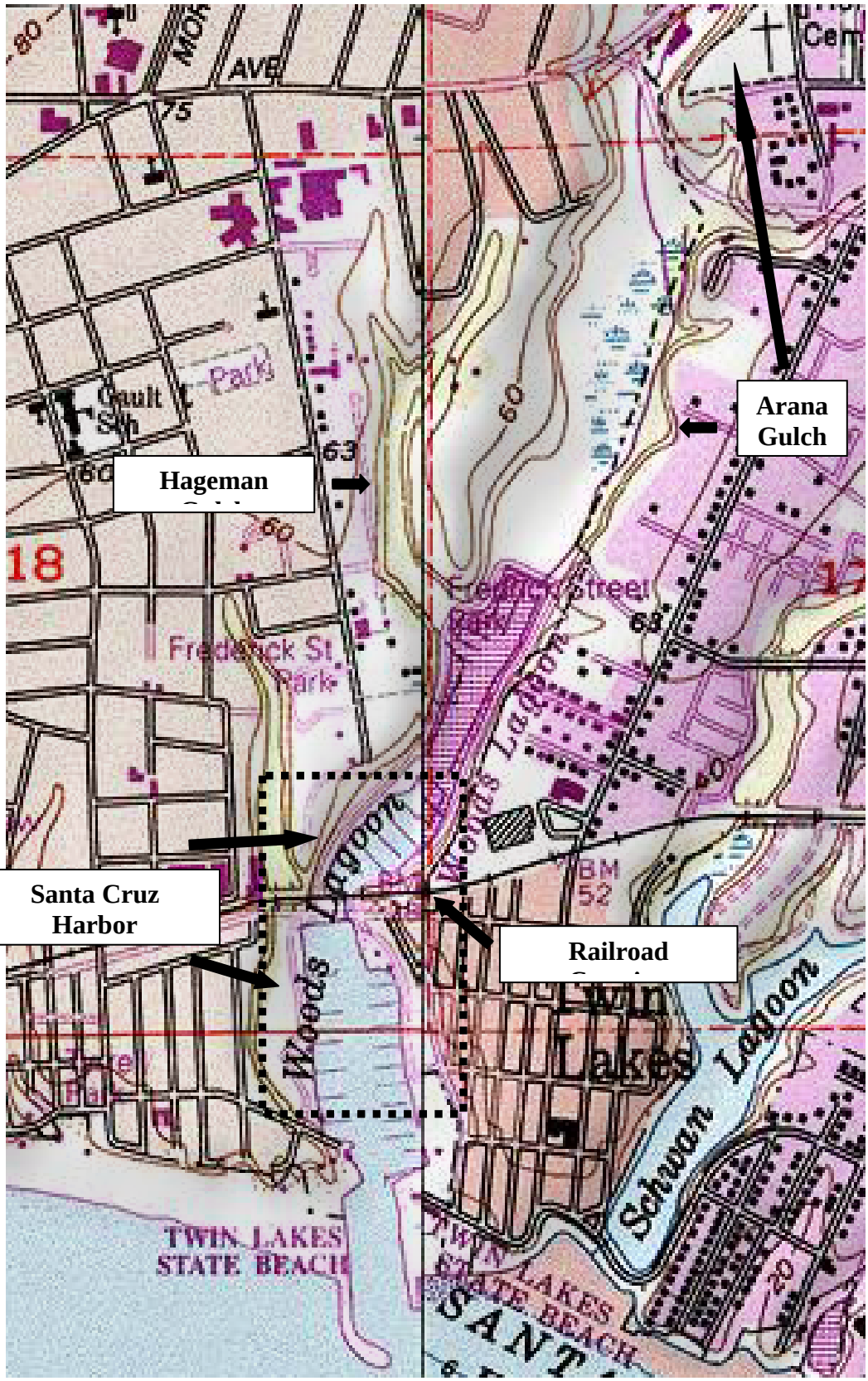


Figure 4. Biological Study Area and Surroundings

Figure 5. Railroad Right-of-Way

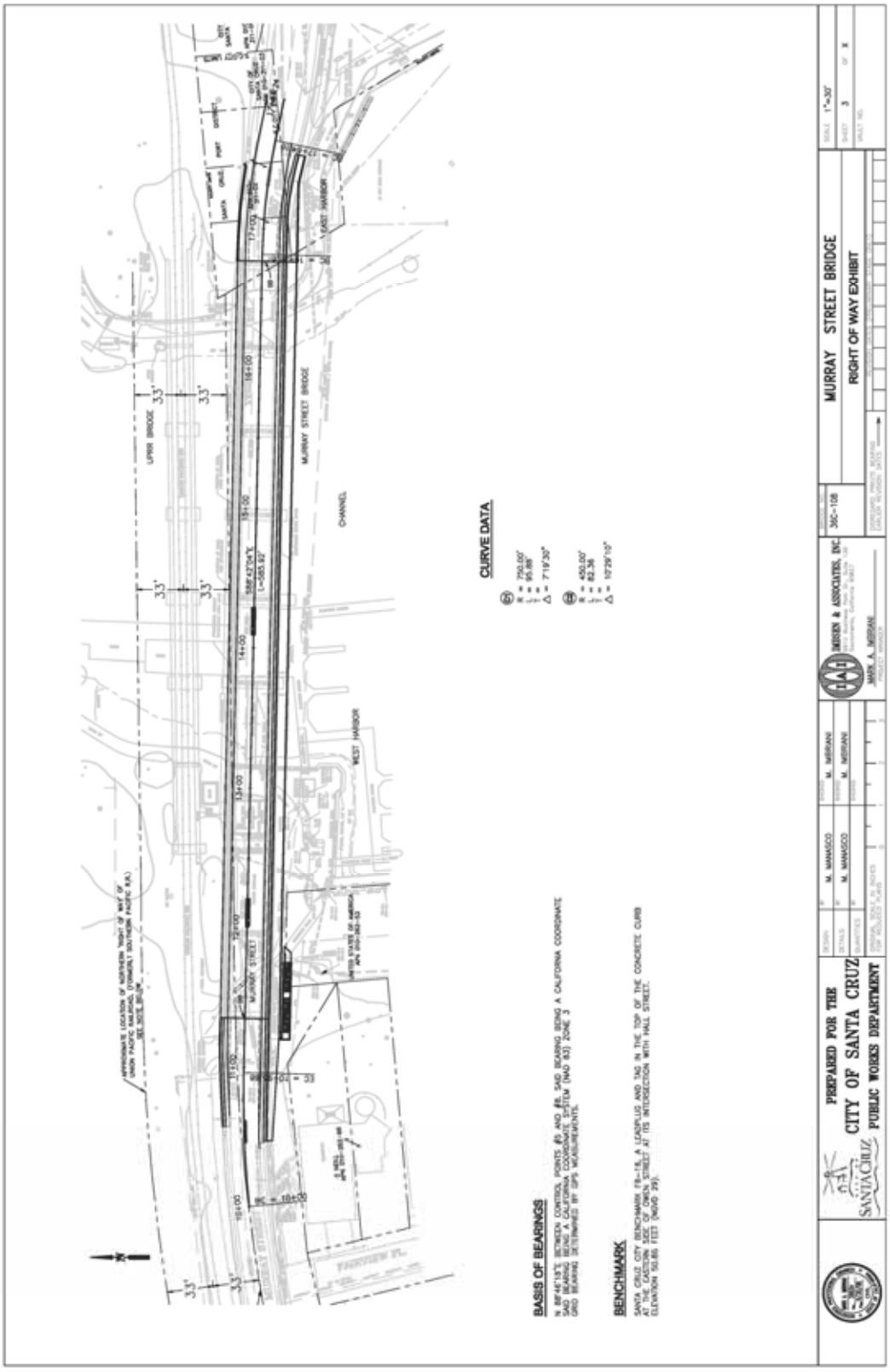
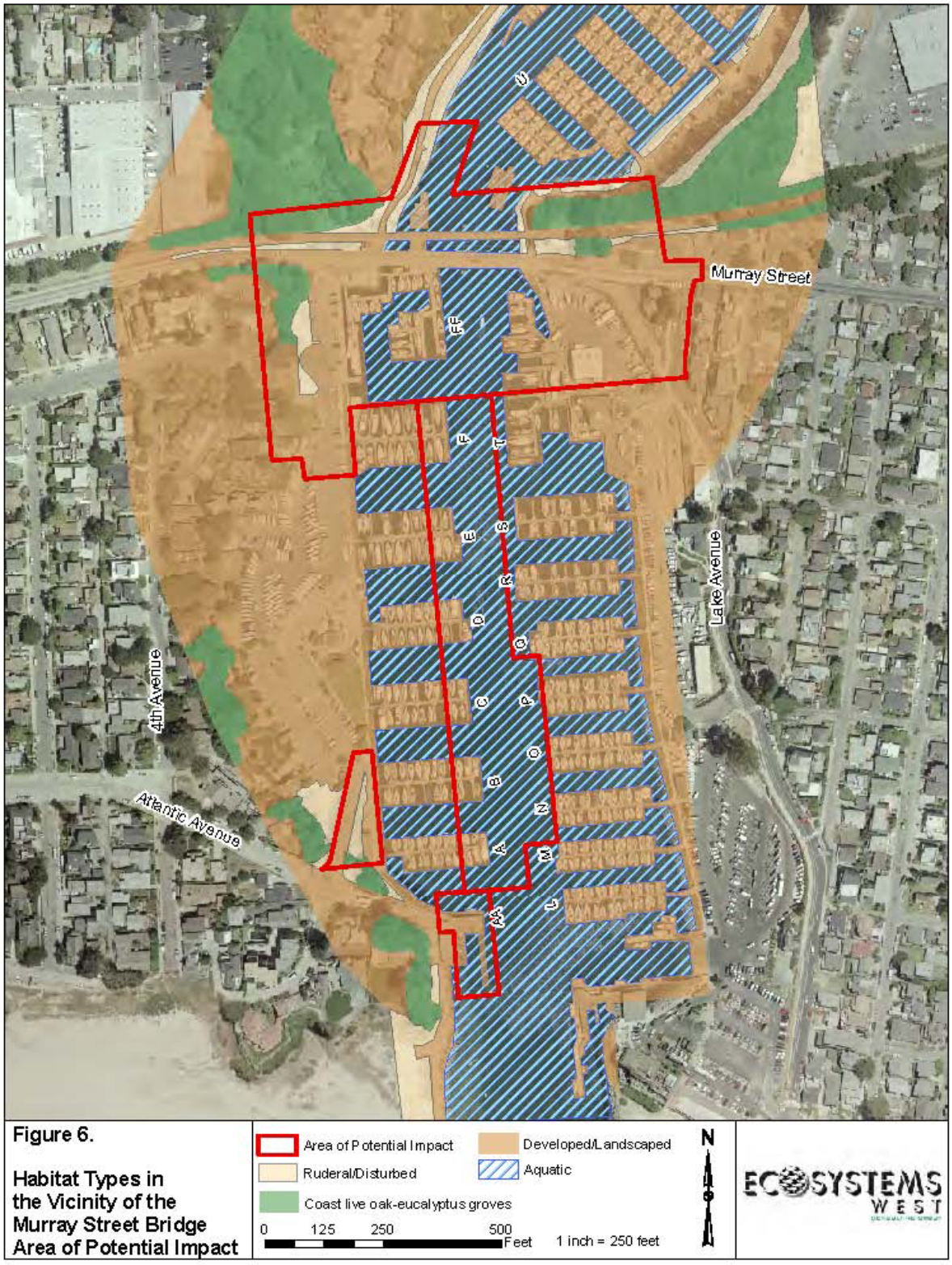


Figure 6. Habitat Types



East of the existing bridges and north of Murray Street there is a small area of remnant forest on and at the top of the steep slope between the railroad and East Drive. At its western end, this patch of forest is dominated by the native tree species coast live oak (*Quercus agrifolia*). To the east, the non-native tree species blue gum eucalyptus (*Eucalyptus globulus*) dominates the canopy, with subcanopy-sized coast live oaks underneath. The understory is disturbed and variable in species composition. The native woody vine Pacific blackberry (*Rubus ursinus*) and the non-native vine greater periwinkle (*Vinca major*) form dense patches over part of the area. Herbaceous species dominate other areas, including miner's-lettuce; cleavers (*Galium aparine*), which may or may not be native in the Santa Cruz area; and the non-native species rattlesnake grass and common chickweed. Under the eucalyptus, another non-native vine, English ivy (*Hedera helix*) is relatively abundant, and cape-ivy (*Delairea odorata* [= *Senecio mikanioides*]) another non-native vine that is highly invasive, is localized. One small individual of the native riparian tree species box elder (*Acer negundo* var. *californicum*) occurs at the edge of the eucalyptus stand. Coast live oak and eucalyptus also grow in the narrow area between Murray Street and the railroad track.

The area east of the existing bridges and south of Murray Street is essentially entirely developed. A narrow vegetated strip bordering the harbor is dominated by French broom, pampas grass, ice plant, and Bermuda-buttercup.

West of the existing bridges and north of Murray Street and the railroad track, there is a stand of coast live oak at the top of a steep bank. The understory is disturbed and is vegetated with a relatively sparse cover consisting mostly of non-native species, including greater periwinkle, English ivy, and fennel (*Foeniculum vulgare*). Several small coast live oaks occur in the area between Murray Street and the railroad track.

Much of the area west of the existing bridges and south of Murray Street is occupied by a parking lot. A patch of remnant forest borders the parking lot on the west. To the south, the canopy of this patch of forest is dominated by blue gum eucalyptus. To the north, the canopy is dominated by coast live oak, with one large California bay (*Umbellularia californica*), also a native tree species. Several individuals of Monterey pine (*Pinus radiata*) a species that is native in northwestern Santa Cruz County but not native in the vicinity of Santa Cruz, occur close to Murray Street. The understory of this patch of forest is partly landscaped; where not landscaped, the understory is vegetated mostly by weedy non-native species, with Bermuda-buttercup being especially abundant.

The small area to the south, adjacent to the end of Atlantic Avenue, that is also part of the project area, consists entirely of pavement, artificial structures, and open water. It is essentially unvegetated.

3.1.2. Wildlife

In general, the developed and disturbed areas of the land portion of the project site provide low quality habitat for wildlife species. Buildings provide temporary perching places for avian

species such as gull species (*Larus sp*.), rock dove (*Columbia livia*), double crested cormorant (*Phalacrocorax auritus*), and black phoebe (*Sayornis nigricans*).

The Murray Street Bridge structure provides habitat for both avian and bat species. Rock dove, barn swallow (*Hirundo rustica)*, and cliff swallow (*Petrochelidon pyrrhonota*) typically nest on bridge structures. Western gulls (*Larus occidentalis*) nest on the footings of the bridge, while birds such as double crested cormorant, and black-crowned night heron (*Nycitcorax nycticorax*) roost on the footings. Bats may utilize the crevice features on the bridge for day roosting and maternity colonies. Night roosting may occur in the box-like structures under the bridge where heat is trapped and near the abutments where airflow is decreased.

Eucalyptus trees, although non-native, provide habitat for a variety of wildlife species. Monarch butterflies utilize eucalyptus trees as a nectar source, temporary roosts, and winter roosts. Eucalyptus also provides nesting and roosting opportunities for various avian species such as double-crested cormorant, great blue heron (*Ardea herodias*), great egret (*Ardea alba*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), merlin (*Falco columbarius*), white-tailed kite (*Elanus leucurus*), Anna's hummingbird (*Calypte anna*), and Allen's hummingbird (*Selasphorus sasin*).

Oak woodlands are considered important habitats for the conservation of many bird and mammal species (Block et al. 1990). As a seasonal food, acorns are important for the survival of many wildlife species in fall and winter (Tietje 1990). Bat species, including the big brown bat (*Eptesicus fuscus*), many *Myotis* species, western red bat (*Lasiurus blossevillii*), and hoary bat (*Lasiurus cinereus*) may roost in these stands of oaks as winter migrants, in maternity colonies, or as year-round residents.

Birds observed during field surveys include: belted kingfisher (*Ceryle alcyon*), great blue heron, black-crowned night heron at bridge support bent 8, double crested cormorant, rock dove, black phoebe, western grebe (*Aechmophorus occidentalis*), and a few gull species. Western gulls have been observed nesting on the footings of the bridge in past years (Gerow 2006). It is likely that gulls will return and attempt to nest at this bridge site. Several swallow mud nest remains were observed underneath the Murray Street Bridge. The mud nests were located at bridge support bents 6, 7, 8, and 9. Although surveys were conducted outside of nesting bird season, cliff swallows have been observed nesting on bridge supports in previous years (Gerow 2006). Nest remains indicate the presence of cliff swallows and/or barn swallows in the project area. It is assumed that swallows will return and attempt to nest at this bridge site.

Terrestrial mammals observed during field surveys include: one unidentified bat in a tunnel on the northwest side of the Murray Street Bridge.

The aquatic portion of the project area is located within the Santa Cruz Small Craft Harbor (Harbor), which primarily includes boat docks in the project vicinity. The Harbor opened in 1964 with 360 berths and a launching ramp, and was subsequently expanded into the upper portion of the former Woods Lagoon in 1972. Permanent jetties placed along the east and west sides of the Harbor's entrance channel provide year-round access to the Pacific Ocean. Since its construction, the Harbor has experienced extensive shoaling of the harbor entrance after episodic storm events

and seasonal periods of high surf. Entrance dredging has occurred annually since 1965, and dredging of portions of the inner-harbor has been necessary at times. Harbor dredging and disposal activities are regulated by a number of federal, state, and regional agencies.

The Santa Cruz Harbor is fed by waters from Arana Gulch and Hagemann Gulch upstream (north) of the project area (Figure 4). The harbor area covers an area of approximately 30 acres (two acres in the entrance channel and 28 acres in the inner harbor areas). Existing depths are from 0.0 feet MLLW to -20 feet MLLW, depending on the location. Sediment in the entrance channel and the South Harbor is composed primarily of sand; sediment in the North Harbor is a combination of sand, silt and clay (U.S. Army Corps of Engineers, 2000).

The docks in the study area are used as haul-out sites for eastern Pacific harbor seal (*Phoca vitulina richardsi*) and California sea lion (*Zalophus californianus*) and roosts for gulls, cormorants (*Phalacrocorax* sp.), and herons (*Ardea herodias, Ardea alba,* and *Nycticorax nycticorax*) The open water of the study area provides habitat for marine mammals, including the southern sea otter (*Enhydra lutris nereis*), the eastern Pacific harbor seal, and the occasional California sea lion.

Harbor waters support a variety of benthic and pelagic fish species. The intertidal environment is characterized by shore bottom substrates, rocky shores and the floating docks also provide some substrate. Sandy and muddy shores are populated with burrowers and mobile surface dwellers. The bottom substrate is affected by seasonal deposition of silt from streams that flow into the harbor. Although recent species inventories have not been conducted, species that have been observed in the Harbor include green algae, barnacles (*Balanus glandula* and *Palanus tintinnabulum*), and Cancer crabs. Other species that have been found in Harbor waters include periwinkles, limpets, mussels, chitins, the black turban snail, various shore crabs, anemones, sea sponges, and worms. Fish species that have been found in the Harbor include white croaker, speckled sandperch, jacksmelt, varieties of surfperch, rockfish and starry flounder. The Harbor also experiences periodic invasion by large schools of anchovies, which can deplete food and oxygen supplies (Santa Cruz Port District, December, 1980).

Steelhead trout (*Oncorhynchus mykiss*) have been found within Harbor waters and the upstream Arana Gulch that discharges into the Upper Harbor has supported steelhead passage in the past. Surveys conducted by D.W. Alley (2000) recorded an extremely small steelhead population in the lowest reach of Arana Gulch Creek and attributed these low densities to extremely poor spawning habitat conditions and limited rearing habitat

Information from the National Marine Fisheries Services indicates that the Harbor is located within designated "essential fish habitat" (EFH) for various life stages of fish species managed under the following Fishery Management Plans (FMP) under the Magnuson-Stevens Fishery Conservation and Management Act (MSA):

- Pacific Coast Groundfish FMP – various rockfish, sole, shark, etc.
- Pacific Coast Salmon FMP – Chinook salmon, coho salmon
- Coastal Pelagic Species FMP – northern anchovy, Pacific sardine, etc.

3.2. Regional Species and Habitats of Concern

3.2.1. Botany

Table 2. indicates the special-status plant species with potential to occur in the vicinity of the project area, and includes information on listing status, habitats, county-level distribution, and flowering period. This list is based on USGS quadrangle occurrence records from the CNDDB and the CNPS *Inventory of Rare and Endangered Vascular Plants of California* (Tibor 2001; CNPS 2007) for the Santa Cruz quadrangle and the four quadrangles surrounding it, except for species on List 4 of the CNPS *Inventory*. List 4 species are included based on their known distribution in Santa Cruz County, although specific quadrangle occurrences records are not available.

All special-status plant species listed in Table 2 are presumed absent due to the highly disturbed nature of the entire area and the lack of suitable habitat; therefore, no further study is needed. The botanical survey was conducted in January, at a time when not all plant species occurring or potentially occurring in the project area were identifiable. The survey was conducted at the time environmental review was initiated for the project, which preceded the spring flowering season by several months. Although the survey was conducted in January, before some special status species would have been identifiable, a detailed review of special status plants with potential to occur in the project area (Table 2 and Appendix A) supports the conclusion that no native special status plant species occurs in the project area due to the highly disturbed nature of the entire area and the lack of suitable habitat. The vast majority of the site is urbanized and natural areas are limited in size and heavily fragmented by development and infrastructure. Most vegetated areas consist of ornamental landscaping around parking areas and structures. Due to the close proximity of known populations of Santa Cruz tarplant (*Holocarpha macradenia*) at Arana Gulch, special conideration was taken to identify potenital habitat for this species including annual grassland and coastal scrub. However, the January site visit did not reveal potential habitat for this or any other special status plant species. As a result, the biologists determined that no additional focused botanical surveys are necessary for the project area.

3.2.2. Wildlife

Records maintained by the CNDDB and previous surveys conducted by EcoSystems West (City of Santa Cruz 2007) indicate that a number of special-status wildlife species are known or have potential to occur in the vicinity of the Murray Street Bridge, despite the small isolated pockets of wildlife habitat provided by the study area. These species are listed in Table 3, along with their habitat requirements and potential to occur. Rationale for these species' potential to occur follows the table in subsequent text. Potentially occurring or occurring nesting birds and marine mammals are also listed in Table 3.

Table 2. Status, distribution and habitat of special-status plants with potential to occur in the vicinity of the Murray Street Bridge Seismic Retrofit project area, Santa Cruz, California.

Species **Common Name**[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Distribution by County[6]	Flowering Period[7]
Amsinckia lunaris bent-flowered fiddleneck	None	None	List 1B.2	Cismontane woodland, valley and foothill grassland, coastal bluff scrub	ALA, CCA, COL, LAK, MRN, NAP, SBT, SCL, SCR, SMT, SON, YOL	March-June
Arabis blepharophylla coast rock cress	None	None	List 4.3	Rocky places in broadleafed upland forest, coastal bluff scrub, coastal prairie, coastal scrub	CCA, LAK, MNT, MRN, SCR, SFO, SMT, SON	February-May
Arctostaphylos andersonii Santa Cruz manzanita	None	None	List 1B.2	Chaparral; openings in and edges of broadleafed upland forest and north coast coniferous forest	SCL, SCR, SMT	November-April
Arctostaphylos pajaroensis Pajaro manzanita	None	None	List 1B.1	Sandy soil, chaparral	MNT, SBT, SCR*	December-March
Arctostaphylos silvicola Bonny Doon manzanita	None	None	List 1B.2	Inland marine sands in chaparral, closed-cone coniferous forest, sand parkland, sandhill ponderosa pine forest	SCR	February-March
Arenaria paludicola marsh sandwort	Endangered	Endangered	List 1B.1	Freshwater marshes	SBD*, SCR*, SFO*, SLO, Washington*	May-August
Calandrinia breweri Brewer's calandrinia	None	None	List 4.2	Chaparral, coastal scrub in sandy or loamy soil, often on burns or disturbed sites	CCA, LAX, MRN, MPA, MEN, MNT, NAP, ORA, RIV, SBA, SBD, SCL, SCR, SCZ, SDG, SHA, SLO, SMT, SON, SRO, VEN, Baja California	March-June
Calochortus umbellatus Oakland star-tulip	None	None	List 4.2	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland, often on serpentine	ALA, CCA, LAK, MRN, SCL, SCR*, SMT, STA	March-May
Calyptridium parryi var. *hesseae* Santa Cruz Mtns. pussypaws	None	None	List 3	Chaparral, cismontane woodland	MNT, SBT, SCL, SCR*	May-July

Species **Common Name**[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Distribution by County[6]	Flowering Period[7]
Campanula californica swamp harebell	None	None	List 1B.2	Moist places; bogs and fens, closed-cone coniferous forest, coastal prairie, meadows, freshwater marshes and swamps, north coast coniferous forest	MEN, MRN, SCR*, SON	June-October
Carex comosa bristly sedge	None	None	List 2.1	Marshes and swamps, lake margins, coastal prairie, valley and foothill grassland	CCA, LAK, MEN, SAC, SBD*, SCR*, SFO*, SHA, SJQ, SON, Idaho, Oregon, Washington, other states	May-September
Carex saliniformis deceiving sedge	None	None	List 1B.2	Moist places, coastal prairie, coastal scrub, meadows, coastal salt marshes	HUM, MEN, SCR*, SON	June
Castilleja latifolia Monterey Indian paintbrush	None	None	List 4.3	Sandy soil, closed-cone coniferous forest, openings in cismontane woodland, coastal dunes, coastal scrub	MNT, SCR	February-September
Ceanothus cuneatus var. *rigidus* Monterey ceanothus	None	None	List 4.2	Sandy soil, closed-cone coniferous forest, chaparral, coastal scrub	MNT, SCR, SLO	February-April
Chorizanthe pungens var. *hartwegiana* Ben Lomond spineflower	Endangered	None	List 1B.1	Inland marine sands in chaparral, closed-cone coniferous forest, sand parkland, sandhill ponderosa pine forest	SCR	April-July
Chorizanthe pungens var. *pungens* Monterey spineflower	Threatened	None	List 1B.2	Sandy soil, maritime chaparral, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland	MNT, SCR, SLO	April-June (July)
Chorizanthe robusta var. *hartwegii* Scotts Valley spineflower	Endangered	None	List 1B.1	Meadows, grasslands in sandy or mudstone soil	SCR	April-July
Chorizanthe robusta var. *robusta* robust spineflower	Endangered	None	List 1B.1	Coastal dunes, coastal scrub, openings in cismontane woodland, in sandy or gravelly soil	ALA*, MNT, MRN?, SCL*, SCR, SFO, SMT*	April-September
Collinsia multicolor San Francisco collinsia	None	None	List 1B.2	Closed-cone coniferous forest, coastal scrub, broadleafed upland forest	MNT, SCL, SCR, SFO, SMT	March-May

Species **Common Name**[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Distribution by County[6]	Flowering Period[7]
Cupressus abramsiana Santa Cruz cypress	Endangered	Endangered	List 1B.2	Closed-cone coniferous forest, chaparral, sandhill ponderosa pine forest on sandstone or granitic substrate	SCR, SMT	N/A
Cypripedium fasciculatum clustered lady's-slipper	None	None	List 4.2	Lower montane coniferous forest, north coast coniferous forest	BUT, DNT, GLE, HUM, MEN, NEV, PLU, SCL, SCR*, SHA, SIE, SIS, SMT, TEH, TRI, YUB, Oregon, Utah, other states	March-July
Cypripedium montanum mountain lady's-slipper	None	None	List 4.2	Broadleafed upland forest, cismontane woodland, lower montane coniferous forest, north coast coniferous forest	DNT, GLE, HUM, MAD, MEN, MPA, MOD, PLU, SCR(*?), SHA, SIE, SIS, SMT(*?), SON, TEH, TRI, TUO, Oregon, Washington, other states	March-August
Elymus californicus California bottlebrush grass	None	None	List 4.3	Cismontane woodland, north coast coniferous forest, broadleafed upland forest, riparian woodland	MRN, SCR, SMT, SON	May-August (November)
Eriogonum nudum var. *decurrens* Ben Lomond buckwheat	None	None	List 1B.1	Inland marine sands in chaparral, closed-cone coniferous forest, sand parkland, sandhill ponderosa pine forest	ALA?, SCL, SCR	June-October
Erysimum teretifolium Santa Cruz wallflower	Endangered	Endangered	List 1B.1	Inland marine sands in chaparral, closed-cone coniferous forest, sand parkland, sandhill ponderosa pine forest	SCR	March-July
Fritillaria agrestis stinkbells	None	None	List 4.2	Low-lying areas in heavy clay soil, chaparral, cismontane woodland, valley and foothill grassland, pinyon and juniper woodland	ALA, CCA, FRE, KRN, MPA, MEN, MER, MNT, PLA, SAC, SBA, SBT, SCL, SCR*, SLO, SMT*, STA, TUO, VEN, YUB	March-June
Grindelia hirsutula var. *maritima* San Francisco gumplant	None	None	List 1B.2	Coastal bluff scrub, coastal scrub, valley and foothill grassland, in sandy or serpentine soil	MNT, MRN, SCR, SFO, SLO, SMT	June-September

Species **Common Name**[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Distribution by County[6]	Flowering Period[7]
Hoita strobilina Loma Prieta hoita	None	None	List 1B.1	Moist sites in chaparral, cismontane woodland, riparian woodland, usually serpentinite soil	ALA*, CCA*, SCL, SCR	May-July (August-October)
Holocarpha macradenia Santa Cruz tarplant	Threatened	Endangered	List 1B.1	Coastal prairie, valley and foothill grassland, coastal scrub, often in clay or sandy soils	ALA*, CCA*, MNT, MRN*, SCR, SON*	June-October
Horkelia cuneata ssp. *sericea* Kellogg's horkelia	None	None	List 1B.1	Openings in closed-cone coniferous forest, maritime chaparral, coastal scrub, coastal prairie, in sandy or gravelly soil	ALA*, MRN*, MNT, SBA, SCR, SFO*, SLO, SMT	April-September
Horkelia marinensis Point Reyes horkelia	None	None	List 1B.2	Coastal dunes, coastal prairie, coastal scrub, in sandy soil	MEN, MRN, SCR, SMT, SON	May-September
Leptosiphon (*Linanthus*) *ambiguus* serpentine leptosiphon	None	None	List 4.2	Cismontane woodland, coastal scrub, valley and foothill grassland, on serpentine or sandstone substrate	ALA, CCA, MER, SBT, SCL, SCR, SJQ, SMT, STA	March-June
Leptosiphon (*Linanthus*) *grandiflorus* large-flowered leptosiphon	None	None	List 4.2	Coastal scrub, coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal dunes, coastal prairie, valley and foothill grassland, usually in sandy soil	ALA, KRN, MAD, MER, MRN, MNT, SBA*, SCL, SCR, SFO, SLO, SMT, SON	April-August
Lilium rubescens redwood lily	None	None	List 4.2	Broadleafed upland forest, north coast coniferous forest, chaparral, lower montane coniferous forest, upper montane coniferous forest	DNT, GLE, HUM, LAK, MEN, NAP, SCR*, SHA, SIS, SON, TRI	April-August
Lomatium parvifolium small-leaved lomatium	None	None	List 4.2	Closed-cone coniferous forest, chaparral, coastal scrub, riparian woodland	MNT, MRN, SCR, SLO	January-June
Lotus formosissimus harlequin lotus	None	None	List 4.2	Moist to wet places, broadleafed upland forest, coastal scrub, coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal prairie, meadows and seeps, marshes, north coast coniferous forest, valley and foothill grassland	DNT, HUM, MRN, MEN, MNT, SBT, SCR, SFO, SLO, SMT, SON, Oregon, Washington	March-July

Species **Common Name**[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Distribution by County[6]	Flowering Period[7]
Lupinus tidestromii Tidestrom's lupine	Endangered	Endangered	List 1B.1	Coastal dunes	MRN, MNT, SON	April-June
Malacothamnus arcuatus arcuate bush mallow	None	None	List 1B.2	Chaparral, cismontane woodland	SCL, SCR, SMT	April-September
Micropus amphibolus Mt. Diablo cottonweed	None	None	List 3.2	Rocky areas in broadleafed upland forest, chaparral, cismontane woodland, valley and foothill grassland, coastal scrub	ALA, CCA, COL, LAK, MNT, MRN, NAP, SBA, SCL, SCR, SJQ, SLO, SOL, SON	March-May
Microseris paludosa marsh microseris	None	None	List 1B.2	Moist places in closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland	MEN, MNT, MRN, SBT, SCR, SFO*, SLO, SMT*, SON	April-June
Mimulus rattanii ssp. *decurtatus* Santa Cruz County monkeyflower	None	None	List 4.2	Margins of chaparral, sandhill ponderosa pine forest, in sandy or rocky soil	MNT, SCR	May-July
Monardella undulate Curly-leaved monardella	None	None	List 4.2	Maritime chaparral, coastal dunes, coastal prairie, coastal scrub, ponderosa pine sandhills, closed-cone pine forest, in sandy soil	MNT, MRN, SBA, SCR, SFO, SLO, SMT, SON	May-September
Pedicularis dudleyi Dudley's lousewort	None	Rare	List 1B.2	Maritime chaparral, north coast coniferous forest, cismontane woodland, valley and foothill grassland	MNT, SCR*, SLO, SMT	April-June
Penstemon rattanii var. *kleei* Santa Cruz Mtns. Beardtongue	None	None	List 1B.2	Chaparral, lower montane coniferous forest, north coast coniferous forest, often in sandy soil	SCL, SCR	May-June
Pentachaeta bellidiflora white-rayed pentachaeta	Endangered	Endangered	List 1B.1	Valley and foothill grassland, coastal scrub, coastal prairie	MNT, MRN*, SCR*, SMT	March-May
Perideridia gairdneri ssp. *gairdneri* Gairdner's yampah	None	None	List 4.2	Moist sites in coastal prairie, broadleafed upland forest, chaparral, valley and foothill grassland, vernal pools	CCA, DNT, KRN, LAX*, MRN, MEN, MNT, NAP, ORA*, SBT, SCL, SCR, SDG*, SLO, SMT(*?), SOL, SON	June-October

Species **Common Name**[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Distribution by County[6]	Flowering Period[7]
Piperia candida white-flowered rein orchid	None	None	List 4.3	Lower montane coniferous forest, north coast coniferous forest, broadleaved upland forest	DNT, HUM, MEN, SCR, SIS, SMT, SON, TRI, Oregon, Washington, other state	May-September
Piperia michaelii Michael's rein orchid	None	None	List 4.2	Coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, broadleafed upland forest, coastal scrub, lower montane coniferous forest	ALA, AMA, BUT, CCA, FRE, HUM, LAX*, MRN, MNT, SBA, SBT, SCL, SCR, SCZ, SFO, SLO, SMT, STA, TUL, TUO, VEN(*?), YUB	April-August
Plagiobothrys chorisianus var. chorisianus Choris's popcorn-flower	None	None	List 1B.2	Moist places in chaparral, coastal prairie, coastal scrub	ALA(*?), SCR, SFO, SMT	March-June
Plagiobothrys chorisianus var. *hickmanii* Hickman's popcorn-flower	None	None	List 4.2	Moist places in closed-cone coniferous forest, chaparral, coastal scrub, marshes and swamps, vernal pools	MNT, SBT, SCL, SCR, SLO, SMT?	April-June
Plagiobothrys diffusus San Francisco popcornflower	None	Endangered	List 1B.1	Coastal prairie; valley and foothill grassland	ALA, SCR, SFO*, SMT	March-June
Polygonum hickmanii Scotts Valley polygonum	Endangered	Endangered	List 1B.1	Valley and foothill grassland	SCR	May-August
Ranunculus lobbii Lobb's aquatic buttercup	None	None	List 4.2	Seasonally inundated places, cismontane woodland, north coast coniferous forest, valley and foothill grassland, vernal pools	ALA, CCA, MEN, MRN, NAP, SAC, SCL, SCR(*?), SMT(*?), SOL, SON, Oregon, other states	February-May
Sanicula hoffmannii Hoffmann's sanicle	None	None	List 4.3	Broadleafed upland forest, chaparral, coastal scrub, often serpentinite or clay soil	MNT, SBA, SCR, SCZ, SLO, SMT, SRO	March-May
Sidalcea malachroides maple-leaved checkerbloom	None	None	List 4.2	Broadleafed upland forest, coastal prairie, coastal scrub, north coast coniferous forest, riparian woodland, often in disturbed places	DNT, HUM, MEN, MNT, SCL, SCR, SON, Oregon*	April-July (August)

Species **Common Name**[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Distribution by County[6]	Flowering Period[7]
Silene verecunda ssp. *verecunda* San Francisco campion	None	None	List 1B.2	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland, in sandy or rocky soil	SCR, SFO, SMT, SUT	March-August
Stebbinsoseris decipiens Santa Cruz microseris	None	None	List 1B.2	Open areas in broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland	MRN, MNT, SCR, SFO, SLO, SMT	April-May
Trifolium buckwestiorum Santa Cruz clover	None	None	List 1B.1	Coastal prairie; margins of broadleafed upland forest, cismontane woodland	MEN, MNT, SCL, SCR, SMT, SON	April-October
Zigadenus micranthus var. *fontanus* marsh zigadenus	None	None	List 4.2	Vernally moist places in chaparral, cismontane woodland, lower montane coniferous forest, meadows, marshes and swamps, often serpentinite soil	LAK, MRN, MEN, MNT, NAP, SBT, SCR, SLO, SMT, SON	April-July

[1]Nomenclature follows Hickman (1993); Tibor (2001); California Native Plant Society (2007).
[2]U.S. Fish and Wildlife Service (2008a, b, c).
[3]Section 1904, California Fish and Game Code (California Department of Fish and Game 2007).
[4]Tibor (2001); California Native Plant Society (2007).
CNPS Lists: List 1B: Rare, Threatened, or Endangered in California and elsewhere. List 2: Rare, Threatened, or Endangered in California, more common elsewhere. List 3: Plants about which more information is needed. List 4: Plants of limited distribution: a watch list.
Threat Code extensions: .1: Seriously endangered in California. .2: Fairly endangered in California. .3 Not very endangered in California.
[5]Thomas (1960); Munz and Keck (1973); Hickman (1993); Tibor (2001); Morgan et. al. (2005); California Native Plant Society (2007); and unpublished information.
[6]Tibor (2001); California Native Plant Society (2006); and unpublished information; counties abbreviated by a three-letter code (below); occurrence in other states as indicated.
[7]Munz and Keck (1973); Tibor (2001); California Native Plant Society (2007)

ALA: Alameda
AMA: Amador
BUT: Butte
CCA: Contra Costa
COL: Colusa
DNT: Del Norte
FRE: Fresno
GLE: Glenn
HUM: Humboldt
KRN: Kern
LAK: Lake
LAX: Los Angeles
MAD: Madera
MEN: Mendocino
MER: Merced
MNT: Monterey
MOD: Modoc
MPA: Mariposa
MRN: Marin
NAP: Napa
NEV: Nevada
ORA: Orange
PLA: Placer
PLU: Plumas
RIV: Riverside
SAC: Sacramento
SBA: Santa Barbara
SBD: San Bernardino
SBT: San Benito
SCL: Santa Clara
SCR: Santa Cruz
SCZ: Santa Cruz Island (SBA Co.)
SDG: San Diego
SFO: San Francisco
SHA: Shasta
SIE: Sierra
SIS: Siskiyou
SJQ: San Joaquin
SLO: San Luis Obispo
SMT: San Mateo
SOL: Solano
SON: Sonoma
SRO: Santa Rosa Island (SBA Co.)
STA: Stanislaus
SUT: Sutter
TEH: Tehama
TRI: Trinity
TUL: Tulare
TUO: Tuolumne
VEN: Ventura
YOL: Yolo
YUB: Yuba

* Presumed extinct in these counties or states.

Table 3: Special Status Wildlife Species Listed, Proposed Species, Critical Habitat, Nesting Birds, and Marine Mammals Potentially Occurring or Known to Occur in the Murray Street Bridge Seismic Retrofit project area, Santa Cruz, California.

Species Name	Status: Federal/State/Other	Habitat Characteristics	Occurrence Potential
Invertebrates			
Zayante band-winged grasshopper *Trimerotropis infantillis*	FE/ -/-	Restricted to Santa Margarita sandstone (Zayante sands) of the Zayante sandhills in Santa Cruz County. Associated with open, sunny areas and require bare, loose soils to lay their eggs. Adults take flight between late May and early August, moving no more than a few feet.	A
Ohlone tiger beetle *Cidindela ohlone*	FE/-/-	The Ohlone tiger beetle is associated with coastal prairie, although it has also been found in degraded prairie remnants that are characterized by a mix of annual grasses and other ruderal plants. The beetle often occurs on Watsonville loams (Bowman et al.1980). Other factors that influence habitat suitability include soil particle size, moisture, and depth (D. Arnold pers. comm. 2006).	A
Mt. Hermon june beetle *Polyphylla barbata*	FE/-/-	Restricted to habitats of Santa Margarita sandstone (Zayante sands) of the Zayante sandhills in Santa Cruz County. Adults take flight between late May and July.	A
Monarch butterfly (Wintering Sites) *Danaus plexippus*	-/-/S3, L	The wintering monarch butterfly occupies a narrow band of habitat close to the ocean. Eucalyptus groves (*Eucalyptus globulus*) and conifer groves are commonly utilized as overwintering sites in California.	HP, P
Fish			
Steelhead (Central California Coast DPS) *Oncorhynchus mykiss*	FT/-/-	Permanent ponds, pools, and streams**.** Spends the first few years of its life in fresh water before migrating to the ocean. Adults will later return to the freshwater location where they were spawned to breed.	HP, P, CH
Tidewater goby *Eucyclogobius newberryi*	FE/CSC/AFS-E	Coastal lagoons and creeks; found up to 3 miles upstream in slow-moving water. Sandbar formation is required for the establishment of a resident population.	A

Species Name	Status: Federal/State/Other	Habitat Characteristics	Occurrence Potential
North American green sturgeon (Southern DPS) *Acipenser medirostris*	FT/CSC/-	Spend the majority of their lives in nearshore oceanic waters, bays, and estuaries. Spawning and early life-history stages (less than 4 years old) occurs in fresh water.	HP, CH
Amphibians/Reptiles			
California tiger salamander *Ambystoma californiense*	FT/CSC/-	Restricted to vernal pools, seasonal ponds, and stockponds in grassland, oak savannah, scrub or chaparral. Significantly associated with active fossorial mammal burrows. May migrate up to 1 mile from upland sites to breeding aquatic sites. Breeding occurs from first fall-winter rains to April. Occupy upland burrow sites for up to 2-5 years before returning to aquatic sites to breed (USFWS 2003).	A
Santa Cruz long-toed salamander *Ambystoma macrodactylum croceum*	FE/SE, CFP/-	Require shallow ponds with emergent and submerged vegetation for cover during the aquatic phase of their life. In the terrestrial phase, woodlands with a dense understory and abundant burrows are required for continued survival. May migrate over 1 mile to reach breeding ponds (USFWS 1996).	A
California red-legged frog (CRLF) *Rana aurora draytonii*	FT/CSC/-	Occupies and breeds in marshy habitats, springs, natural and artificial ponds, and slack water pools of rivers and streams (Stebbins 1985). Known to occur and reproduce in tidally-influenced coastal marshes under certain conditions (Reis 1999). Requires the presence of surface water until mid to late summer for reproduction Upland habitat includes leaf litter and small mammal burrows; adults are known to travel over 2 miles overland between aquatic sites.	A
Southwestern pond turtle (WPT) *Emys marmorata*	-/CSC/-	Highly aquatic, ponds, marshes, rivers and streams; basks along banks, on floating logs and debris, boulders, and gravel bars. Eggs are laid from March to August in loose sandy substrate or dense vegetation cover along banks and upper terraces of slow-moving streams and rivers (Rathbun et al. 1992 and Feldman 1982).	A

Species Name	Status: Federal/State/Other	Habitat Characteristics	Occurrence Potential
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	FE/ SE, CFP/-	Highly associated with mostly freshwater marshes, ponds, reservoirs, and slow moving streams in San Mateo County and northern Santa Cruz County. Preferred food sources include the California red-legged frog and Pacific tree frog. Utilizes dense cover in upland habitat near aquatic sites and small burrows for refuge and aestivation.	A
Birds (rookeries, nesting, and/or wintering)			
Brown Pelican (nesting and communal roosts) *Pelecanus occidentalis*	Delisted* /SE**, CFP/S1S2	Roosts in sand spits and offshore sand bars. Habitat includes coastal areas such as sandy beaches, lagoons, waterfronts and marinas.	HP, P
Double-crested cormorant (rookery site) *Phalacrocorax auritus*	-/CSC/S3	Inshore open waters, large coastal ponds and lagoons, and inland ponds and lakes; form rookeries and/or congregate at night-roosts on undisturbed structures or in trees. Nests are typically built on the ground, but are occasionally built in trees.	P
Great blue heron (rookery) *Ardea herodias*	-/-/MBTA	Nests in colonies, sometimes as lone pair, usually high in trees, occasionally on the ground (Cornell 2007). The nest is made of sticks, lined with pine needles, moss, reeds, dry grass, or twigs. In the San Francisco Bay area, great blue herons begin to occupy rookeries in January, although sometimes as early as late December. Generally, rookeries remain active until mid-June but can persist until mid-September (Kelly et al 2005).	HP, P
Great egret (rookery) *Ardea alba*	-/-/MBTA	Nests colonially with other herons in trees or shrubs made of sticks covered with green material (Cornell 2007). Great egrets arrive at their rookeries between mid-February and early April. Generally, rookeries are occupied into August, but can persist until mid-September (Kelly et al 2005).	HP, P
Black-crowned night heron (rookery) *Nycitcorax nycticorax*	-/-/S3	Nests in large colonies within dense-foliaged trees and shrubbery, vine tangles, as well as dense (fresh or brackish) emergent wetlands (Cogswell 1977). Black-crowned night herons arrive at their rookery sites between March and late April. Rookeries are generally occupied into August, but can persist until mid-September (Kelly et al 2005).	P
Sharp-shinned hawk (nesting) *Accipiter striatus*	-/CSC/-	Commonly associated with dense stands of smaller conifers, but can nest in a variety of habitats, including deciduous riparian forest (Zeiner et al. 1990). The hawk often hunts near openings in the foliage, using adjacent woodland for cover.	A

Species Name	Status: Federal/State/Other	Habitat Characteristics	Occurrence Potential
Cooper's hawk (nesting) *Accipiter cooperi*	-/CSC/-	Deciduous riparian woodland, live oak, or second-growth conifers, in dense stands with a relatively high crown closure and open understory, usually near stream courses (Call 1978, Zeiner et al. 1990); highly sensitive to disturbance.	A
White-tailed kite (nesting) *Elanus leucurus*	-/CFP/	Nests in conifers on the margins of large open areas including grasslands and sloughs containing a high abundance of small mammals and lizards.	A
Bald eagle *Haliaeetus leucocephalus*	Delisted/SE, CFP/-	In western North America, nests and roosts in coniferous forests within approximately one mile of a lake, reservoir, stream, river, or the ocean. Requires large, old growth tees or snags in remote mixed stands near water for nest sites. Fish are primary food source. Highly sensitive to human disturbance when nesting.	HP
Merlin (wintering) *Falco columbarius*	-/CSC/-	Wintering habitats include riparian, dense woodlands, grasslands, open fields, marshes and developed areas. The bird also favors coastlines, lakeshores, and wetlands and is often observed in open habitats at low elevations near water. The merlin utilizes dense strands of trees for cover. The merlin feeds primarily on small birds, but will eat small mammals and insects as well. The merlin also forages along shorelines in winter, to hunt for shorebirds (CDFG California Interagency Wildlife Task Group 2005)	HP
California clapper rail *Rallus longirostris obsoletus*	FE/SE, CFP/-	Requires emergent coastal wetlands, tidal sloughs, and brackish areas with shallow water and mudflats for foraging, with adjacent higher vegetation for cover during high water. Highly associated with emergent wetland dominated by pickleweed and cordgrass, and brackish emergent wetland with these two species and bulrush. In saline emergent wetlands, nests mostly where cordgrass is abundant. In fresh or brackish water, builds nest in dense cattail or bulrush.	A
Western gull (nesting) *Larus occidentalis*	-/-/MBTA	Occupies coastal islands, cliffs, harbors, bays, river mouths, and garbage dumps. Nests in a wide variety of habitats affording protection from predators. Occupies nesting habitat up to 6 months prior to egg laying and engages in courtship and mating behavior. Breeds colonially April through August (CDFG California Interagency Wildlife Task Group 2005).	HP, P

Species Name	Status: Federal/State/Other	Habitat Characteristics	Occurrence Potential
Yellow-billed cuckoo *Coccyzus americanus*	FC/SE/-	Breeding habitat consists of riparian areas with a cottonwood-willow, and/or alder-willow component. They breed later than most migrant species, beginning in June and continuing through September. Highly secretive.	A
Vaux's swift (nesting) *Chaetura vauxi*	-/CSC/S3	Nests in man-made chimneys, large tree hollows.	A
Least Bell's vireo *Vireo bellii pusillus*	FE/SE/-	Restricted to early successional riparian habitat during breeding. Inhabits structurally diverse woodlands along watercourses, including cottonwood-willow forests, oak woodlands along coastal California. Wintering grounds may include mesquite scrub vegetation in arroyos hedgerows associated with agricultural fields and rural residential areas (USFWS 1998 & 2006b)	A
Cliff swallow (nesting) *Petrochelidon pyrrhonota*	-/-/MBTA	Summer resident throughout open habitats of California, including coastal grassland, shrubland, and mixed conifer habitats. Breeding now frequently dependent on human-made structures usually near water, such as barns and bridges; nests occasionally in natural sites. Nests made of mud pellets, grasses, and feathers adhered to sheltered underside of structure. Breeds April through August with a peak from May into July (CDFG California Interagency Wildlife Task Group 2005).	HP, P
Barn swallow (nesting) *Hirundo rustica*	-/-/MBTA	Spring migrant and summer resident throughout California, in a variety of habitats from grasslands and similar open areas to forests. Makes nests of mud pellets, often attached to human-made structures such as eaves of houses, barns, bridges, or other sheltered surfaces; also attaches nests to rock overhangs, cliffs, and occasionally tree trunks or branches. Pairs nest colonially, from April into August with peak activity in June (CDFG California Interagency Wildlife Task Group 2005).	HP, P
Yellow warbler (nesting) *Dendroica petechia brewsteri*	-/CSC/S2	Nests in dense, deciduous riparian woodland along streams or other watercourses; forages for insects in dense understory of riparian woodland.	A
Mammals			

Species Name	Status: Federal/State/Other	Habitat Characteristics	Occurrence Potential
Pallid bat *Antrozous pallidus*	-/CSC/S3, HP (WBWG)	Roosts in tree hollows, crevices, and structures such as bridges and buildings.	HP
Townsend's big-eared bat *Corynorhinus townsendii*	-/CSC/ HP (WBWG)	Roost sites are highly associated with caves and mines; buildings must offer "cave-like" features; known to night roost in tree hollows and under bridges.	HP
Western red bat *Lasiurus blossevillii*	-/-/ HP (WBWG)	Roosts in foliage, primarily in riparian and wooded habitats. In California this species is often associated with cottonwood trees and willows.	HP
Fringed myotis *Myotis thysanodes*	-/-/ HP (WBWG)	Roost sites are primarily in caves, rock crevices, cliffs, buildings or mines, as well as in large conifer snags. Along the west coast the fringed myotis is associated with redwood forest (Pierson and Heady 1997).	HP
Long-legged myotis *Myotis volans*	-/-/HP (WBWG)	Roosts primarily in large hollow tree snags, or live trees with exfoliating bark. Primarily a coniferous forest bat, it may also be found in riparian habitats (Warner and Czaplewski 1984). Also uses rock crevices, mines, and buildings.	HP
San Francisco dusky footed woodrat *Neotoma fuscipes annectens*	-/CSC/-	Occurs in the coast range of California from the San Francisco Bay Area to the Pajaro River watershed. Associated with riparian and oak woodland habitats. Builds stick nests under or in trees, understory, debris or buildings.	HP
Southern sea otter *Enhydra lutris nereis*	FT/CFP/MMPA	Inhabits nearshore coastal waters, bays, harbors, and estuaries along the central California coast, and are often associated with rocky substrate. Most remain inshore of the outer kelp edge, and foraging activity is generally restricted to water depths of 25 meters or less .	HP, P
California Sea-lion *Zalophus californianus*	-/-/MMPA	Observed in pelagic and nearshore coastal waters. Haul-out and breeding sites with nearby food supply, and easy access to water where human disturbance is minimal, such as offshore rock outcroppings, beaches, jetties, docks, and buoys. Sometimes travel up rivers, bays, and harbors.	HP, P
Eastern Pacific harbor seal *Phoca vitulina richardsi*	-/-/MMPA	Occurs in nearshore coastal California waters, rivers, bays, harbors and estuaries. Hauls out on rock outcroppings, beaches, mudflats and docks that have easy access to water and minimal human disturbance.	HP, P

Notes:

Federal:
FE = Listed as "Endangered" under federal Endangered Species Act.
FT = Listed as "Threatened" under federal Endangered Species Act.
FC = Candidate for Listing under federal Endangered Species Act.

State:
SE = Listed as "Endangered" under California Endangered Species Act.
CSC = Considered a California "Species of Special Concern" by the California Department of Fish and Game; roosts, nests, rookeries, and wintering areas are recognized as significant biotic features.
CFP = "CDFG Fully Protected" species; individuals may not be possessed or taken at any time.

Other:
AFS-E = American Fisheries Society categorizes as "Endangered" under a set of criteria utilized to determine global extinction.
CNDDB: S1 =
S2 = State ranking – Endangered.
S3 = State ranking - Restricted range, Rare; based on the number of individuals per area of occupied habitat.
HP (WBWG) = Considered as a "High Priority" for conservation by the Western Bat Working Group (WBWG). (CDFG 2006b)

MBTA = Migratory Bird Treaty Act protects active nests (USFWS 1918).
MMPA = Marine Mammal Protection Act protects all marine mammals and haul out sites (NOAA NMFS 2004).
L = Local City of Santa Cruz General Plan/Local Coastal Plan (City of SC 2003).

[A] – Absent - no habitat present and no further work needed.
[HP] - Habitat Present - habitat is, or may be present. The species may be present.
[P] – Present- the species is present.
[CH] - Critical Habitat - project footprint is located within a designated critical habitat unit, but does not necessarily mean that appropriate habitat is present.

*On November 17, 2009 the brown pelican was removed from the Federal List of Endangered and Threatened Wildlife (USFWS 2009).
**On February 5, 2009 the Fish and Game Commission adopted the proposed changes to remove the brown pelican from the CESA list of endangered species. The Commission's decision to delist the brown pelican will now be reviewed by the Office of Administrative Law before the bird is officially removed from the state list (California Fish and Game Commission 2009).

Zayante Band-winged Grasshopper (*Trimerotropis infantillis*). No suitable habitat occurs for the Zayante band-winged grasshopper in the study area. The area lacks Zayante sands and habitat associated with the Zayante Sandhills (Bowman and Estrada 1980; USFWS 2000a, b; Mc Graw 2004). The nearest population of ZBG occurs near the community of Pasatiempo in Santa Cruz County approximately 4 miles north of the study area (CNDDB 2007).

Ohlone Tiger Beetle (*Cidindela ohlone*). No suitable habitat occurs for the tiger beetle in the project area due to lack of coastal prairie or annual grassland. The Ohlone tiger beetle has been known to occur in Pogonip Park, on Moore Creek Preserve (R. Arnold pers. comm. 2007) and on UCSC campus lands.

Mt. Hermon June Beetle (*Polyphylla barbata*). No suitable habitat occurs for the Mt. Hermon june beetle in the study area. The area lacks Zayante sands and habitat associated with the Zayante Sandhills. The nearest population of Mt. Hermon june beetle occurs near the community of Pasatiempo in Santa Cruz County approximately 4 miles north of the study area (CNDDB 2007).

Monarch Butterfly (*Danaus plexippus).* Monarch butterflies were observed in the biological study area (Figure 4) and suitable temporary and winter roosting habitat for the monarch butterfly occurs in the eucalyptus grove northwest of the Murray Street Bridge (see Figure 7).

Steelhead (*Oncorhynchus mykiss*). The Harbor and Arana Gulch are federally designated critical habitat for the central California coast steelhead Distinct Population Segment (DPS). Steelhead have been found within Harbor waters and upstream Arana Gulch that discharges into the Upper Harbor has supported steelhead passage in the past. Surveys conducted by D.W. Alley & Associates (2000) recorded an extremely small steelhead population in the lowest reach of Arana Gulch Creek and attributed these low densities to extremely poor spawning habitat conditions and limited rearing habitat (cover and food) (D.W. Alley & Associates 2000). The lower reach of Arana Gulch is characterized as a tidal channel that extends approximately 1,500 feet upstream to the four 72-inch culverts connected to the Upper Harbor. Tidal effects result in a static backwater environment that causes settling of fine sediment onto the streambed that covers potential spawning gravels and aquatic insects (Ibid.). The upper reaches of Arana Gulch are also characterized by areas of erosion and steelhead migrational barriers (Ibid.). The Arana Gulch Watershed Alliance (AGWA) is actively seeking to restore the gulch for steelhead habitat.

Tidewater Goby (*Eucyclogobius newberryi*). Tidewater gobies are adapted to coastal lagoons and the uppermost brackish zone of larger estuaries, rarely invading marine or freshwater habitats. The species is typically found in water less than 1 meter (3.3 feet) deep and salinities of less than 12 parts per thousand (U.S. Fish and Wildlife Service, December 7, 2005).

A letter from CDFG to the Santa Cruz Port District dated March 1993 stated that, as of that time, the tidewater goby had not been collected or observed in the Santa Cruz Harbor. The letter indicated that potential habitat for the goby may occur in the brackish water/freshwater zone at the mouth of Arana Creek, which is located north of and drains into the Upper Harbor (CDFG 1993). Additionally, the predominantly saltwater, developed portions of the Harbor were not identified by the CDFG as potential goby habitat. This species requires relatively closed habitat where daily tidal fluctuations are reduced or absent. The majority of the Harbor experiences tidal

influences, especially in the Lower Harbor. The U.S. Fish and Wildlife Service has reviewed surveys and data regarding presence of tidewater gobies in Harbor waters, and concurred that tidewater gobies do not inhabit Harbor waters (USFWS 2001).

A survey of lower Arana Gulch for tidewater gobies was conducted in 2004 by Camm Swift, a recognized tidewater goby expert, but no tidewater gobies were found (Entrix, 2004b). Furthermore, no historical records of tidewater gobies are known for Arana Gulch, the Santa Cruz Harbor, or the antecedent Woods Lagoon (Entrix 2004b). CNDDB reports a 1984 occurrence for Woods Lagoon, but Camm Swift, the original source of the CNDDB record, recently noted that this record is inaccurate, and that the USFWS' tidewater goby recovery plan is the most reliable source of current and historic occurrences of the species within Santa Cruz County (Swift personal communication 2009). The recovery plan does not list Arana Gulch, the Santa Cruz Harbor, or Woods Lagoon as known or potential habitat for the species (U.S. Fish and Wildlife Service, December 7, 2005). It should also be noted that harbors are typically not inhabited by tidewater gobies (Entrix 2004b). Although it is possible that a few tidewater gobies may enter Santa Cruz Harbor after being displaced from nearby occupied habitat, such as the San Lorenzo River, after strong storm events, current conditions within the Project area (e.g., continuous tidal action, presence of predator species) are thought to preclude the establishment of a resident population (Entrix 2004b; Swift personal communication 2009). The USFWS determined that currently unoccupied habitat is not essential for the conservation of the tidewater goby (USFWS 2008).

North American Green Sturgeon (*Acipenser medirostris*). The project area is located within the estuarine portion of federally designated critical habitat for the southern DPS of green sturgeon. The southern DPS of the species consists of coastal and Central Valley populations south of the Eel River with the only known spawning population occurring in the Sacramento River (NOAA 2009). However, the DPS occupies coastal estuaries and coastal marine waters from southern California to Alaska. While there are no known records of green sturgeon occurrences within the Santa Cruz Harbor, the species is known to occur within other harbors, including Moss Landing Harbor in Monterey County (Tenera 2007). Thus, there is a potential for southern DPS green sturgeon to occur within the project area.

California Tiger Salamander (CTS) (*Ambystoma californiense*). No suitable habitat for CTS occurs in the project area due to the lack of freshwater aquatic breeding habitat surrounded by upland aestivation habitat, extensive urban barriers, and the distance to known populations. The nearest known population of CTS occurs approximately 15 miles south of the project area along San Andreas Road near the community of La Selva Beach (CNDDB 2007). The project area does not occur in federal designated critical habitat (USFWS 2005).

Santa Cruz Long-toed Salamander (*Ambystoma macrodactylum croceum*). No suitable habitat occurs for SCLS in the study area due to the lack of freshwater aquatic breeding habitat surrounded by upland aestivation habitat. In addition, obstructions from extensive urban barriers and distance to known populations prohibit SCLTS from occurring in the study area. Nearest observation of SCLS is from Aptos, approximately 10 miles southeast of project area (CNDDB 2007). The project area does not occur in federally designated critical habitat for the SCLS (USFWS 1978).

California Red-Legged Frog (CRLF) (*Rana aurora draytonii*). No suitable habitat for CRLF occurs in the study area due to the salinity of the Harbor waters (Woods Lagoon) and the extent of surrounding development. No occurrences of CRLF have been reported upstream of Murray Street Bridge either in Arana Gulch Creek or Hagemann Gulch, where potential habitat exists (City of Santa Cruz 2007). The nearest known records for CRLF are approximately 3.5 miles to the west in Natural Bridges State Park, and over 5 miles to the northwest in the upper Soquel Creek watershed on the Soquel Demonstration Forest lands (CNDDB 2007). Extensive urban development between potential habitat in the vicinity of the site and watersheds known to support CRLF pose extensive barriers to CRLF movement.

Western Pond Turtle (WPT) (E*mys* [=*Clemmys*] *marmorata*). No suitable habitat for WPT occurs in the study area due to the salinity of the water of Woods Lagoon. No occurrences of WPT have been reported upstream of Murray Street Bridge either in Arana Gulch Creek or Hagemann Gulch, where potential habitat exists (City of Santa Cruz 2007). The nearest WPT occurrence records are approximately 2 miles to the northwest in Neary Lagoon, and over 5 miles to the northeast in the upper Soquel Creek watershed (CNDDB 2007), with extensive urban development between these locations and potential habitat in the vicinity of the study area.

San Francisco Garter Snake (SFGS) (*Thamnophis sirtalis tetrataenia*). No suitable habitat for SFGS occurs within the project area due to lack of marshland habitat. The SFGS is not expected to occur in the project site due to the lack of habitat, distance to other known occurrences [the nearest known SFGS occurrence is from Waddell Creek near the northern boundary of Santa Cruz County, approximately 20 miles from the project site (USFWS 1985; USFWS 2007)] extensive urban barriers (e.g., neighborhoods, roads and highways), and the fact that the project site is not located between known breeding habitats from which individuals may occasionally be expected to disperse (USFWS 1985).

Brown Pelican (*Pelecanus occidentalis*). Brown pelicans were observed hunting and scavenging within the Biological Study Area during the EcoSystems West fall 2009 marine mammal surveys. Brown pelicans were observed on communal roost sites within the vicinity of the study area, on the roof of the bait shop near the Harbor launch and on the wedge-shaped buoy in the Harbor Entrance more than 500 feet downstream (south) of the Bridge. No known communal roost sites are located within the Area of Impact. Marginal communal roosting habitat occurs within the study area due to the extensive development and boatyard activities. Communal roosts of the brown pelican are located on the west side of the City of Santa Cruz along the coast (EcoSystems West 2006). The brown pelican is also known to roost on the Santa Cruz Municipal Wharf (Entrix 2004) and along the San Lorenzo River (Swanson Hydrology and Geomorphology, Native Vegetation Network, and Hagar Environmental Science 2002). Individuals of this species may roost temporarily within the study area.

Double-crested Cormorant (*Phalacrocorax auritus*). This species was observed roosting in the study area during the site visit and is known to roost throughout the vicinity of the study area (Gerow 2006). No rookery habitat occurs in the study area due to the extensive development. A rookery is located nearby in Schwann Lagoon. Potential nesting habitat is located in the upper Yacht Harbor (Gerow 2006).

Figure 7. Wildlife Features

Great Blue Heron (*Ardea herodias*). This species was observed during the initial site visit and during subsequent marine mammal surveys roosting and foraging along the Harbor's edge. A great blue heron rookery exists in the eucalyptus grove on the northwest side of Murray Street Bridge. This same grove is used for night roosting (EcoSystems West 2006, Gerow 2006).

Great Egret (*Ardea albus*). Great egrets are known to nest in the great blue heron rookery at the eucalyptus grove on the northwest side Murray Street Bridge. A pair of great egrets was successfully nesting in this rookery in 2005 (Gerow 2006).

Black-crowned Night Heron (*Nycticorax nycticorax*). Black-crowned night herons were observed in the study area roosting on the docks, boats, and other features, and foraging for fish. No rookery habitat exists within the study area due to lack of contiguous dense forest, scrub habitat, or emergent wetland. Black-crowned night herons breed erratically in Santa Cruz County and were known to nest historically in Branciforte Creek (Gerow 2006).

Sharp-shinned Hawk (*Accipiter striatus*) (nesting). No sharp-shinned hawks were observed during the site visit. No nesting habitat for the sharp-shinned hawk occurs within the study area due to the small isolated stands of trees and the extensive surrounding development. The sharp shinned hawk is known by the Santa Cruz Bird Club to occur in Arana Gulch open space as a winter migrant (Strelow and EcoSystems West 2000). The upper harbor in Arana Gulch open space provides potential breeding habitat for the bird (HRG 1996, Strelow and EcoSystems West 2000). This species may occur in the study site perching or foraging.

Cooper's Hawk (*Accipiter cooperi*) (nesting). No Cooper's hawks were observed during the site visit. No nesting habitat for the Cooper's hawk occurs within the study area due to the small isolated stands of trees and the extensive surrounding development. The nearest confirmed nest sites are in Delaveaga Park, Pogonip, Harvey West Park (Gerow 2006), and Moore Creek (Strelow 2002).

White-tailed Kite (*Elanus leucurus*) (nesting). No white tailed kites were observed in the study area. No nesting habitat for the white tailed kite occurs within the study area due to the small isolated stands of trees and the extensive surrounding development. The nearest white-tailed kite nests are located in the Pogonip (Gerow 2006), Natural Bridges (Strelow 2002), and on the University of California Santa Cruz (UCSC) Campus (Ecosystems West 2004). The upper harbor in Arana Gulch open space provides potential breeding habitat for the bird (HRG 1996, Strelow and EcoSystems West 2000).

Bald Eagle (*Haliaeetus leucocephalus*). No suitable nesting habitat for the bald eagle occurs in the study area. The area lacks remote old growth trees and/or snags and is surrounded by human disturbance from harbor and urban street traffic noise (Polite and Pratt 1999). Although bald eagles are not expected to nest within the study area, they may forage on the site or occur as seasonal migrants. A recent (winter 2006) observation of a bald eagle was made in Henry Cowell State Park; they may forage over the San Lorenzo River (Suddjian personal communication 2007).

Merlin (*Falco columbarius*) (wintering). No merlins were observed during the site visit. The study area provides marginal wintering habitat for this species with limited cover and access to small birds and shorebirds as prey species. Merlins could perch or forage in the study area. This species is known to occur in Arana Gulch open space (HRG 1996, City of Santa Cruz 2007).

California Clapper Rail (*Rallus longirostris obsoletus*). No suitable nesting or foraging habitat occurs in the study area due to the lack of coastal emergent wetlands dominated by pickleweed and cordgrass (Harvey 1999). The area also lacks marshland habitat with cattail and bulrush marshland used alternatively by CCR to nest and forage in brackish areas (Harvey 1999). The nearest documented occurrence of CCR is from Elkhorn Slough in Monterey County, approximately 22 miles south of the project area (CNDDB 2007).

Western Gull (*Larus occidentalis*) (nesting).
Western gulls were observed in the study area during the site visit. This species has been observed nesting on the footings of the bridge in previous years (Gerow 2006). It is likely that gulls will return and attempt to nest at this bridge location.

Yellow-billed Cuckoo (YBC) (Coccyzus americanus) (nesting). No suitable nesting habitat occurs for the western yellow-billed cuckoo in the study area. The area lacks structurally diverse riparian habitat such as cottonwood-willow riparian with a stratified canopy along the watercourse of the harbor. YBC historically nested in Santa Cruz County but no recent nesting records have been documented in over 10 years (Suddjian 2004).

Cliff Swallow (*Petrochelidon pyrrhonota*) and Barn Swallow (*Hirundo rustica*) (nesting). Although surveys were conducted outside of the breeding bird season, several swallow mud nest remains were observed underneath the Murray Street Bridge during the site visit. The mud nests were located at bridge support bents 6, 7, 8, and 9. Cliff swallows have been observed nesting on the bridge in previous years (Gerow 2006). The existing Murray Street Bridge supports a small nesting population of swallows. It is assumed that swallows will return and attempt to nest at this bridge location.

Vaux's Swift (*Chaetura vauxi*) (nesting). No Vaux's swifts were observed during the site visit. No nesting habitat exists for the Vaux's swift in the study area, due to the lack of tree hollows in the isolated of trees that are present. This species has been documented in Arana Gulch open space previously. The nearest Vaux's swift nests were located in chimneys in a residential area near Natural Bridges in 2005 and 2006 (Gerow 2006).

Least Bell's Vireo (LBV) (*Vireo bellii pusillus*) (nesting). No suitable nesting LBV habitat occurs in the study area. The area lacks structurally diverse woodlands such as cottonwood-willow and oak woodlands with a stratified canopy along the watercourse of the harbor. The project area does not occur in federal designated critical habitat for the LBV (USFWS 1994). No breeding records occur within Santa Cruz County (CNDDB 2007). The nearest reports of nesting pairs are from Gilroy (Santa Clara County) in 1997 (Roberson et al. 1997; Kus 2002). Historically the vireo was known from Salinas River in Monterey County (USFWS 1998).

Yellow Warbler (***Dendroica petechia brewsteri)*** **(nesting).** This species was not observed during the field visit and no yellow warbler habitat is located in the study area due to lack of

deciduous riparian wetland. The yellow warbler nested historically along Arana Gulch (HRG 1996).

Bat Species. One unidentified bat was observed in a tunnel on the northwest side of the Murray Street Bridge. Low quality roosting habitat exists for the foliage roosting western red bat (*Lasiurus blossevillii*) in the isolated stands of trees in the study area. The western red bat is known to occur in Arana Gulch. For the remaining bats in Table 3, bat roosting habitat exists in the expansion joints crevices of Murray Street Bridge and in the weep holes of the Southern Pacific Rail Road Bridge. The fringed myotis (*Myotis thysanodes*) may also roost in the marginal habitat provided by the coast live oak trees in the study area.

It is not uncommon for a single bridge, or even an expansion joint, to simultaneously contain several bat species. Bridges provide good foraging habitat for bats (because they are located over water), as well as protection from ground predators, such as snakes, and human disturbance. The value of bridges as habitat has become increasingly important for bat species, as populations have declined.

San Francisco Dusky-footed Woodrat (*Neotoma fuscipes annectens*). No San Francisco dusky-footed woodrat individuals or stick nests were observed during the site visit. Marginal habitat is present in the isolated stands of trees that occur within the study area. This species is known to occur along Arana Gulch Creek and in the Hagemann Gulch woodlands.

Marine Mammal Species. The three marine mammal species listed in Table 3 were observed within the Biological Study Area during site visits. Southern sea otters are occasional visitors to the Harbor, using the Harbor for foraging. California sea lions are frequent visitors to the Harbor, using the waters for foraging and the Docks and other features within the study area as occasional haul-out sites. Large numbers of California sea lions may be present when fish runs occur within the harbor. (Weather, currents, seasonal upwelling conditions, and other oceanographic factors periodically bring anchovies, sardines, and other prey species into the Harbor, in turn drawing great numbers of birds and marine mammals.) Harbor seals are residential within the Harbor with the greatest numbers occurring fall and winter, outside of breeding and molting seasons. Harbor seals forage within the Area of Impact with the greatest concentrations of animals just downstream of the Bridge by the Live Bait dock (Dock S) (Figure 7). Harbor seals also use Docks F and FF, immediately downstream of the Bridge, as primary haul-out sites during nighttime hours (Figure 7).

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

4.1. Natural Communities of Special Concern

4.1.1 Wetlands and Waters of the U.S.

The tidal waters of the Santa Cruz Small Craft Harbor are subject to CWA Section 404 and Rivers and Harbors Act Section 9 jurisdiction by the Army Corps of Engineers up to the high tide line (HTL). Within the Study Area, the HTL is defined as the intersection with land and the water's surface at the maximum height reached by the rising tide. It is clearly identifiable by an impressed line along the shore demarcated by water stained rocks, sediment deposits, debris and vegetation driftlines, and the abrupt transition between unvegetated mudflats below the HTL and areas dominated by weedy upland grasses and forbs such as wild oats and ice plant. Because the tidal waters lack emergent vegetation, there are no tidal wetlands within the project area. The tidal waters are mapped by the USFWS service National Wetland Inventory as Estuarine-Subtidal-Unconsolidated bottom-Excavated (E1UBLx). Additionally, the site does not contain adjacent non-tidal wetlands or "other waters" of the U.S.

4.1.2 Essential Fish Habitat

Information from the National Marine Fisheries Services indicates that the Santa Cruz Small Craft Harbor and nearshore dredge disposal areas are located within an "essential fish habitat" (EFH) for various life stages of fish species managed within the following Fishery Management Plans (FMP) under the Magnuson-Stevens Fishery Conservation and Management Act (MSA):

- Pacific Coast Groundfish FMP – various rockfish, sole, sharks, etc.
- Pacific Coast Salmon FMP – Chinook salmon, coho salmon
- Coastal Pelagic Species FMP – northern anchovy, Pacific sardine, etc.

The Santa Cruz Harbor is not located within a designated "Habitat Areas of Particular Concern" (HAPC). HAPC are subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important or located in an environmentally stressed area. Offshore kelp canopies are designated HAPC (National Marine Fisheries Service, December 2007).

Potential adverse effects of the proposed project on designated EFH are discussed in the *Essential Fish Habitat Assessment* prepared for the project (see Appendix C). The EFH assessment concludes that the proposed project will not adversely affect EFH for Pacific coast salmon, coastal pelagic species, and Pacific coast groundfish due to the localized and temporary nature of construction-related impacts and the minor extent of permanent habitat loss. Based on

the permanent impact of 430 square feet to EFH, this project will have a permanent, but not substantial impact to EFH.

4.2. Special Status Plant Species

No special status plant species that are native in the project area were observed in the botanical survey. Although the survey was conducted in January, before some special status species would have been identifiable, a detailed review of special status plants with potential to occur in the project area (Table 2 and Appendix A) supports the conclusion that no native special status plant species occurs in the project area due to the highly disturbed nature of the entire area and the lack of suitable habitat. The vast majority of the site is urbanized and natural areas are limited in size and heavily fragmented by development and infrastructure. Most vegetated areas consist of ornamental landscaping around parking areas and structures. Due to the close proximity of known populations of Santa Cruz tarplant (*Holocarpha macradenia*) at Arana Gulch, special conideration was taken to identify potenital habitat for this species including annual grassland and coastal scrub.

One species occurring in the project area, Monterey pine, is a special-status species in the areas of California where it is native. Monterey pine is native in the vicinity of Swanton and Año Nuevo in northwestern Santa Cruz County and southwestern San Mateo County and in two other restricted areas on the California coast, the Monterey Peninsula and the vicinity of Cambria in San Luis Obispo County, but is naturalized and not native in the vicinity of Santa Cruz (Thomas 1960; Hickman 1993; Tibor 2001; Morgan et. al. 2005; CNPS 2007). Outside of its native range, Monterey pine cultivars are listed as invasive species by the California Invasive Plant Council (Cal-IPC) with limited ecological impacts to natural communities and low to moderate levels of invasiveness.

No direct, indirect or cumulative effects to sensitive botanical resources are anticipated.

4.3. Special Status Animal Species Occurrences, Nesting Birds, and Marine Mammals

4.3.1. Monarch Butterfly (*Danaus plexippus).*

4.3.1.1. SURVEY RESULTS

Monarch butterflies are present in the vicinity of study area in the eucalyptus grove (*Eucalyptus globulus*) on the adjacent private property northwest of the Murray Street Bridge. Potential autumnal and winter roosting habitat for the monarch butterfly occurs on this property with the site providing suitable characteristics for winter roosting, including nectaries, protection from wind, and a southeast aspect that allows sufficient penetration of sunlight and air flow. During the 2006 site visit, two monarch butterflies were observed on a eucalyptus tree northwest of Murray Street Bridge. During fall 2009 marine mammal surveys, numerous butterflies were observed foraging in the ivy growing up the Eucalyptus trees and roosting in the trees. Ten individual monarchs were observed previously in the eucalyptus grove in October 2006 (Ecosystems West 2006).

Access was not available to the adjacent private property providing monarch butterfly roosting habitat, so temporary or winter roosting by the species could not be confirmed; nor have previous studies been conducted to determine the extent of occupation of this monarch habitat.

4.3.1.2. AVOIDANCE AND MINIMIZATION EFFORTS

The monarch habitat (eucalyptus grove) adjacent to the project area (Figure 7) will not be altered during project activities. No vegetation buffering the grove from wind or cold will be removed during project activities.

4.3.1.3. PROJECT IMPACTS

The overwintering monarch butterfly is considered sensitive due to the species' restricted range, rare CNDDB ranking and under the local city of Santa Cruz General Plan/Local Coastal Plan.

Monarch populations may fluctuate widely from year to year depending upon a number of factors, including the timing of winter rains, winter temperatures and adequate food supply for larva. Both fluctuations in population and changes in location characteristics affect the selection of wintering roost sites from year to year. A site may serve as an autumnal roost site in low population years and as an overwintering site in years with greater numbers of butterflies. Changes in the canopy density of a tree stand may cause a shift in a site from an overwintering site to autumnal roost. In general, there is great variability from year to year, in terms of which sites will be occupied. In other words, survey results from one year would not be predictive of monarch overwintering occupation in subsequent years. Therefore, it is unknown whether the monarch habitat in the vicinity of the project will be occupied during proposed project timelines.

Nevertheless, no impacts to the monarch butterflies are anticipated. No trees in the grove are slated for removal. Only a few types of butterflies are known to be sensitive to ultrasonic frequencies and these do not include monarchs. At present, there is no evidence that adult monarchs detect sound (Jayne Yack, Pers. Comm. 2007) although monarch larva do respond to sound (Rothchild and Bergstrom 1997). The eucalyptus grove in the vicinity of the project site does not provide breeding habitat for the monarch so larva will not be impacted by project activities.

4.3.1.4. COMPENSATORY MITIGATION

No mitigation is required.

4.3.1.5. CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.2. Steelhead

4.3.2.1. SURVEY RESULTS

O. mykiss have been found within the Harbor and the upstream Arana Gulch that discharges into the Upper Harbor. *O. mykiss* in Arana Gulch may be either anadromous steelhead or resident (non-migratory) rainbow trout. The presence of *O. mykiss* and the proximity of Arana Gulch to ocean habitat suggests the potential for protected migratory steelhead to occur at the project site. Surveys conducted by D.W. Alley & Associates (2000) recorded an extremely small *O. mykiss* population in the lowest reach of Arana Gulch Creek and attributed these low densities to extremely poor spawning habitat conditions and limited rearing habitat (cover and food)

(Skewes-Cox 2006, D.W. Alley& Associates 2000). The lower reach of Arana Gulch is characterized as a tidal channel that extends approximately 1,500 feet upstream to the four 72-inch culverts connected to the Upper Harbor. Tidal effects result in a static backwater environment that causes settling of fine sediment onto the streambed that covers potential spawning gravels and aquatic insects (Skewes-Cox 2006). The upper reaches of Arana Gulch are also characterized by areas of erosion and steelhead migrational barriers (D.W. Alley & Associates 2000). The Arana Gulch Watershed Alliance (AGWA) is actively seeking to restore the gulch for steelhead habitat.

The proposed project site is located within designated critical habitat for Central California Coast DPS steelhead trout. Critical habitat consists of the water, substrate, and adjacent riparian zone of estuarine and riverine reaches (50 CFR Part 226). The Harbor waters provide passage for steelhead adult and smolt migration to/from upstream habitat in Arana Gulch, but it does not provide spawning or rearing habitat. The upstream migration season for steelhead is generally between December and April, and the downstream migration season generally peaks from March through May. Previous reviews conducted for the Santa Cruz Port District with regards to dredging operations indicated that there would be negligible effects on steelhead population in Arana Gulch if these activities were conducted outside of smolt out-migration and adult migration periods (D.W. Alley & Associates 2001).

4.3.2.2. AVOIDANCE AND MINIMIZATION EFFORTS

- Conduct pile driving activities in Harbor waters from July 1 to mid-November, outside the fish migration period, unless otherwise permitted by the National Marine Fisheries Service (NMFS). This applies to all pile driving activity, including installation of permanent bridge piles, harbor berth replacement piles, and temporary piles to support a construction trestle, if one is utilized, as well as removal of existing berth piles and removal of temporary trestle piles, if a construction trestle is erected. Criteria for extension of pile driving would include consideration of weather conditions. For example a low rainfall period in November and December could warrant extension to the beginning of January.
- Based on the geotechnical site characteristics, the permanent bridge piles will be partially or entirely vibrated into the Harbor substrate rather than driving them by means of "hammering". Vibratory pile driving does not generate peak sound pressure levels that cause direct impacts to fish species.
- Pile driving activities that rely on impact hammers rather than vibratory techniques shall be designed to assure compliance with the interim criteria for Sound Exposure Levels (SEL) less or equal to 187 decibels (dB) in any single strike, and peak sound pressure less or equal to 208 dB in any single strike, measured at a distance of 32.8 feet from the source. In addition, to reduce sound pressure levels to the greatest extent feasible, a cushioning block between hammer and pile shall always be used.
- Bubble curtains shall be used at all piles driven by impact hammers.
- Incorporate BMPs into construction specifications, including, but not limited to:
    - To protect water quality, require all excavated soils, fill and construction materials be stored and contained in a designated area away from Harbor waters, and cover stockpiled soils to prevent release of sediments.
    - Prohibit fueling, cleaning, or maintenance of equipment except in designated areas located as far from Harbor waters as possible. As a precaution, require contractor to maintain adequate materials onsite for containment and clean-up of any spills.

- Install temporary erosion and sedimentation control devices.
- Locate equipment and spoils in designated staging areas.
- Control of dewatering process to limit turbidity.
- Prepare and implement a Stormwater Pollution Prevention Plan that further details measures for erosion, sediment and water quality control.
- All fill material would be clean material that would meet applicable water quality standards.

4.3.2.3. PROJECT IMPACTS

Central California coast DPS steelhead are federally listed as a threatened species. The proposed project site is also located within the designated critical habitat for the DPS. The Santa Cruz Small Craft Harbor and Arana Gulch provide marginal habitat for a small population of fish (see survey results above).

The proposed project bridge seismic retrofit project would result in a permanent alteration of steelhead critical habitat due to installation of 24 30-inch steel casing piles to support and reinforce the bridge design. The piles would cover a total of approximately 430 square feet. Although this alteration would be permanent, the project would not appreciably diminish the value of critical habitat for both the survival and recovery of the species, and therefore, will not result in an adverse modification of critical habitat. The installation of the new piles would not affect water or remove channel substrate or estuarine or riparian habitat. Additionally, the covered area is minimal compared to the remaining harbor waters that cover over 30 acres. The piles would not result in obstruction to fish passage or migration.

The proposed Murray Street Bridge Seismic Retrofit project could result in potential direct and indirect impacts to steelhead that may be present during installation of permanent bridge piles, reinstallation of docks and floats for boat berths, and installation of temporary piles to support a construction trestle if one is used. The 24 permanent bridge piles will be installed over a period of approximately two days for each of the 24 planned piles. A total of 35 boat berth piles would be installed for new and relocated berths within three different construction phases; approximately 23 berth piles would be removed. If used, a construction trestle could require installation of approximately 120 12-inch steel piles with an estimated installation of 6-8 piles per day. Pile installation (and removal) for bridge, berth, and trestle construction that would occur within the Harbor channel would be undertaken in Phases 2 and 4 and only between July and mid-November.

Installation of piles could result in localized increased turbidity if not properly managed. High rates of turbidity can result in direct mortality or deleterious sublethal effects (e.g., gill abrasion, decreased visibility during migration and foraging) to fish. Bjornn and Reiser (1991) found that exposure to turbidities between 25 and 50 nephlometric turbidity units (NTU) over extended periods of time reduced growth of juvenile steelhead. However, because of the expected short duration of any turbidity events, and the fact that these events would be likely to occur during low migration periods when densities of steelhead in the project area would be relatively low, any harm that may occur to steelhead from pile driving-induced turbidity increases are not expected to result in appreciable reductions in the species' likelihood of surviving and recovering in the wild (NOAA NMFS 2008). The installation of the dock piles and temporary trestle piles (if a construction trestle is erected) would result in the same, though less severe impacts, as construction of the permanent bridge piers due to smaller size and use of a vibratory driver.

Equipment refueling, fluid leakage, and maintenance activities within or water bodies pose a risk of accidental water contamination that may result in injury or death to fish species. Many commonly used hydraulic fluids contain organophosphate ester additives that are toxic to steelhead and other fish species. Acute lethal and sublethal effects have been documented in salmonids in particular (as opposed to warm water species). Leaks or spills of petroleum hydrocarbon products found in construction equipment have similar adverse effects on fish.

Pile driving activities create underwater sound pressure levels that may adversely affect fish species, including steelhead. Fish may be injured or killed by the impact sounds generated by percussive pile driving. Their hearing may also be affected or their behavior altered such that it constitutes harassment or harm. The specific effects of pile driving on fish depend on a wide range of factors including the type of pile, type of hammer, fish species, environmental setting, and many other factors (Popper et al. 2006).

The loss of hearing sensitivity may adversely affect a fish's ability to orient itself (*i.e.,* due to vestibular damage), detect predators, locate prey, or sense their acoustic environment. Fish also may exhibit noise-induced avoidance behavior that causes them to move into less-suitable habitat. During pile driving activities associated with the proposed project, this may result in steelhead fleeing the project area. Likewise, chronic noise exposure can reduce their ability to detect piscine predators either by reducing the sensitivity of the auditory response in the exposed steelhead or masking the noise of an approaching predator. Disruption of the exposed steelhead's ability to maintain position or swim with the school may enhance its potential as a target for predators (NOAA NMFS 2006).

A scientific review of various studies of sound pressure effects on different species of fish resulted in the recommendation of the following interim criteria to avoid injury to fish from pile driving activities (Popper et al. 2006):

- The Sound Exposure Level (SEL) should not exceed 187 dB (re: 1 μPa^2 •sec) in any single strike, measured at a distance of 32.8 ft from the source;

- The peak sound pressure level should not exceed 208 dB (re: 1 μPapeak) in any single strike, measured at a distance of 32.8 ft from the source.

The use of devices to produce air bubbles in the vicinity of the piles may reduce underwater noise by 25 to 30 dB (Brown 2003). An air bubble curtain system typically consists of rings of perforated pipes surrounding the pile and template system (used for holding piles in place). The perforated pipes emit air bubbles, thus allowing for the pile driving operation to be completely enclosed by bubbles for the full depth of the water column and for a radial dimension of at least 6.5 feet as measured from the outside surface of the pile. Bubble curtains attenuate the effects of sound pressure waves on fish during pile driving, reducing barotraumas injury and related mortality (Caltrans 2004).

Hydraulically-powered vibratory drivers reduce potential noise impacts. The vibratory hammer would be better for starting each pile, but may not have enough "power" to penetrate the rock-like material in which case a hydraulic impact hammer would be needed to finish the pile driving. Driving 80% with a vibratory and then putting an impact hammer on the shell will reduce the overall noise. Use of a vibratory driver initially would result in a gradual increase in

noise vibration that could be considered a mitigating action as the level of disturbance would not be as significant and a gradual increase would allow fish to move through the area.

The project proposes to avoid and minimize impacts to steelhead by scheduling pile driving outside of the steelhead migration period. The project plans to conduct pile driving activities outside of the steelhead migration period, and such work will only be conducted from July 1 to mid-November unless otherwise approved by the National Marine Fisheries Service.

4.3.2.4. COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.2.5. CUMULATIVE EFFECTS

Since its construction, the Harbor has experienced extensive shoaling of the harbor entrance after episodic storm events and seasonal periods of high surf. Entrance dredging has occurred annually since 1965, and dredging of portions of the inner-harbor has been necessary at times. Dredging operation as expected to continue in the future and may adversely affect steelhead. However, Harbor dredging and disposal activities are regulated by a number of federal, state, and regional agencies and are subject to federal Section 7 consultation (Strelow Consulting, 2009).

The Arana Gulch Watershed Alliance is actively working toward reducing erosion and sedimentation in Arana Gulch. If successful, these efforts are expected to result in reduced sediment transport to Santa Cruz Harbor, particularly the north harbor (Strelow Consulting 2009), and may subsequently reduce the frequency and extent of dredging operations. This would have a beneficial impact on steelhead and is not expected to result in significant cumulative effects.

4.3.3. North American Green Sturgeon

4.3.3.1. SURVEY RESULTS

The southern DPS of the species consists of coastal and Central Valley populations south of the Eel River with the only known spawning population occurring in the Sacramento River (NOAA NMFS 2009). However, adults and subadults of the DPS occupy coastal estuaries and coastal marine waters from southern California to Alaska. While there are no known records of green sturgeon occurrences within the Santa Cruz Harbor, the species is known to occur within other harbors, including Moss Landing Harbor in Monterey County (Tenera 2007). Thus, there is a potential for southern DPS green sturgeon to occur within the Project area.

The proposed project site is located within designated critical habitat for southern DPS green sturgeon. Critical habitat in estuarine areas consists of food resources, water flow, migratory corridor, depth, and sediment quality (NOAA NMFS 2009). The Harbor waters provide estuarine habitat for subadult and adult green sturgeon.

4.3.3.2. AVOIDANCE AND MINIMIZATION EFFORTS

Potential impacts to green sturgeon and designated critical habitat are similar to those discussed above for steelhead. As such, implementation of the avoidance and minimization discussed above under Section 4.3.2.2 will also avoid and minimize adverse effects to green sturgeon and designated critical habitat, and no additional measures are required.

4.3.3.3. PROJECT IMPACTS

Potential impacts to green sturgeon and designated critical habitat are similar to those discussed above for steelhead under Section 4.3.2.3. However, adult and subadult green sturgeon could potentially be present in the project area on a year-round basis and may therefore be exposed to underwater sound pressures generated by the proposed pile driving activities. The potential impacts of underwater acoustical noise upon green sturgeon cannot be accurately determined at this time, as no species-specific reference literature investigating the hearing capabilities of this species was available at the time of NES preparation. Moreover, sturgeons have a different ear structure than steelhead and delta smelt (Hastings and Popper 2005) and thus the potential effects of underwater sounds on green sturgeon cannot be extrapolated from currently available bioacoustics data. However, the above cited interim criteria (Popper et al. 2006) represent the best currently available information on the effects of sound pressure levels on fish species. Thus, it is assumed that the proposed action would not adversely affect green sturgeon if sound pressure levels generated by the pile driving activities remain below the interim criteria. NMFS has concurred with this approach on other similar projects (e.g., NOAA NMFS 2008).

4.3.3.4. COMPENSATORY MITIGATION

No mitigations are required.

4.3.3.5. CUMULATIVE EFFECTS

Since its construction, the Harbor has experienced extensive shoaling of the harbor entrance after episodic storm events and seasonal periods of high surf. Entrance dredging has occurred annually since 1965, and dredging of portions of the inner-harbor has been necessary at times. Dredging operation as expected to continue in the future and may adversely affect green sturgeon. However, Harbor dredging and disposal activities are regulated by a number of federal, state, and regional agencies and are subject to federal Section 7 consultation (Strelow Consulting, 2009).

The Arana Gulch Watershed Alliance is actively working toward reducing erosion and sedimentation in Arana Gulch. If successful, these efforts are expected to result in reduced sediment transport to Santa Cruz Harbor, particularly the north harbor (Strelow Consulting 2009), and may subsequently reduce the frequency and extent of dredging operations. This would have a beneficial impact on green sturgeon and is not expected to result in significant cumulative effects.

4.3.4. Brown Pelican (*Pelecanus occidentalis*).

4.3.4.1. SURVEY RESULTS

During the fall 2009 marine mammal surveys, brown pelicans were observed hunting in the Harbor waters during fish runs, scavenging around fishing boats at the Harbor launch, and communal roosting on the roof of the bait shop and on the wedge-shaped buoy in the Harbor entrance more than 500 feet or more downstream (south) of the Bridge (Figure 6). . Marginal communal roosting habitat occurs within the study area, due to the extensive development and boatyard activities. The structure of the Murray Street Bridge provides very limited roosting substrate.. Additional communal roosts of the brown pelican are located on the west side of the City of Santa Cruz along the coast (EcoSystems West 2006). The brown pelican is also known to roost on the Santa Cruz Municipal Wharf (Entrix 2004a) and along the San Lorenzo River (Swanson Hydrology and Geomorphology, Native Vegetation Network, and Hagar Environmental Science 2002). Individuals or groups of pelicans may roost in the study area.

4.3.4.2 AVOIDANCE AND MINIMIZATION EFFORTS

The study area is not currently used as a communal roost site. The potential communal roosting habitat within the study area is of a marginal quality due to extensive development and boatyard activities, and episodic nature of prey resources in the Harbor. The Murray Street Bridge itself provides very limited roost substrates. Individuals or groups of pelicans may use the study area as a temporary roost site.

If pelicans roost in the project area before construction activities have commenced for the day, construction activities will not begin until the bird/s have flushed. Workers will not engage in harassment of the bird/s or any activity to encourage flushing. If a pelican or group of pelicans enters the project area once construction activities have begun for the day, no further avoidance efforts are required.

4.3.4.3 PROJECT IMPACTS

The brown pelican is a CDFG Fully Protected species. On February 5, 2009 the Fish and Game Commission adopted the proposed changes to remove the brown pelican from the CESA list of endangered species. The Commission's decision to delist the brown pelican will now be reviewed by the Office of Administrative Law before the bird is officially removed from the state list (California Fish and Game Commission 2009). The potential communal roosting habitat within the study area is of a marginal quality due to the extensive development and boatyard activities and is not currently used as a communal roost site. No potential habitat will be altered permanently. With the above avoidance efforts, no impacts are anticipated.

4.3.4.4 COMPENSATORY MITIGATION

No mitigations are required.

4.3.4.5 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.5 Double-crested Cormorant (*Phalacrocorax auritus*) (rookery site)

4.3.5.2 SURVEY RESULTS

Individuals of this species were observed in the water on the north side of the bridge during the site visits but the site does not provide nesting habitat. A rookery for the double-crested cormorant exists in nearby Schwann Lagoon and these birds are known to night-roost in tall eucalyptus grove there. The upper Yacht Harbor provides potential nesting habitat.

4.3.5.3 AVOIDANCE AND MINIMIZATION EFFORTS

No avoidance and minimization measures are required.

4.3.5.4 PROJECT IMPACTS

The rookeries of the double-crested cormorant are protected as California Species of Special Concern and under the MBTA. The project area does not provide nesting habitat for the bird. No impacts are anticipated.

4.3.5.5 COMPENSATORY MITIGATION

No mitigations are required.

4.3.5.6 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.6 Great Blue Heron (*Ardea herodias*)

4.3.6.2 SURVEY RESULTS

A great blue heron rookery exists in the eucalyptus grove on the northwest side of Murray Street Bridge (Figure 7). This same grove is used for night roosting (EcoSystems West 2006, Gerow 2006). Seven nest platforms were observed in the eucalyptus grove during the site visit and great blue heron individuals were seen in the study area. A roosting heron was observed at dusk in a eucalyptus tree in the coast guard yard on the west side of the bridge. A potential nest was located in the tree in which the great blue heron was observed roosting. Breeding herons were not observed during surveys because wildlife surveys were conducted in December, at a time not suitable for determining the presence of breeding birds.; however, great blue herons are known to return to this rookery and occupy nests year after year (Strelow Consulting and EcoSystems West 2000; Gerow 2006). It is likely that great blue herons will continue to breed in the rookery.

4.3.6.2 AVOIDANCE AND MINIMIZATION EFFORTS

- Require that a pre-construction survey be conducted at least 30 days prior to the beginning of construction activities that occur during the heron breeding season (typically late December through mid-June) to determine if active nesting is occurring at the heron rookery. If active nesting is not occurring, project construction activities may begin. If active nests are observed, construction activities will not occur until young have fledged or an appropriate buffer zone is established by a qualified biologist in consultation with resource agencies as needed.

- Noise controls will be implemented at the source:
  - Operations will be conducted to avoid noisiest construction activities (pile driving) during breeding season.
  - Modern and quieter alternate equipment will be used.
  - Equipment will be operated at lowest possible power levels.

- A biological monitor will be on-site during nesting season to observe the rookery. If it appears that project activities may cause nest abandonment or disruption of breeding, even with noise reducing controls implemented, project activities must cease until the young are able to fly well or Caltrans and the USFWS has been consulted and additional measures taken to protect the heron rookeries.

4.3.6.3 PROJECT IMPACTS

The rookeries of the great blue heron are protected under the Migratory Bird Treaty Act. While populations of the species are stable, colonies are vulnerable to disturbance. Construction near heronries is detrimental (National Audubon Society 2007). When disrupted, especially early in the breeding season, the birds may abandon rookeries (CDFG California Interagency Wildlife Task Group 2005, National Audubon Society 2007) or experience diminished reproductive success (National Audubon Society 2007).

No direct impacts will occur to potential nesting areas as no trees will be removed in the areas adjacent to the project. Project construction activities may disrupt or diminish reproduction in the great blue heron rookery, and birds may abandon the rookery. Pile drivers produce a noise disturbance of over 100 decibels at a distance 50 ft. from the equipment location. Typical construction equipment generates noise levels of about 70 to 85 decibels at a distance of 100 feet, while vibratory pile driving could reach 80 to 95 decibels at 100 feet during pile driving.

Some project construction activities would be within 100 feet of known rookeries. Disturbance from pile driving is likely to be the loudest of construction activities (U.S. Department of Transportation Federal Highway Administration 2006). Due to the period of time during which pile driving can occur within the water (July-November), it is expected that pile driving would occur outside of the breeding season.

If Murray Street Bridge project activities are to be instigated during the heron breeding season (late December through mid-June), prior to beginning project activities, a qualified biologist will conduct preconstruction surveys 30 days prior to the instigation of construction to determine if acting nesting is occurring at the heron rookery. If active nesting is not occurring, project activities may be initiated. If active nests are observed, no project activities will occur until young have fledged or an appropriate construction buffer zone is established by a qualified biologist in consultation with resource agencies as needed.

Noise will be reduced during the heron breeding season. This parameter may be met through a variety of standard noise-reducing procedures for construction equipment. Similar guidelines for reducing noise disturbance recommended by the U.S. Department of Transportation Federal Highway Administration (2006) in nighttime residential settings will be employed.

With implementation of avoidance and minimization efforts, no impacts are anticipated.

4.3.6.4 COMPENSATORY MITIGATION

No mitigations are required.

4.3.6.5 CUMUYLATIVE EFFECTS

No permanent alteration of the great blue heron rookery is planned as part of the Murray Street Bridge and no trees are slated for removal. Therefore, no cumulative effects are anticipated.

4.3. 7 Great Egret (*Ardea albus*)

4.3.7.1 SURVEY RESULTS

Great egrets are known to nest in the great blue heron rookery at the eucalyptus grove on the north side Murray Street Bridge (Figure 7). A pair of great egrets was successfully nesting in this rookery in 2005 (Gerow 2006). No great egrets were observed during the site visit; however the visit did not coincide with the breeding season; however, great egrets are known to return to this rookery and occupy nests year after year (Gerow 2006). It is likely that great egrets will continue to breed in the rookery.

4.3.7.2 AVOIDANCE AND MINIMIZATION EFFORT

See avoidance and minimization 4.3.6.2.

4.3.7.3 PROJECT IMPACTS

Rookeries of the great egret are protected under the MBTA. Rookeries are susceptible to disruption and nest abandonment from noise disturbance, especially early in the breeding season.

With implementation of avoidance and minimization efforts, no impacts are anticipated.

3.3.7.4 COMPENSATORY MITIGATION

No mitigations are required.

3.3.7.5 CUMULATIVE EFFECTS

No permanent alteration of the rookery is planned as part of the Murray Street Bridge retrofit and no trees are slated for removal. Therefore, no cumulative effects are anticipated.

3.3.8 Black-crowned Night Heron (*Nycticorax nycticorax*).

4.3.8.1SURVEY RESULTS

Black-crowned night herons were observed roosting and hunting throughout the study area both upstream and downstream of the bridge, on the docks, boats, railroad bridge, and other roosting features; however the study area does not provide nesting habitat. Black-crowned night herons breed erratically in Santa Cruz County and were known to nest historically in Branciforte Creek (Gerow 2006).

4.3.8.2 AVOIDANCE AND MINIMIZATION EFFORTS

No avoidance and minimization measures are required.

4.3.8.3 PROJECT IMPACTS

The rookeries of the black-crowned night heron are protected under CEQA because of the species' restricted range; rare CNDDB ranking and under the MBTA. The project area does not provide nesting habitat for the bird. No impacts are anticipated.

4.3.8.4 COMPENSATORY MITIGATION

No mitigations are required.

4.3.8.5 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.9 Bald Eagle (*Haliaeetus leucocephalus*).

4.3.9.1 SURVEY RESULTS

No bald eagles were observed during the site visit. No suitable nesting habitat for the bald eagle occurs in the study area. The study area provides marginal wintering habitat for the bird. A recent (winter 2006) observation of a bald eagle was made in Henry Cowell State Park; they may forage over the San Lorenzo River (Suddjian personal communication 2007). A bald eagle could perch in the study area.

4.3.9.2 AVOIDANCE AND MINIMIZATION EFFORTS

No avoidance and minimization measures are required.

4.3.9.3 PROJECT IMPACTS

The bald eagle was recently delisted as a federal Endangered species and is a California Endangered and CDFG Fully Protected. The study area does not provide nesting habitat for the bald eagle. The potential wintering habitat within the study area has low quality habitat characteristics. No potential habitat will be altered permanently; no trees or perches are slated for removal. No impacts are anticipated.

4.3.9.4 COMPENSATORY MITIGATION

No avoidance and minimization measures are required.

4.3.9.5 CUMULATIVE EFFECTS
No cumulative effects are anticipated.

4.3.10 Merlin (*Falco columbarius*) (wintering).
4.3.10.1 SURVEY RESULTS
No merlins were observed during the site visit. Merlins are known to occur in Arana Gulch open space (HRG 1996, City of Santa Cruz 2007). The study area provides marginal wintering habitat for the bird. Merlins could perch or forage in the study area.

4.3.10.2 AVOIDANCE AND MINIMIZATION EFFORTS
No avoidance and minimization measures are required.

4.3.10.3 PROJECT IMPACTS
The wintering merlin is a California Species of Special Concern. The potential wintering habitat within the study area has low quality habitat characteristics for the merlin. No potential habitat will be altered permanently; no trees or perches are slated for removal. No impacts are anticipated.

4.3.10.4 COMPENSATORY MITIGATION
No avoidance and minimization measures are required.

4.3.10.5 CUMULATIVE EFFECTS
No cumulative effects are anticipated.

4.3.11 Western gull (*Larus occidentalis)*
4.3.11.1 SURVEY RESULTS
Western gulls were observed in the study area. Although surveys were conducted outside of the breeding bird season, this species has been observed nesting in the footings of the Murray Street Bridge during previous years (Gerow 2006). It is likely that gulls will return and attempt to nest at this bridge site.

4.3.11.2 AVOIDANCE AND MINIMIZATION EFFORTS
- Require that a pre-construction survey for nesting avian species (and other species protected under the Migratory Bird Act) be conducted at least 30 days prior to the beginning of construction activities that occur during the nesting/breeding season (typically February through July) to assure that this area is not actively being used. If active nesting is not occurring, project construction activities may begin. If a nesting special-status bird is found during the survey, construction within 100 feet of the nest site should be postponed until after the bird has fledged or consultation with the California Department of Fish and Game be conducted to determine alternative measures or appropriate buffers.

- If project activities are to be initiated outside of the breeding season, existing nests under the bridge will be removed and exclusion netting installed under the bridge to prevent nesting for the season. Nests will be removed from the bridge structure before the breeding season including the courtship period, usually January through July. Exclusion netting will be subsequently installed to prevent re-establishment of nest structures on the bridge infrastructure during construction.

4.3.11.3 PROJECT IMPACTS

Nesting western gulls are protected under the MBTA and may nest at the bridge site. Construction during the nesting period could disrupt nesting if it is occurring at the bridge.

With implementation of avoidance and minimization efforts, no impacts are anticipated.

4.3.11.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.11.5 CUMULATIVE EFFECTS

No permanent loss of nesting habitat will result from the Murray Street Bridge retrofit. No cumulative effects are anticipated.

4.3.12 Cliff swallow (*Petrochelidon pyrrhonota)*

4.3.12.1 SURVEY RESULTS

Although surveys were conducted outside of the breeding season, several swallow mud nest remains were observed underneath the Murray Street Bridge. The mud nests were located at bridge support bents 6, 7, 8, and 9. It is unknown if the remains are of cliff swallow and/or barn swallow nests. Cliff swallows have been observed nesting on Murray Street bridge in previous years (Gerow 2006).

4.3.12.2 AVOIDANCE AND MINIMIZATION EFFORTS

It is assumed that swallows will return and attempt to nest at this bridge location. See Avoidance and Minimization 4.3.11.2.

4.3.12.3 PROJECT IMPACTS

Nesting swallows are protected under the MBTA. A small nesting population of swallows occupies the Murray Street Bridge.

With implementation of avoidance and minimization efforts, no impacts are anticipated.

4.3.12.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.12.5 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.13 Barn swallow (*Hirundo rustica)*

4.3.13.1 SURVEY RESULTS

Although surveys were conducted outside of the breeding season, several swallow mud nest remains were observed underneath the Murray Street Bridge. The mud nests were located at bridge support bents 6, 7, 8, and 9. It is unknown if the remains are of cliff swallow and/or barn swallow nests. Cliff swallows have been observed nesting on Murray Street bridge in previous years (Gerow 2006) but it is possible that both species occupy the bridge.

4.3.13.2 AVOIDANCE AND MINIMIZATION EFFORTS

It is assumed that swallows will return and attempt to nest at this bridge location. See Avoidance and Minimization 4.3.11.3.

4.3.13.3 PROJECT IMPACTS

Nesting swallows are protected under the MBTA. A small nesting population of swallows occupies the Murray Street Bridge.

With implementation of avoidance and minimization efforts, no impacts are anticipated.

4.3.13.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.13.5 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.14 Pallid bat (*Antrozous pallidus*).

4.3.14.1 SURVEY RESULTS

No pallid bats were observed or acoustically detected at the site visit, nor have guano or urine stains been identified to indicate that bats utilize crevice features. One unidentified bat was observed in a tunnel on the northeast side of the Murray Street Bridge. The nearest occurrence record for the pallid bat is located near Summit Road in the headwaters of Soquel Creek (CNDDB 2007). Bat roosting habitat exists in the expansion joints crevices of the Murray Street Bridge and in the weep holes of the Southern Pacific Rail Road Bridge. The pallid bat may roost in the project area.

4.3.14.2 AVOIDANCE AND MINIMIZATION EFFORTS

- Bat roosting habitat in crevices will be sealed or bat exclusion devices installed prior to the onset of bat reproductive season (April 1).
- For construction activities scheduled during bat reproductive season (April 1 – August31) or winter roost season (October 15 – February 15), a qualified biologist will conduct focused pre-construction surveys of the Murray Street Bridge, no more than 30 days prior to the initiation of project activities to determine if bats are roosting in the bridge's expansion joint crevices. If no bats are found, no further mitigation would be necessary. If roosting bats are found, delay project activities until roosting bats have vacated the crevices or juvenile bats have fledged or install bat exclusion devices (by a qualified biologist) between February 15 and April 15 or between September 15 and October 15, outside of bat reproductive and winter roost seasons. A qualified monitor will document the effectiveness of the exclusion devices to ensure that all roosting bats have vacated the roost prior to initiation of construction.

4.3.14.3 PROJECT IMPACTS

The pallid bat is protected under CEQA as a California Species of Special Concern and a High Priority species. No bats have been observed roosting on the bridge, nor have guano or urine stains been identified to indicate that bats utilize crevice features. If pallid bats are using the expansion joints crevices of the bridge either for roosting or maternity roosting, construction activities could disrupt roosting.

With implementation of avoidance and minimization efforts, no impacts are anticipated.

4.2.14.4 COMPENSATORY MITIGATION
No compensatory mitigation is required.

4.3.14.5 CUMULATIVE EFFECTS
No cumulative effects are anticipated.

4.3.15 Townsend's big-eared bat (*Corynorhinus townsendii*).

4.3.15.1 SURVEY RESULTS
No Townsend's big-eared bats were observed or acoustically detected during the site visit, nor have guano or urine stains been identified to indicate that bats utilize crevice features. One unidentified bat was observed in a tunnel on the northeast side of the Murray Street Bridge . The nearest occurrence of the Townsend's big-eared bat is from the Pogonip Clubhouse (Paul Heady pers. comm.). Bat roosting habitat exists under the Murray Street Bridge and in the weep holes of the Southern Pacific Rail Road Bridge. The Townsend's big-eared bat may roost in the project area.

4.3.15.2 AVOIDANCE AND MINIMIZATION EFFORTS
See Avoidance and Minimization 4.3.14.2.

4.3.15.3 PROJECT IMPACTS
The Townsend's big-eared bat is protected under CEQA as a California Species of Special Concern and a High Priority species. No bats have been observed roosting on the bridge, nor have guano or urine stains been identified to indicate that bats utilize crevice features. If Townsend bats are using the expansion joints crevices of the bridge either for roosting or maternity roosting, construction activities could disrupt roosting.

With implementation of avoidance and minimization efforts, no impacts are anticipated.

4.3.15.4 COMPENSATORY MITIGATION
No compensatory mitigation is required.

4.3.15.5 CUMULATIVE EFFECTS
No cumulative effects are anticipated.

4.3.16 Western red bat (*Lassiurus blossevilli).*

4.3.16.1 SURVEY RESULTS
Western red bats were not observed or acoustically detected during the site visit. Low quality roosting habitat exists for the western red bat in the wooded areas of the study area. During previous studies, a western red bat was detected in Arana Gulch open space (EcoSystems West 2006). The western red bat may roost in the project area.

4.3.16.2 AVOIDANCE AND MINIMIZATION EFFORTS
No avoidance and minimization measures are required.

4.3.16.3 PROJECT IMPACTS

The western red bat is protected under CEQA by its designation as a WBWG High Priority species. No trees are slated for removal; no alteration of potential western bat habitat will occur. No impacts are anticipated.

4.3.16.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.16.5 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.17 Fringed myotis (*Myotis thysanodes).*

4.3.17.1 SURVEY RESULTS

Fringed myotis were not observed or acoustically detected at the site visit. One unidentified bat was observed in a tunnel on the northeast side of the Murray Street Bridge. The nearest record for the fringed myotis is from UCSC north campus (EcoSystems West 2004). Roosting habitat exists in the expansion joint crevices of Murray Street Bridge and in the weep holes of the Southern Pacific Rail Road Bridge. The fringed myotis may roost in bridge crevices or railroad weep holes. The fringed myotis (*Myotis thysanodes*) may also roost in the marginal habitat provided by the coast live oak trees in the study area.

4.3.17.2 AVOIDANCE AND MINIMIZATION EFFORTS

See Avoidance and Minimization 4.3.14.2.

4.3.17.3 PROJECT IMPACTS

The fringed myotis is protected under CEQA by its designation as a WBWG High Priority species. No trees are slated for removal; no alteration of potential oak woodland habitat for fringed myotis will occur. No impacts to this potential habitat are anticipated. No bats have been observed roosting on the bridge, nor have guano or urine stains been identified to indicate that bats utilize crevice features.

4.3.17.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.17.5 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.18 Long-legged myotis (*Myotis volans).*

4.3.18.1 SURVEY RESULTS

Long–legged myotis was not observed or acoustically detected at the site visit. One unidentified bat was observed in a tunnel on the northeast side of the Murray Street Bridge. The nearest record for the long-legged myotis is from UCSC north campus (EcoSystems West 2004). Bat roosting habitat exists in the expansion joint crevices of Murray Street Bridge and in the weep holes of the Southern Pacific Rail Road Bridge. The long-legged myotis may roost in the project area.

4.3.18.2 AVOIDANCE AND MINIMIZATION EFFORTS

See Avoidance and Minimization 4.3.14.2.

4.3.18.3 PROJECT IMPACTS

The long-legged myotis is protected under CEQA by its designation as a WBWG High Priority species. No trees are slated for removal; no alteration of potential oak woodland habitat for fringed myotis will occur. No impacts to this potential habitat are anticipated. No bats have been observed roosting on the bridge, nor have guano or urine stains been identified to indicate that bats utilize crevice features.

4.3.18.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.18.5 CUMULATIVE EFFECTS

No cumulative effects are anticipated.

4.3.19 San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*).

4.3.19.1 SURVEY RESULTS

No San Francisco dusky-footed woodrat individuals or stick nests were observed during the site visit. This species occurs along Arana Gulch Creek and in the Hagemann Gulch woodlands. The study area provides marginal habitat for the woodrat.

4.3.19.2 AVOIDANCE AND MINIMIZATION EFFORTS

No avoidance or minimization efforts are required.

4.3.19.3 PROJECT IMPACTS

The San Francisco dusky-footed woodrat is protected under CEQA as a California Species of Special Concern. The project area provides marginal habitat for the woodrat and no impacts to the wooded portions of the project area are anticipated.

4.3.19.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.19.5 CUMULATIVE EFFECTS

No cumulative impacts are anticipated.

4.3.20 Southern Sea Otter (*Enhydra lutris nereis*)

4.3.20.1 SURVEY RESULTS

An individual sea otter was observed swimming in the open water north of the Murray Street Bridge during the December 2006 site visit. During marine mammal surveys conducted in the fall of 2009, southern sea otters were observed foraging in the Harbor during five of the nineteen surveys conducted. Observations were concentrated during one week of the four-week-long survey period between September 17 and October 23, 2009. On four of the visits, only one sea otter was observed. On one visit, a mother and juvenile were observed and heard calling and responding, until the pair reunited. Table 1 in the Marine Mammal Mitigation Plan (Appendix B) presents observations of sea otters during 2009 surveys, with dates and general locations within the study area.

Southern sea otters appear to be incidental visitors to the Harbor. Otters occur in the kelp forests just off the coast, where groupings of females and young, territorial males, and non-territorial males breed, forage, and groom, in close proximity to the Harbor. Availability of food resources based both on seasonal variation and seasonal and El Nino-influenced ocean currents, as well as late spring to early fall algal blooms of a diatomic species of *Pseudo-nitzschia***,** causing domoic acid poisoning, may have been factors influencing the presence of otters in the Harbor during 2009 surveys. Similar factors are likely to exist in subsequent years, but numbers will likely vary.

4.3.20.2 AVOIDANCE AND MINIMIZATION EFFORTS

- Implement Marine Mammal Mitigation Plan (see Appendix B) that includes pre-construction monitoring, monitoring during in-water construction activity, establishment of buffer zone, and delaying construction if otters are present in the work area. (See Appendix B for full details.)

  A qualified biological monitor will be present during in-water construction activities to search for target marine mammal species and halt project activities that could result in injury or mortality to these species. A Safety Zone will be established, a minimum of 500-foot radius, and visibly flagged on the banks of the harbor during construction activities. The buffer radius may be reduced or increased based on a measurement of the distance the 160 db pressure travels in the underwater harbor waters and/or through the air. This would be determined using approved underwater and in-air acoustic monitoring devices. The City of Santa Cruz would notify Caltrans in writing of the proposed change in buffer zone area.

  Prior to in-water construction, the approved biological monitor will conduct a workers' training to instruct construction crews regarding actions to be taken to avoid or minimize impacts in the event of a target species entering the in-water work area.

  The monitor will be present during in-water construction activities. Each day prior to the commencement of pile-driving, the approved monitor will survey the buffer zone for marine mammals. If a marine mammal is detected, pile driving will be delayed until the animal has moved beyond the buffer zone, verified by visual confirmation or lack of visual sighting 15 minutes from the last sighting. If the animal should move back into the buffer zone after the start of pile-driving, no further work stoppage will be necessary, unless the animal moves within an unsafe distance of project construction activities that may result in injury to the animal. This distance will be determined by USFWS, NMFS, and/or CDFG. No disturbance or noise will be used to encourage the movement of the target species from the work area. The City will contact Caltrans to consult with NMFS and USFWS to determine the best approach for exclusion of the target species from the in-water work area.

- Implementation of measures to reduce underwater sound pressure levels to the greatest extent feasible as described above in section 4.3.2.2.

4.3.20.3 PROJECT IMPACTS

The southern sea otter is federally-listed as Threatened, State-listed as CDFG Fully Protected and is protected under the MMPA. The waters under Murray Street Bridge do not provide mating or

breeding habitat, or habitat of a similar ecological significance for the otter; however, this area may be used as a regular foraging site for the observed otters.

Work within the waterway will consist of installing temporary barges to provide work platforms for pile installation. If barges are utilized, prefabricated modular units may be brought to the site and locked together. This type of platform can be installed, reconfigured, and removed relatively quickly, but the system is not suitable for areas that are too narrow to accommodate the modules. For example, footings from the Union Pacific Railroad Bridge to the north and footings from the Murray Street Bridge appear too close together to allow use of a modular barge between footings. In these areas, a trestle likely will need to be constructed. Other construction activities within Harbor waters include removal and replacement of boat berths as described in section 1.2.1.

A total of 24 permanent bridge piles will be installed. The CISS piles at Bents 5 through 8 will be installed within the waterway by driving 30-inch steel casings either to refusal at rock or into a shaft drilled within rock (depending on the location). The shaft and/or casing will be dewatered and concrete will be poured into the casings, which will be left in place. The 30-inch CIDH piles at Bent 5 will also be constructed by pouring concrete into permanent steel casings; dewatering is not expected to be achievable at this location, and a "wet" installation is planned. Overall the installation of piles is expected to take approximately 2 days for each pile. The piles will either be driven in with a pile driver or a vibrator.

A total of 35 boat berth piles would be installed for new and relocated berths within three different construction phases; approximately 23 berth piles would be removed. If used, a construction trestle could require installation of approximately 120 12-inch steel piles with an estimated installation of 6-8 piles per day. Pile installation (and removal) for bridge, berth, and trestle construction that would occur within the Harbor channel would be undertaken in Phases 2 and 4 and only between July and mid-November.

Loud underwater sounds, such as in-water pile driving, could result in detrimental effects to marine mammals including the increased stress, behavioral changes, decreased communication, and a loss of predator/prey detection. Considered most significant is potential for temporary or permanent loss of hearing. The National Marine Fisheries Service has preliminarily determined that underwater impulse sound levels of 160 dB of pressure results in observable behavioral changes (LSA Associates, Inc. 2004). A minimum 500-foot buffer area will be provided to reduce sound exposure, and monitoring will be conducted during pile driving activities.

Project construction activities within Harbor waters may deter otters from regular foraging in the project area. Disruption of movement may be considered temporary harassment and a direct project impact. With implementation of avoidance and minimization efforts (see Appendix B), no killing or injuring an individual and no alterations to otter habitat are anticipated as a result of the project. No other direct or indirect impacts are anticipated. A NMFS Incidental Harassment Authorization will be required for this project. A USFWS Biological Opinion or other formal consultation with USFWS may be required for otters known to occur in the project area.

4.3.20.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.20.5 CUMULATIVE EFFECTS

No long term impacts resulting from disturbance to the waters beneath the bridge during construction are anticipated.

4.3.21 California Sea-lion (*Zalophus californianus*)

4.3.21.1 SURVEY RESULTS

One individual California sea lion was observed swimming under the western section of the Murray Street Bridge during the 2006 site visit. During Fall 2009 surveys, California sea lions were observed foraging and hauling-out within the study area on 18 of 19 survey visits. Numbers of California sea lions varied widely throughout the survey period, from 1 animal to 13-15 animals/survey. The larger numbers of animals were observed when "rafts" of sea lions were present foraging throughout the study area and fish presence was evident (30 September – 2 October). Table 1 of Appendix B presents estimates of California sea lions during 2009 surveys, with dates and general locations within the study area. Individuals and occasionally pairs of sea lions were observed hauled-out on docks throughout the study area, on the Fuel Dock, and more commonly, on the Vessel Assist Dock, and the Docks on the Western side of the Harbor, from AA to FF, and the rubber Kayak docks under the Bridge. Table 2 of Appendix B presents the number of animals observed hauled-out and the haul-out locations during 2009 surveys. Some of the animals that were observed hauled-out appeared to be lethargic, remaining on the same or proximate dock for two or more days in a row, or swimming without vigor in the adjacent waters. One individual that remained in the harbor for several days was heard coughing. One young of the year was observed hauled-out on the cement wall on the western border of the Harbor between E and F Docks (see Figure 7). Observations of sea lions were distributed throughout the Study area, with a spike of observations in the area near the Launch Ramp, Fuel Dock, and Vessel Assist Dock.

California sea lions appear to be incidental visitors to the Harbor, appearing in the greatest numbers when schools of fish are abundant within the Harbor, as evidenced by jumping fish and large congregations of feeding birds and "rafts" of sea lions. Sick and weakened sea lions also appear to use the Harbor as a haul-out refuge. Additional information about the factors affecting the presence of sea lions in the Harbor is contained in Appendix B

4.3.21.2 AVOIDANCE AND MINIMIZATION EFFORTS

See Avoidance and Minimization Effort 4.3.20.2. In addition, the City should remove marine mammal resting sites beyond the area of activity. These sites could include floating docks (i.e. Dock FF) or boats, such as those used by UCSC.

4.3.21.3 PROJECT IMPACTS

The California sea lion is protected under the MMPA. The waters under Murray Street Bridge do not provide rookery habitat, mating grounds, or habitat of a similar ecological significance for the sea lion; however, this area may be used as a regular foraging site for sea lions.

Project construction activities within Harbor waters may deter sea lions from regular foraging or hauling-out in the project area. With implementation of avoidance and minimization efforts (see Appendix B), potential effects will be minimized; however, temporary harassment may occur. Disruption of movement may be considered temporary harassment and a direct project impact. With implementation of the proposed work restrictions, monitoring and other mitigation measures specified in the following section, disturbance from project-related construction

activities is expected to have only a short-term impact. No long-term avoidance or permanent abandonment of work sites or nearby areas is expected. No alterations to sea lion habitat are anticipated as a result of the project. No other direct or indirect impacts are anticipated. A NMFS Marine Mammal Incidental Take Authorization and/or an Incidental Harassment Authorization may be required for California sea lions known to occur in the project area.

4.3.21.4 COMPENSATORY MITIGATION

No compensatory mitigation is required.

4.3.21.5 CUMULATIVE EFFECTS

No long term impacts resulting from disturbance to the waters beneath the bridge during construction are anticipated.

4.3.22 Harbor Seal (*Phoca vitulina*)

4.3.22.1 SURVEY RESULTS

During December 2006 site visits, six harbor seals were observed hauled-out on dock FF at night. During fall 2009 surveys, harbor seals were observed within the study area on 18 out of 19 surveys, foraging and telescoping or hauled-out on docks. Numbers of observed harbor seals varied widely from 1 to 11 animals/survey. Table 1 of Appendix B presents estimates of harbor seals during 2009 surveys, with dates and general locations within the study area. Harbor Seals were only observed hauled-out on F and FF Docks, only during early morning surveys, and when biologists arrived prior to nearby early morning Harbor activities, such as the arrival of kayakers at FF Dock and "Velocity" Crew at F Dock. With any proximate activity, including the quiet approach of EcoSystems West biologists within approximately 30 feet (close enough to count the animals in the darkness), harbor seals flushed from their haul-out locations into the water. Table 2 of Appendix B presents the number of animals observed hauled-out and the haul-out locations during 2009 surveys.

Observations of harbor seals were concentrated in two locations: to a lesser degree in the area around the Launch Ramp, Fuel Dock and Vessel Assist Dock; and primarily in the area around Docks F and FF and Dock S, the Live Bait dock, where harbor seals were frequently observed telescoping just off Dock S. The Live Bait dock clerk, Kevin Carney, and well as Port District staff (Brian Foss) report that five or six of the harbor seals appear to be residential, hauling-out, foraging, and telescoping in the area of Docks FF through S throughout the year (K. Carney, Pers. Comm.; B. Foss, Pers. Comm.).

The entire Upper Harbor, upstream (north) of the Bridge, was surveyed on one date. This survey was conducted in an effort to assess potential use of the Upper Harbor during midday. Six harbor seals were observed foraging in the Upper Harbor.

Harbor seals are residential within the Harbor. Harbor seals use Docks F and FF as primary haul-out sites during nighttime hours and the surrounding area as foraging habitat. The Harbor does not provide breeding or molting habitat. Nearby known breeding and molting locations include Point Lobos, Elkhorn Slough (NOAA 2007), and Lover's Point State Marine Reserve (SIMON 2008). The numbers of harbor seals occupying the Harbor are likely to be highest during late summer, fall and winter, outside of breeding (March - May) and molting (June - July) seasons.

Individuals that are not sexually reproductive may remain at the Harbor later into the spring, until molting season.

The harbor seals only use Docks F and FF as haul-out sites at night, when disturbances in the Harbor are at a minimum. The animals flush with any disturbance in the early morning. The total number of hours of haul-out time/day for harbor seals outside of breeding and molting season averages seven hours. It is unknown if the harbor seals occupying the Harbor use the site exclusively as their haul-out during the fall and winter or if they use other nearby haul-outs in conjunction with the Harbor. Appendix B contains additional information on the use of haul-outs sites by harbor seals.

4.3.22.2 AVOIDANCE AND MINIMIZATION EFFORTS

See Avoidance and Minimization Effort 4.3.20.2. In addition, the City should remove marine mammal haul-out sites, preferably to a near-by location outside work area.. These sites could include floating docks (i.e. Dock FF) or boats, such as those used by UCSC.

4.3.22.3 PROJECT IMPACTS

The harbor seal is protected under the MMPA. Harbor seal haul-out sites and foraging habitat will be affected by construction activities. Primary nighttime harbor seal haul-out sites at Dock FF will be removed temporarily during construction activities. In addition, harbor seals congregate and forage immediately downstream of the Work Area and well within 500 feet of the work area around Dock S (see Figure 7). Pile driving, other in-water construction activities, and construction activities with a higher noise level than normal Harbor activities will likely deter harbor seals from regular foraging in the project area. Disruption of regular haul-out behavior and movement and foraging patterns may be considered temporary harassment and a direct project impact. With implementation of avoidance and minimization efforts (see Appendix B), potential effects will be minimized; however, temporary harassment may occur. With implementation of the proposed work restrictions, monitoring and other mitigation measures specified in the following section, disturbance from project-related construction activities is expected to have only a short-term impact. No long-term avoidance or permanent abandonment of work sites or nearby areas is expected. An application for an Incidental Harassment Authorization will be submitted NMFS. Habitat within the Harbor does not provide mating, breeding, molting, or other habitat of a similar ecological significance. No permanent alterations to harbor seal habitat are anticipated as a result of the project. No other direct or indirect impacts are anticipated.

4.3.22.4 COMPLENSATORY MITIGATION

No compensatory mitigation is required.

4.3.22.5 CUMULATIVE EFFECTS

Dock FF will be replaced. No long term impacts resulting from the temporary removal of the dock or disturbance to the waters beneath the bridge are anticipated.

Chapter 5. Results: Permits and Technical Studies for Special Laws or Conditions

The following permits, approvals, and/or reviews will be required for the Murray Street Bridge retrofit project activities:

1) FEDERAL

- Caltrans: NEPA Approval and Construction Authorization
- USFWS Section 7 Consultation
- NMFS Section 7 Consultation for steelhead and Essential Fish Habitat
- A NMFS Marine Mammal Incidental Harrassment Authorization will be required for marine mammals known to occur in the project area. Consultation with USFWS will be required for southern sea otters known to occur in the Project Area. A USFWS Section 7 Consultation and a Biological Opinion may be required.
- U.S. Army Corps of Engineers: Section 404 Permit and Section 9 Permit
- U.S. Coast Guard: Bridge Permit
- Coastal Zone Management Act (CZMA) Federal Consistency: Consultation will be initiated by Caltrans following approval of a Coastal Development Permit by the California Coastal Commission.

2) STATE

- California Coastal Commission: Approval of Coastal Development Permit
- Regional Water Quality Control Board: Section 401 Water Quality Certification
- California Department of Fish and Game: Potential 1601 Streambed Alteration Permit for work within the channel of the Yacht Harbor.
- Public Utilities Commission: Potential approval for encroachment and/or work within or adjacent to the railroad right-of-way. (Approval from the Union Pacific Railroad will be required.)

3) LOCAL

- Santa Cruz Port District: Approval of temporary dock removal and replacement and use of Harbor lands for construction staging areas
- County of Santa Cruz: Potential Encroachment Permit for work within County roadways

5.1 Federal Endangered Species Act Consultation Summary

Consultation with USFWS and NMFS regarding federally endangered species will be conducted by Caltrans upon submittal of the Biological Assessment.

5.2 Federal Fisheries and Essential Fish Habitat Consultation Summary

Section 7 Consultation with USFWS and NMFS regarding federally endangered species will be initiated and maintained by Caltrans upon submittal of the Biological Assessment.

5.3 California Endangered Species Act Consultation Summary

The City of Santa Cruz will consult with the California Department of Fish and Game as part of obtaining required permits, such as a Streambed Alteration Agreement for construction activity in the harbor waters.

5.4 Wetlands and Other Waters

Executive Order 11990 mandates that Federal or Federally assisted projects and programs minimize the destruction, loss or degradation of wetlands and avoid new construction in wetlands, taking into account public health and safety, maintenance of natural systems, and other public interests. The site does not contain adjacent non-tidal wetlands or "other waters" of the U.S. The tidal waters of the Santa Cruz Small Craft Harbor are subject to Clean Water Act Section 404 and Rivers and Harbors Act Section 9 jurisdiction by the Army Corps of Engineers up to the high tide line (HTL). Within the Study Area, the HTL is defined as the intersection with land and the water's surface at the maximum height reached by the rising tide. It is clearly identifiable by an impressed line along the shore demarcated by water stained rocks, sediment deposits, debris and vegetation driftlines, and the abrupt transition between unvegetated mudflats below the HTL and areas dominated by weedy upland grasses and forbs such as wild oats and ice plant. Because the tidal waters lack emergent vegetation, there are no tidal wetlands within the project area. The tidal waters waters are mapped by the USFWS service National Wetland Inventory as Estuarine-Subtidal-Unconsolidated bottom-Excavated (E1UBLx).

Consultation with ACOE, DFG, Coastal Commission, RWQCB, will be initiated by the City of Santa Cruz as part of permit applications and based on the description of wetlands and other waters in Section 4.1 above.

5.5 Invasive Species

Some non-native, invasive terrestrial plant species are found in the project vicinity, but none are within the work areas where soil and/or vegetation will be disturbed. There is no threat of spread of invasive species. In accordance with Executive Order 13112, in the event that any vegetation

is removed during project activities, all vegetation will be disposed of at an approved disposal site to avoid the spread of invasive plants occurring on the project site. There are no known invasive marine species within the Harbor according to Santa Cruz Port District staff (Brian Foss, personal communication). If a temporary barge is brought in for construction, all equipment will be inspected prior to entry into harbor waters to prevent potential introduction of invasive plant or animal species.

5.6 Floodplains

Executive Order 11988 requires that Federal or Federally assisted projects take action to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities."

No natural or beneficial floodplain values exist within the biological study area. In accordance with Executive Order 11988 no project impacts are anticipated.

National Flood Insurance Program base floodplain maps indicate that no floodplains occur within the biological study area. The tidal waters of the Santa Cruz Small Craft harbor extending up to the high tide line is mapped as FEMA Flood Zone A. Areas mapped as “Zone A” are subject to inundation by the 1-percent-annual-chance flood event. There is no significant habitat in the project work area, except for steelhead in the Harbor waters. The proposed action would not affect upland habitat in the floodplain adjacent to Arana Gulch (north of the upper harbor and outside the project API) as there would be no change in flood levels as a result of the project. Since no property is being affected by flooding as a result of the project that would affect associated biological resources, and the harbor is artificially created and maintained, the proposed action would have no impact on natural and beneficial floodplain values.

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Appendix A. U.S. Fish and Wildlife Service Species List.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2010-SL-0365

August 3, 2010

Erin McGinty
Ecosystems West Consulting Group
819 ½ Pacific Avenue, Suite 4
Santa Cruz, California 95060

Subject: Listed Species in the Vicinity of the Murray Street Bridge Seismic Retrofit Project (Federal Project Number STPLZ-5025-015), City and County of Santa Cruz, California

Dear Ms. McGinty:

This letter responds to your request, dated and received in our office on July 13, 2010, for an official list of endangered, threatened, and other special status species that may occur in the vicinity of the proposed Murray Street Bridge Seismic Retrofit located in the City of Santa Cruz, California. Ecosystems West Consulting Group was contracted to conduct a biological assessment of the proposed project site and originally generated and submitted an online species list for Santa Cruz County to Caltrans in November 2008. This recent request for an official species list for Santa Cruz County results from the recent delisting of the brown pelican (*Pelecanus occidentalis*) and is intended to update the proposed project's draft natural environment study and biological assessment.

The enclosed list of species fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act of 1973, as amended (Act). Caltrans, as the lead Federal agency for the project, has the responsibility to review its proposed activities and determine whether any listed species may be affected. If the project is a construction project which may require an environmental impact statement[1], Caltrans has the responsibility to prepare a biological assessment to make a determination of the effects of the action on the listed species or critical habitat. If Caltrans determines that a listed species or critical habitat is likely to be adversely affected, it should request, in writing through our office, formal consultation pursuant to section 7 of the Act. Informal consultation may be used to exchange information and resolve conflicts with respect to threatened or endangered species or their critical habitat prior to a written request for formal consultation. During this review process, Caltrans may engage in

[1] "Construction project" means any major Federal action which significantly affects the quality of the human environment designed primarily to result in the building of structures such as dams, buildings, roads, pipelines, and channels. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorizations or approval which may result in construction.

planning efforts but may not make any irreversible commitment of resources. Such a commitment could constitute a violation of section 7(d) of the Act.

Candidate species are those species presently under review by the Service for consideration for Federal listing. Candidate species should be considered in the planning process because they may become listed or proposed for listing prior to project completion. Preparation of a biological assessment, as described in section 7(c) of the Act, is not required for candidate species. If early evaluation of your project indicates that it is likely to affect a candidate species, you may wish to request technical assistance from this office.

We recommend that you also review information in the California Natural Diversity Data Base and contact the California Department of Fish and Game at (916) 324-3812 for information on other sensitive species that may occur in this area.

If you have any questions, please call Lena Chang at (805) 644-1766, extension 302.

Sincerely,

Julie Vanderwier
for

Douglass M. Cooper
Deputy Assistant Field Supervisor

LISTED SPECIES THAT MAY OCCUR IN SANTA CRUZ COUNTY, CALIFORNIA

Mammals		
Southern sea otter	*Enhydra lutris nereis*	T
Birds		
California least tern	*Sterna antillarum browni*	E
Least Bell's vireo	*Vireo bellii pusillus*	E
Marbled murrelet	*Brachyramphus marmoratus*	T, CH
Yellow-billed cuckoo	*Coccyzus americanus*	C
Western snowy plover	*Charadrius alexandrinus nivosus*	T, CH
Reptiles		
San Francisco garter snake	*Thamnophis sirtalis tetrataenia*	E
Amphibians		
California red-legged frog	*Rana draytonii*	T, CH
California tiger salamander	*Ambystoma californiense*	T
Santa Cruz long-toed salamander	*Ambystoma macrodactylum croceum*	E
Fish		
Coho salmon	*Oncorhynchus kisutch*	*
Tidewater goby	*Eucyclogobius newberryi*	E
Steelhead	*Oncorhynchus mykiss*	*
Invertebrates		
Mount Hermon June beetle	*Polyphylla barbata*	E
Ohlone tiger beetle	*Cicindela ohlone*	E
Smith's blue butterfly	*Euphilotes enoptes smithi*	E
Zayante band-winged grasshopper	*Trimerotropis infantilis*	E, CH

Plants

Ben Lomond spineflower	*Chorizanthe pungens* var. *hartwegiana*	E
Ben Lomond wallflower	*Erysimum teretifolium*	E
Monterey spineflower	*Chorizanthe pungens* var. *pungens*	T, CH
Robust spineflower	*Chorizanthe robusta* var. *robusta*	E, CH
Santa Cruz cypress	*Cupressus abramsiana*	E
Santa Cruz tarplant	*Holocarpha macradenia*	T, CH
Scotts Valley polygonum	*Polygonum hickmanii*	E, CH
Scotts Valley spineflower	*Chorizanthe robusta* var. *hartwegii*	E, CH
White-rayed pentachaeta	*Pentachaeta bellidiflora*	E

Key:

E – Endangered T – Threatened CH - Critical habitat

C - Candidate species for which the U.S. Fish and Wildlife Service has on file sufficient information on the biological vulnerability and threats to support proposals to list as endangered or threatened.

* Species for which the National Marine Fisheries Service has responsibility. For more information, call the Santa Rosa Field Office at (707) 575-6050 or go to http://swr/ucsd.edu/

Appendix B. Marine Mammal Mitigation Plan

Murray Street Bridge (# 36C-0108)
Seismic Retrofit Project

Marine Mammal Mitigation Plan

Murray Street Bridge
Santa Cruz Yacht Harbor
City of Santa Cruz
Santa Cruz County, CA
Federal Project Number STPLX-5025 (048)

July 2010

For individuals with sensory disabilities, this document is available in Braille, large print, on audiocassette, or computer disk. To obtain a copy in one of these alternate formats, please call or write to Caltrans, Attn: Gary Ruggerone, Environmental Planning, 50 Higuera Street, San Luis Obispo, California 93401; (805) 549-3182 Voice, or use the California Relay Service TTY number, 1 (800) 735-2929.

Murray Street Bridge
Seismic Retrofit Project(# 36C-0108)

Marine Mammal Mitigation Plan

Murray Street Bridge
Santa Cruz Yacht Harbor
City of Santa Cruz
Santa Cruz County, CA
Federal Project Number STPLX-5025 (048)

July 2010

Approved By: _____ Date: _____
Chris J. Schneiter, Assistant Director
Phone Number: 831-420-5422
Office Name: Department of Public Works
District/Region: City of Santa Cruz

Approved By: _____ Date: _____
Gary Ruggerone, Senior Environmental Planner
Phone Number: 805-549-3182
Environmental Planning Branch
District 5, San Luis Obispo

MARINE MAMMAL MITIGATION PLAN

MURRAY STREET BRIDGE SEISMIC RETROFIT PROJECT (#36C-0108),
CITY OF SANTA CRUZ, SANTA CRUZ COUNTY, CALIFORNIA

INTRODUCTION

The marine mammal mitigation plan consists of protection measures incorporated into the project to avoid or minimize impacts on marine mammals. Three marine mammals are known to occur within the Santa Cruz Yacht Harbor, the southern sea otter (*Enhydra lutris nereis*), federally listed as threatened, and listed by the California Department of Fish and Game as "Fully Protected", the Eastern Pacific harbor seal (*Phoca vitulina richardsi),* and the California sea lion (*Zalophus californianus*). All marine mammals are protected under the Marine Mammal Protection Act. The docks and other features within the study area are haul-out sites for Eastern Pacific harbor seal and California sea lion. The open water of the study area provides habitat for the southern sea otter, the harbor seal, and the California sea lion.

INCIDENTAL TAKE AUTHORIZATION APPLICATION QUESTIONS

1. Project Description

The proposed project is located at the eastern edge of the City of Santa Cruz in the County of Santa Cruz (see Figure 1). The project area includes the Murray Street Bridge which spans the Santa Cruz Harbor, portions of lands within the Santa Cruz Port District harbor area, portions of the harbor waters, and the area along the Murray Street road right-of-way, west of Lake Avenue (Figure 2).

The proposed project consists of a seismic retrofit of the existing Murray Street Bridge, which spans the Santa Cruz Small Craft Harbor and additional minor modifications to replace deficient bridge barriers (widening shoulders to standard widths and replacement and improvement of sidewalks and railings). The seismic retrofit project will provide the bridge with additional vertical support and resistance to lateral seismic forces by installing additional pilings and supplemental structural elements. In order to provide sufficient area for construction operations, some boats, Harbor facilities, and commercial businesses will require temporary relocation.

The nine-span bridge is supported by two abutments (identified as Abutments 1 and 10, located at the western and eastern ends of the bridge, respectively) and 8 "bents" (identified as Bents 2 through 9, located at 60-foot intervals between the abutments). The seismic retrofit project consists of the following basic elements:

(1) Installation of concrete infill walls at Bents 2, 3, 4, and 9 to span the voids between the existing concrete support columns.

(2) Installation of shear keys and seat extenders at Abutment 1 and Bents 2 through 9.

(3) Retrofit of foundations with 16-inch diameter CISS (cast-in-steel-shell) piles at Bent 9 and Abutment 10. These piles will extend to depths of approximately –55 feet to –85 feet at Bent 9 and to depths of approximately –30 feet to –50 feet at Abutment 10.

(4) Retrofit abutment with two 96-inch CIDH piles behind Abutment 10 to a depth of -50 feet.

(5) Retrofit of both outriggers and bents with 30-inch diameter CISS piles at Bents 6, 7, and 8 and 30-inch diameter CIDH (cast-in-drilled-hole) piles at Bent 5. These piles will extend to depths of approximately -55 feet to -80 feet at Bent 5 and at approximately –85 feet to –110 feet at Bents 6-8.

(6) Installation of fenders to protect new piles.

Figure 3 provides a cross section showing the abutment and bents and proposed improvements. The installation of new piles at Abutment 10 and Bents 5 through 9 will include two piles on each side for a total of 24 piles.

In-Water Activities. The construction schedule includes 10 months of potential in-water construction activity over 2 years – 5 months during the first year and 5 months during the second year. The construction schedule includes 5 months of potential in-water construction activity for two years. Activities include: removal of docks to accommodate construction access; potential installation of piles for a construction trestle from the bridge; pile driving; transport of materials; and replacement of harbor docks upon completion of the bridge seismic retrofit project. In-water activities would be intermittent throughout the 5-month period, but it is conservatively assumed that some activity could occur daily throughout this period.

The most intense activity would be the installation of new bridge support piles, which will also involve the demolition of the existing piles at Bent 6. CISS piles at Bents 5 through 8 will be installed within the waterway by driving 30-inch steel casings either to refusal at rock or into a shaft drilled within rock (depending on the location). The installation of new piles at Bents 5 through 8 will include two piles on each side for a total of 16 piles in the water (and 8 additional on-land piles). The work activity will be focused within the area of the bridge. Overall the installation of piles is expected to take a total of approximately 2 days for each pile for a total of 32 days. Piles will be partially or entirely vibrated into the Harbor substrate rather than driving them by means of "hammering". The onland installation of piles at Bent 9 and Abutment 10 also will have two piles on each side for a total of 8 piles.

Installation of an in-water barge or temporary bridge trestle is planned to accommodate equipment for pile installation. Work within the waterway will require either the use of barges or construction of trestles to provide work platforms. If barges are utilized, prefabricated modular units may be brought to the site and locked together. This type of platform can be installed, reconfigured, and removed relatively quickly, but the system is not suitable for areas that are too narrow to accommodate the modules. For example, footings from the Union Pacific Railroad Bridge to the north and footings from the Murray Street Bridge appear too close together to allow use of a modular barge between footings. In these areas, a trestle likely will need to be constructed.

FIGURE 1: PROJECT LOCATION

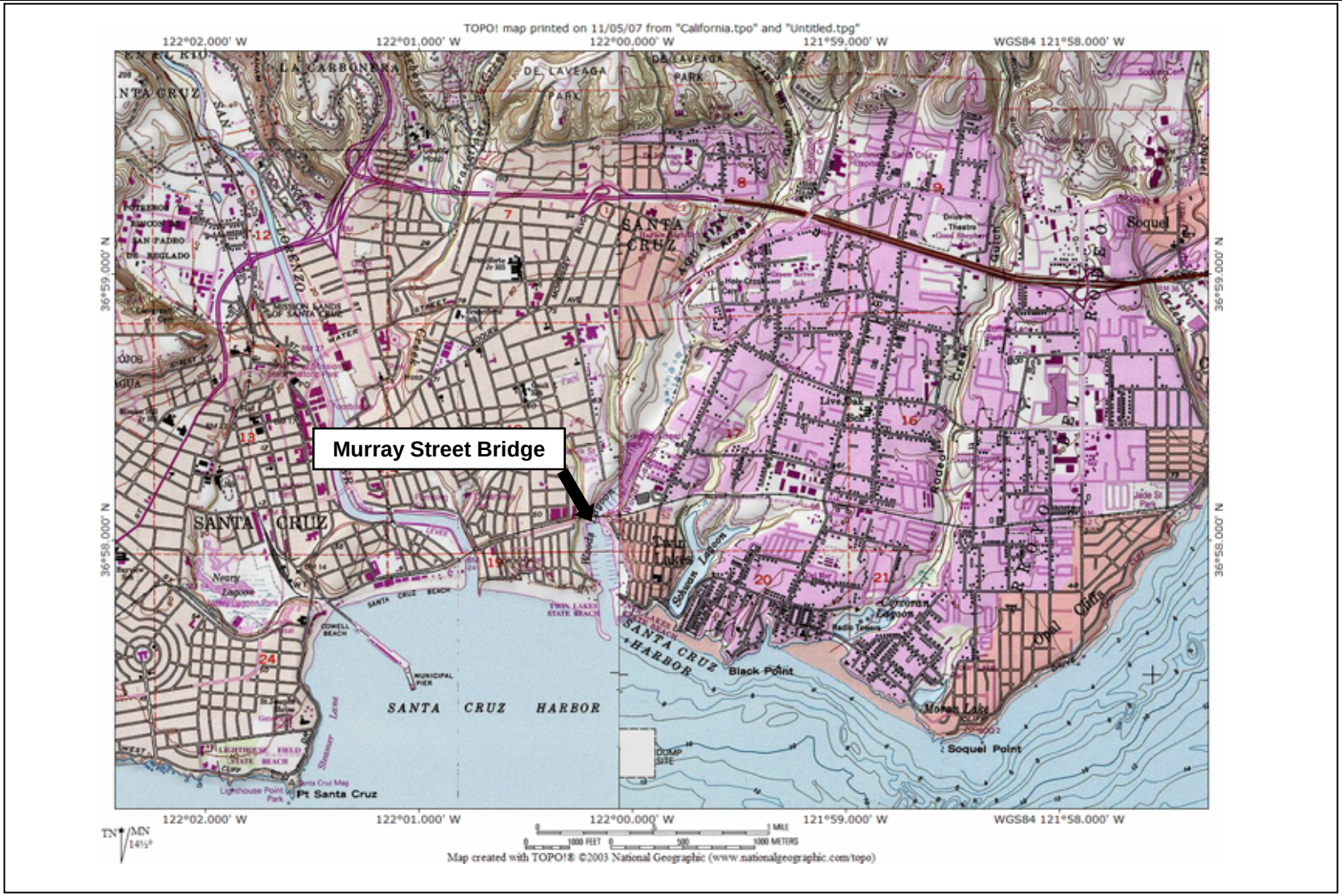
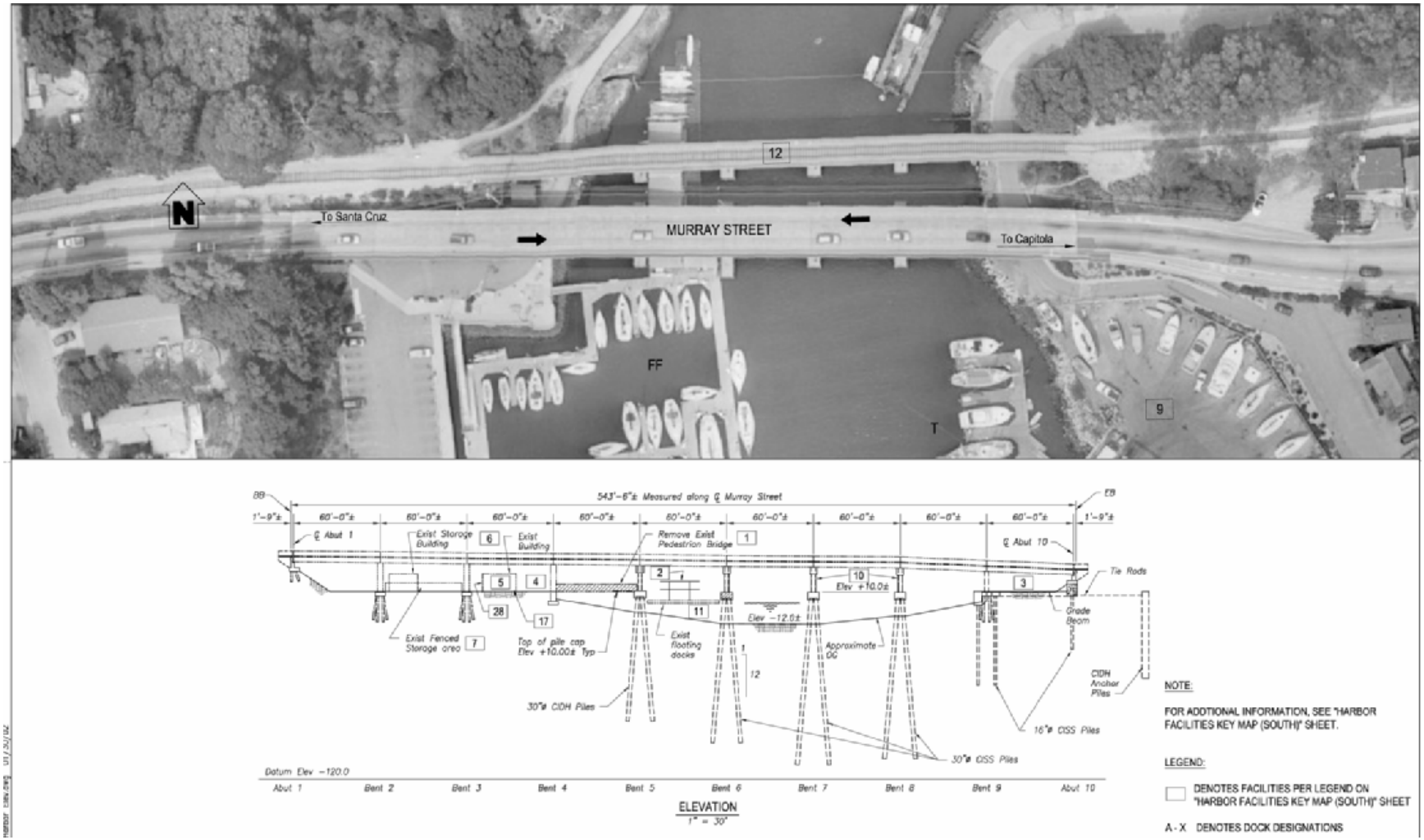


FIGURE 2: Area of Potential Impact

FIGURE 3: BRIDGE CROSS SECTION



Construction of a trestle could vary depending on materials available to contractors. One possible trestle configuration would be 60-foot long steel girders over the Harbor navigation channel. The spans would be supported on falsework bents, perhaps constructed of steel piles which are a fairly common falsework material. Piles would be driven in the water by a crane sitting over the land. Preliminary estimates by the project engineer indicate that up to 120 12-inch steel beams would be required for a trestle spanning the bridge; vibratory drivers would be used. Approximately 6-8 of these small size piles could be installed per day. All piles would be removed at the end of construction. The trestle could be made of "Bailey Bridge" panels that can be used to provide bents or towers. The deck might be made of heavy timbers or open-grid panels with a safety railing to keep people and materials on the deck.

Other in-water activities include removal and replacement of existing boat berths to accommodate construction equipment, which includes removal of 2 berths from dock T with replacement at end of Phase 2 (with 2 piles) and removal of 10 berths from dock FF. Prior to removal. To accommodate the removed berths, 11 new berths will be constructed on the west side of the harbor at Docks A through F with installation of 12 piles. A temporary dock FF--with fewer berths—will be constructed at the southern end of the dock (with 6 piles), which will accommodate 6 boats during construction. (Affected portions of Dock FF will be restored at the end of Phase 4.).

Upon completion of the proposed bridge improvements, 11 new berths will be reinstalled on the west side of the harbor at Docks A through F (see Figure 2 for dock locations). Although design plans have not yet been completed for the reinstalled berths, it is expected that the docks would be plastic, wood or concrete over polyethylene floats and would be anchored with pilings. Piles would be drilled into the harbor floor by mechanical hammer. There would be no dredging or placement of fill in Harbor waters with reinstallation of docks and both berths.

2. Dates and Duration of Activity and Specific Locations

The Murray Street Bridge Retrofit project is tentatively proposed for construction in five partially overlapping phases. Generally, work will begin on the eastern side of the Harbor and progress to the western side. The timing of each phase and a brief description of work to be performed during each phase is provided in Table 1. Overall, the seismic retrofit work will be executed over a period of approximately 18 months within four construction phases as described in Table 1. The additional bridge improvements will be constructed over a period of approximately 6 months as part of Phase 5 of the construction.

In-water activity will occur in Phases 2 and 4 over an approximate total 10-month period. It is estimated that up to 5 months of in-water activity will occur over two seasons, although the phases may overlap. Work tasks will vary throughout the phase. The in-water pile driving would occur over a total of 32 days within this period.

3. Marine Mammal Species Found Within the Project Area

Three marine mammals are known to occur within the Santa Cruz Yacht Harbor, the southern sea otter, federally listed as threatened, and listed by the California Department of Fish and Game as "Fully Protected", the Eastern Pacific harbor seal, and the California sea lion.

The open water of the study area provides habitat for the southern sea otter, the eastern Pacific harbor seal, and the California sea lion. Southern sea otters appear to be incidental visitors to the Harbor, using the site for foraging. California sea lions are frequent visitors to the Harbor, using the waters for foraging and the docks and other features within the study area as occasional haul-out sites. Large numbers of California sea lions are present when fish runs occur within the harbor. (Weather, currents, seasonal upwelling conditions, and other oceanographic factors periodically bring anchovies, sardines, and other prey species into the Harbor, in turn drawing great numbers of birds and marine mammals.) Harbor seals are residential within the Harbor, with the greatest numbers occurring during late summer, fall and winter, outside of breeding and molting seasons. Harbor seals use Docks F and FF (see Figure 2) as primary haul-out sites and the surrounding waters as foraging habitat.

4. Status and Distribution of Marine Mammals Within the Project Area

Survey Methods. Initial wildlife surveys were conducted during December 2006. Follow-up surveys for marine mammals were conducted during September/October 2009 to estimate the numbers of each of three species (California sea lion, harbor seal, and southern sea otter) using the area surrounding the Murray Street Bridge (Bridge) and to determine the type of use, especially during the period of time when in-water construction activities are proposed for the Murray Street Bridge Seismic Retrofit (Project). EcoSystems West conducted nineteen surveys between September 17 and October 21, 2009 for 45 minutes to 2 hours, depending on the number of biologists present (one or two) and the time of day (visibility).

The study area consisted of the open waters, docks, and other potential haul-out features of the Harbor from the Harbor Launch Ramp area (including the fuel dock and Vessel Assist dock) to 500 feet upstream of the boundary of the Area of Impact (see Figure 2). A total of 40 survey hours were conducted, including early morning, midday, evening and nighttime surveys with an emphasis on early morning and midday surveys. In an effort to determine the diurnal and nocturnal movement patterns of the harbor seals, initially 3-4 site visits/day were conducted, 2 times per week. Once a general understanding of the harbor seals' use of the area was gained, the surveys were focused on estimating the number of individuals present in the study area in the morning (when pile driving or other in water activities might be expected to begin for the day) and around midday (when pile driving and other in water activities might resume after a lunch break). An effort was made to determine the maximum number of individuals using haul-outs within the study area by arriving pre-dawn, when animals were still at rest and had not been flushed into the water by Harbor activities. During one survey (October 17th, midday), EcoSystems West biologists surveyed the entire Upper Harbor, upstream (north) of the Murray Street Bridge in an effort to determine the whereabouts of the harbor seals during the middle of the day.

Table 1. Murray Street Bridge Retrofit Project: Construction Phasing & Approximate Schedule.

Work Tasks	Effects on Harbor and Road Operations
Phase 1: Construction in East Zone	
2 months (May-July)[1]	
* Temporarily relocate overhead utilities north of bridge * Prepare construction staging area (8,000 sq.ft.) at harbor boat yard * Retrofit Bent 9 & Abutment 10; install anchor piles * Erect Girder Span 9 * Remove existing south rail	* Install traffic control system with alternating 1-way traffic * Close Murray for 7 days for driving anchor piles * Temporary relocation (dry storage) of 9 dry-docked boats from boat yard * Traffic controls along Lake Avenue during construction staging area setup * Close east walkway under bridge * Close bridge sidewalk
Phase 2: Construction in Eastern Waterway	
5 months (July-December)	
* Construct new berths (8) at ends of docks A through F * Remove berths (12) at docks T and FF * Construct work platform(s) (trestle or barge) for Stage 2 work [2] * Retrofit Bents 7 & 8 (includes installing anchor piles at Bents 7 & 8) * Erect Girder Spans 7 & 8 and construct Deck Spans 7, 8, & 9 * Construct north and south rails (optional) [3] * Restore boat yard; reopen pedestrian path * Remove east work platform * Replace berths (2) at Dock T upon construction in the eastern waterway and only between July and mid-November	* Temporary relocation of 2 boats from Dock T to AA or new dock N-Q * Temporary closure of East Drive & part of harbor boat yard * Availability of only one boat channel under the bridge for 6 non-consecutive half-days
Phase 3: Construction in West Zone	
6 months (December-May)	
* Install row boat storage at docks A/B & USCG area * Install temporary building at USCG area * Temporarily relocate existing offices and row boats to above [2] * Close portion of western parking lot [2] * Construct temporary access ramp to Dock FF * Retrofit Abutment 1 and Bents 2, 3, & 4 * Erect Girder Spans 1, 2, & 3 [and construct Deck Spans 1, 2, & 3]	* Closure of West Path, western concrete stairway and access ramp to Dock FF * Temporary relocation of affected facilities (offices, storage, restrooms, etc.)

Phase 4: Construction in Western Waterway

5 months (May-October)

* Construct modifications to Dock FF; move 7 boats to new Dock FF
* Construct work platform(s) (trestle or barge) for Stage 4 work
* Retrofit Bents 5 & 6 (including installation of anchor piles)
* Erect Girder Spans 4, 5, & 6 [and construct Deck Spans 4, 5, & 6]
* Construct north and south rails [3]
* Remove work platform(s)
* Closure of West Path, western concrete stairway and access ramp to Dock FF
* Temporary relocation of affected facilities (offices, storage, restrooms, etc.)
* Temporary relocation of 8 boats from Dock FF
* Availability of only one boat channel under the bridge for 6 non-consecutive half-days

Phase 5: Construction of Superstructure and Barrier Rails

[no timing provided]

* Remove sidewalks & temporary barrier rails
* Construct new barrier rails
* Restore Dock FF, parking lot, existing offices and related facilities
* Restore all remaining facilities to original condition
* Repair deck

Footnotes:

[1] Note that construction phases overlap; the sum of the construction periods specified is therefore greater than the total period indicated by start and finish dates.

[2] These tasks could be initiated and/or completed during the prior stage.

[3] [These tasks could be completed either in Phase 2 or 4.

[4] Temporary closure of Murray Street bridge roadway to all traffic is possible during any phase for a short duration. The alternating one-way traffic with sign control will occur during the construction, but not during the full duration of construction activities.

For each survey, the following were recorded: the time of the survey, the temperature, visibility, wind speed, tide, and moon phase. During surveys, one or two EcoSystems West biologists walked and sat at key observations points, or rowed a small boat, throughout the study area, using binoculars, and examined the site for presence of marine mammals. A general census of the area was taken on each site visit, counting the numbers of each species present, noting the activity of the animals, as well as their location, with reference to an aerial map of the Area of Influence and vicinity. Notations were made on the aerial map of the site, when necessary, to clarify locations of observed animals. When feasible, observed animals were photographed, and the sex of California sea lions was noted.

It was not possible to determine with certainty whether or not an individual had already been counted (unless all animals remain hauled-out for the duration of the survey); however, an effort was made to avoid duplicating counts by taking into account the time and location of the observation with reference to previous observations. Where we were unable to determine if counts were redundant, we noted this on data tables.

Ecosystems West biologists also made note of fish activity, when we observed evidence such as jumping fish or congregations of feeding birds and mammals. EcoSystems West biologists also noted relevant personal communications with Port District employees, Harbor business employees, and marine mammal experts regarding marine mammal presence. Further, EcoSystems West biologists noted incidental observations of other wildlife species, such as bats or bird species, and recorded all observations on a standard data sheet designed for the Project's marine mammal surveys.

Distribution of Marine Mammals. Table 2 presents the estimates of marine mammals present in the survey area during 2009 surveys. Table 3 presents the number of animals observed hauled-out and the haul-out locations during 2009 surveys. Figure 4 shows the spatial distribution of observed marine mammals throughout the survey area. Figure 2 provides an aerial view of the study area and shows the location of the docks referenced on the x-axis of the spatial distribution figure.

Southern Sea Otter. The southern sea otter is regularly sighted in the Harbor waters. During the December 2006 field surveys, one sea otter was observed swimming in the open water of the main Harbor channel, north (upstream) of the Murray Street bridge. During September/October 2009 surveys, southern sea otters were observed foraging in the Harbor during five of the nineteen surveys conducted, with observations concentrated during one week of the four-week-long survey period, between September 17 and 23 (Table 2) . On four of these visits, only one sea otter was observed. On one visit, a mother and juvenile were observed and heard calling and responding until the pair reunited.

Southern sea otters appear to be incidental visitors to the Harbor. Otters occur in the kelp forests just off the coast, where separate groupings of females and young, territorial males, and non-territorial males breed, forage, and groom, in close proximity to the Harbor. Availability of food resources based both on seasonal variation and seasonal and El Nino-influenced ocean currents,

as well as Spring and Fall algal blooms of a diatomic species of *Pseudo-nitzschia*, causing damoic acid poisoning may have been factors influencing the presence of otters in the Harbor during Fall 2009 surveys. Similar factors are likely to exist in subsequent years, but numbers will likely vary. The Harbor does not provide mating or breeding habitat or other habitat of a similar ecological significance for the southern sea otter.

California Sea Lion. During December 2006 surveys, one California sea lion (*Zalophus californianus californianus*) was observed swimming under the western section of the Murray Street Bridge. During September/October 2009 surveys, California sea lions were observed foraging and hauling-out within the Harbor on 18 of 19 survey visits (the exception was a nighttime survey where visibility was limited). Numbers of California sea lions varied widely throughout the survey period, from 1 animal to 13-15 animals/survey. The larger numbers of animals were observed when "rafts" of sea lions were present foraging throughout the survey area and fish presence was evident (September 30 –October 2). Individuals and occasionally pairs of sea lions were observed hauled-out on docks throughout the survey area, on the fuel dock, and more commonly, on the Vessel Assist dock, and the docks on the western side of the Harbor, from AA to FF (see Table 3). One individual was observed hauled-out on the rubber Kayak docks under the Bridge. Figure 2 provides an aerial view of the survey area, with docks and other haul-out features identified. Some of the animals that were observed hauled-out appeared to be lethargic, remaining on the same or proximate dock for two or more days in a row, sometimes with a cough, or swimming without vigor in the adjacent waters. One juvenile was observed hauled-out on the cement wall on the western border of the Harbor between E and F Docks (see Figure 5). Observations of sea lions were distributed throughout the Survey Area, with a spike of observations in the area near the launch ramp, fuel dock, and Vessel Assist dock (see Figure 4).

California sea lions appear to be incidental visitors to the Harbor, appearing in the greatest numbers when schools of fish are abundant within the Harbor, as evidenced by jumping fish and large congregations of feeding birds and "rafts" of sea lions. Sick and weakened sea lions also appear to use the Harbor as a haul-out refuge. Young of the year sea lions faced an 85% mortality in 2009 due to starvation. This is likely caused by an El Nino-like response in prey resources (G. Oliver, personal communication, 2009). While juvenile rock fish were abundant, anchovies were essentially absent, and while sardines were abundant, juvenile sardines were scarce (G. Oliver, personal communication, 2009; K. Carney, personal communication, 2009). Rock fish and adult sardines provide an adequate prey base for healthy adult sea lions, but may be too fast for juveniles or weakened adults to catch. In addition, more varied and scarce prey resources may require greater traveling distances and deeper diving for successful hunting, placing too great a metabolic demand on young of the year or weakened sea lions (M. Weise, personal communication, 2009; G. Oliver, personal communication, 2009). Spring and Fall algal blooms causing damoic acid poisoning in sea lions may have also been a factor in the presence of hauled-out sea lions in the Harbor (N. Crane, personal communication, 2009). Similar influences will affect the presence of sea lions in the Harbor in subsequent years, but numbers will likely vary. The Harbor does not provide mating or breeding habitat or other habitat of a similar ecological significance for the California sea lion.

Table 2 Estimated Numbers of Marine Mammals in the Murray Street Bridge Seismic Retrofit Survey Area[1] during 2009 Surveys

		Work Area[2]				Upper Harbor[3]				Lower Harbor[4]				Total in Survey Area			
		CASL	HASE	SEOT	Unk[5]	CASL	HASE	SEOT	Unk[5]	CASL	HASE	SEOT	Unk[5]	CASL	HASE	SEOT	Unk[5]
Date	Time																
17-Sep	Morning		3							1				1	3		
17-Sep	Midday						1			1	1			1	2		
17-Sep	Evening									1	1	1		1	1	1	
17-Sep	Night											2				2	
20-Sep	Evening									1				1			
20-Sep	Night	1								3	3			4	3		
21-Sep	Morning				1					1	4	1		1	4	1	1
21-Sep	Midday		1							2	1			2	2		
22-Sep	Night		1							2	2			2	3		
23-Sep	Morning		2							4		1		4	2	1	
23-Sep	Midday		1							2		1		2	1	1	
29-Sep	Night	1	2		2				1					1	2		3
30-Sep	Midday	6	8							9*	6*			9 to 15	8 to 11		
1-Oct	Morning		6 to 9							10	4*			10	6 to 11		
2-Oct	Morning	8	2							13*	4*			13 to 15[6]	4 to 6		
6-Oct	Midday	1	2				1			3	1			4	3		
7-Oct	Morning	1	3			4	1*			2	6			7	9 to 10		
17-Oct	Midday		3				6			1	1 to 2			1	10 to 11		
21-Oct	Midday	1	2				1							1	3		

Notes: CASL – California Sea Lion; HASE – Eastern Pacific Harbor Seal; SEOT – Southern Sea Otter

1. Survey Area = Harbor Launch Area to 500 ft north of the Area of Impact ; 17-Oct midday survey included entire Upper Harbor ≈ 2300 ft north of the Murray St Bridge

2. Work Area = Immediate Area around Murray St Bridge

3. Upper Harbor = Work Area to 500 north of Work Area

4. Lower Harbor = Work Area to Harbor Launch

5. Unknown Marine Mammal due to Darkness

6. "Raft" of 7 CASL foraging throughout the survey area

* Some individuals may have already been counted in other locations

Table 3 Numbers of Animals Hauled Out and Haul-Out Locations within Murray Street Bridge Retrofit Survey Area* during 2009 Surveys

		CASL		HASE	
Date	Time	# of animals-dock	Notes	# of animals-dock	Notes
17-Sep	Morning			3-FF	2 flushed into water when I came within ≈ 30 ft[1]
17-Sep	Midday				
17-Sep	Evening				
17-Sep	Night				
20-Sep	Evening	1-AA			
20-Sep	Night	1-AA, 1-F	same CASL as evening survey still present on AA Dock, large bull CASL with white topknot on D Dock, coughing[2]		
21-Sep	Morning	1-F	large bull CASL with white topknot from 20-Sept still present		
21-Sep	Midday	1-AA, 1-E/F	Sub-adult male or female on end of AA Dock[3]; juvenile on cement wall along harbor[4]		
22-Sep	Night	1-D	large bull CASL with white topknot		
23-Sep	Morning	1-FD, 1-D	CASL on Fuel Dock, flushed when approached by fishermen; large bull CASL with white topknot on D Dock	1-FF, 1-F	HASE on F Dock flushed with arrival of "Velocity" crew
23-Sep	Midday				
29-Sep	Night				
30-Sep	Midday				
1-Oct	Morning	1-AA	sub-adult male or female CASL on end of AA Dock	2-FF	2 HASE on F Dock, growling at HASE in water
2-Oct	Morning	1-AA	sub-adult male or female CASL on end of AA Dock	2-FF, 1-F	HASEs on FF flushed when I approached
6-Oct	Midday	1-AA	sub-adult male or female CASL on end of AA Dock[6]		
7-Oct	Morning			3-FF, 6-F	2 of 3 HASE on FF Dock flushed with arrival of kayakers
17-Oct	Midday				
21-Oct	Midday	1-FF	large bull CASL on rubber docks by UCSC Kayaks[7]		

Notes: CASL – California Sea Lion; HASE – Eastern Pacific Harbor Seal; *Survey Area = Harbor Launch Ramp Area (including Fuel Dock and Vessel Assist Dock) to 500 ft upstream of the Area of Impact

1. See Figure 5a
2. See Figure 5b
3. See Figure 5c
4. See Figure 5d, e
5. See Figure 5f
6. See Figure 5g
7. See Figure 5h

FIGURE 4: DISTRIBUTION OF OBSERVED MARINE MAMMALS

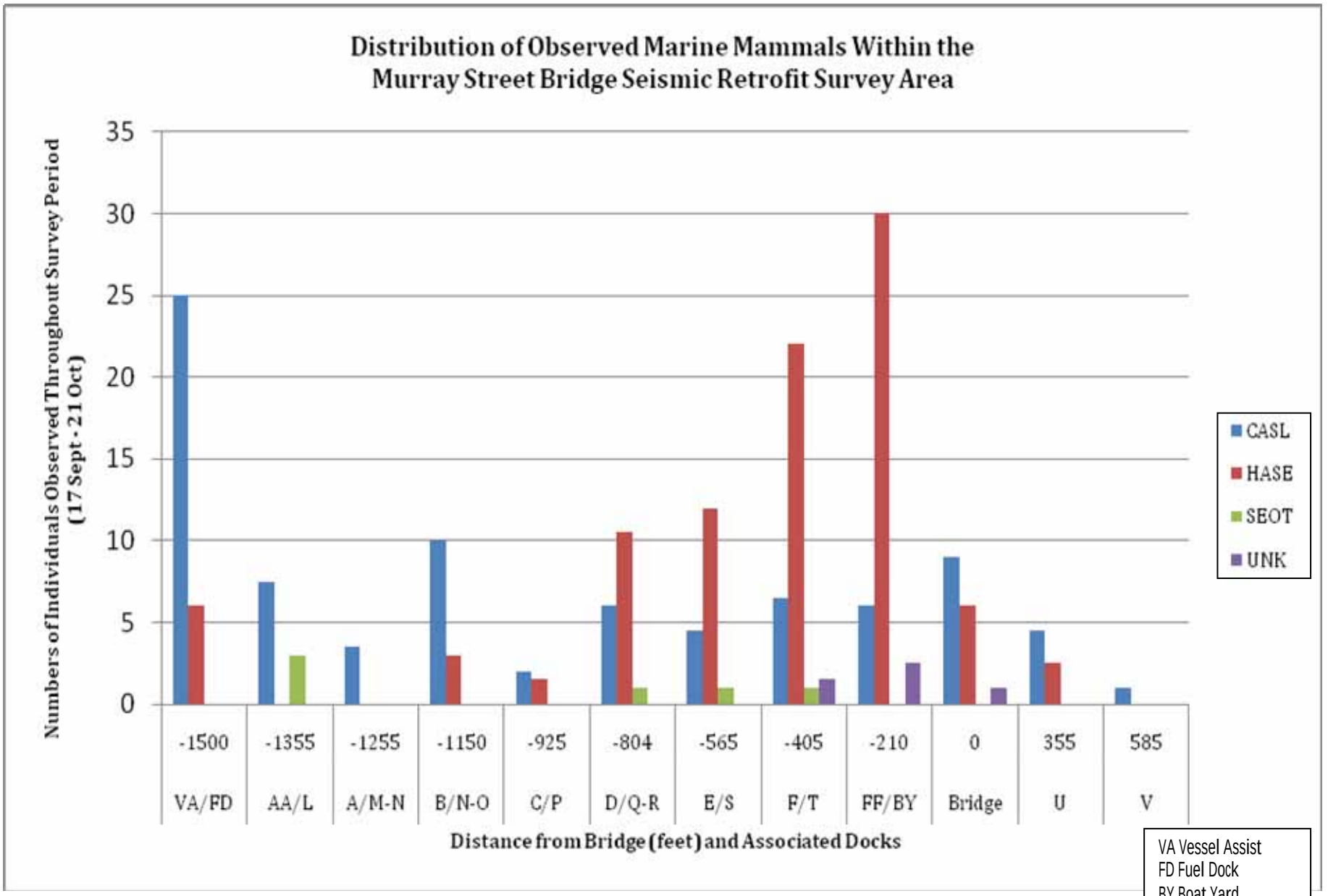
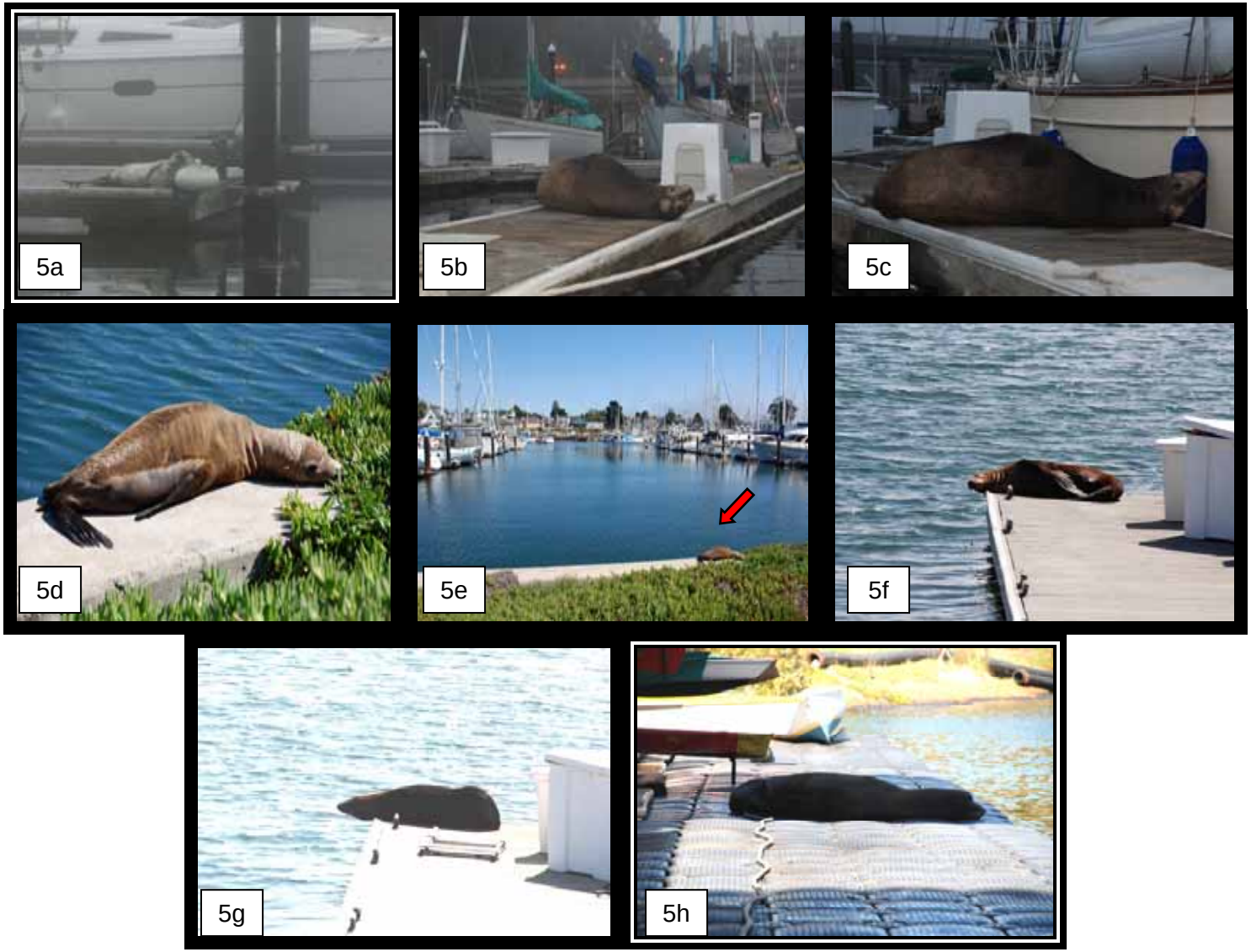


FIGURE 5: PHOTOGRAPHS OF HAULED-OUT MARINE MAMMALS DURING FALL 2009 SURVEYS OF THE MURRAY STREET BRIDGE SEISMIC RETROFIT SURVEY AREA.



Eastern Pacific Harbor Seal. During December 2006 surveys, six Eastern Pacific harbor seals were observed hauled-out on dock FF at night. During Fall 2009 surveys, harbor seals were observed foraging and telescoping on 18 out of 19 surveys. Numbers of observed harbor seals varied widely from 1 to 11 animals. Harbor Seals were only observed hauled-out on F and FF Docks, only during early morning surveys, and when biologists arrived prior to the onset of nearby early morning Harbor activities, such as the arrival of kayakers at FF Dock and "Velocity" Crew at F Dock. With any proximate activity, including the quiet approach of EcoSystems West biologists within approximately 30 feet (close enough to count the animals in the darkness), harbor seals flushed from their haul-out locations into the water.

Observations of harbor seals were concentrated in two locations: to a lesser degree in the area around the launch ramp, fuel dock and Vessel Assist dock; and primarily in the area around Docks F and FF and Dock S, the Live Bait dock, where harbor seals were frequently observed telescoping just off Dock S. The Live Bait dock clerk, Kevin Carney, and well as Port District staff report that five or six of the harbor seals appear to be residential, hauling-out, foraging, and telescoping in the area of Docks FF through S throughout the year (K. Carney, personal communication, 2009; B. Foss, personal communication, 2009).

On only one survey date did we survey the entire Upper Harbor, upstream (north) of the Bridge. This survey was conducted in an effort to assess potential use of the Upper Harbor during midday. Six harbor seals were observed foraging in the Upper Harbor.

Harbor seals are residential within the Harbor, using Docks F and FF as a primary haul-out and the surrounding area as foraging habitat. The Harbor does not provide breeding or molting habitat. Nearby known breeding and molting locations include Point Lobos, Elkhorn Slough (NOAA 2007), and Lover's Point State Marine Reserve (SIMON 2008). The numbers of harbor seals occupying the Harbor are likely to be highest during late summer, fall and winter, outside of breeding (March - May) and molting (June - July) seasons. Individuals that are not sexually reproductive may remain at the Harbor later into the spring, until molting season.

The harbor seals only use Docks F and FF as haul-out sites at night, when disturbances in the Harbor are at a minimum. The animals flush with any disturbance in the early morning. The total number of hours of haul-out time/day for harbor seals outside of breeding and molting season averages seven hours. It is unknown if the harbor seals occupying the Harbor use the site exclusively as their haul-out during the fall and winter or if they use other nearby haul-outs in conjunction with the Harbor. Use of multiple haul-out sites by harbor seals varies, as does distance travelled between multiple haul-out sites and for foraging. In one study in Humboldt and Del Norte Counties, approximately half of the harbor seals tagged used one to two haul-out sites, and half used three or more, traveling an average distance of 28 km between sites. Males travelled further and sub-adult females travelled slightly further than sexually reproductive females (Pecharich, A.G. and P.D. Goley 2003). In a monitoring study of harbor seals for the Richmond San Rafael Bridge, 65% used more than one haul-out site, and when seals used Castle Rock as their primary haul-out, mean in-water distances from the haul-out site for most seals ≤ 5 km (i.e. foraging areas were located close to the primary haul-out site) (Green, D. et al. 2006). In an unpublished study of harbor seal prey base, harbor seals using the San Lorenzo River in Santa

Cruz were found to use the river as their haul-out exclusively, foraging in the ocean and returning during the night when disturbances were at a minimum (Weise, M. personal communication, 2009). Nearby known haul-outs for the eastern Pacific harbor seal include Pleasure Point in Live Oak; the Cement Boat at Seacliff State Beach in Aptos; Table Rock, off Wilder State Park; as well as numerous other sites along the north coast from Wilder State Park to Ano Nuevo State Park (NOAA 2007).

5. Type of Incidental Taking

The potential for incidental take is to eastern Pacific harbor seals, California sea lions, and southern sea otter via potential incidental harassment occurring near the Murray Street Bridge. The method of take is incidental harassment from disturbance associated with construction activities, personnel and equipment, and noise, deterring regular foraging and haul-out activities as well as from temporary removal of primary haul-out sites (Dock FF) for harbors seals. In addition, animals present in the Upper Harbor may be temporarily restricted (until the end of daily construction activities) from moving through the Work Area under the bridge to access the Harbor exit and other areas for foraging or hauling out.

6. Number of Marine Mammals Potentially Taken and Frequency of Take

Incidental harassment of marine mammals during the Murray Street Bridge Retrofit Project may occur to all three marine mammal species (southern sea otter, California sea lion, and eastern Pacific harbor seal) present in the Area of Impact and vicinity. Avoidance and minimization measures will be implemented to reduce the potential for harassment to the maximum extent possible, as detailed in the Mitigation Measure section below.

Estimates of numbers of animals and potential incidents of harassment are based on 2009 Marine Mammal Surveys. Numbers of residential eastern Pacific harbor seals are expected to be at a maximum during the season in which surveys were conducted (outside of breeding and molting seasons). Because pile driving (in-water and on-land) has not been scheduled in detail, estimates are based on the maximum number of days that pile driving could potentially affect marine mammals (installation of 16 permanent in-water piles and 8 on-land piles; installation of 120 temporary piles to support a construction trestle, if used; and 35 boat berth piles). Further, estimates are based on the assumption that potential incidents of harassment may occur both in the morning, when pile-driving activities begin for the day, and in the afternoon, when pile-driving activities resume after the lunch break. In addition, we estimated a one-time harassment of harbor seals when Dock FF is temporarily removed.

Table 4. Estimated Potential Harassment of Marine Mammals During Murray Street Bridge Seismic Retrofit Construction Activities

	Average # of Animals/Day	Maximum # of Animals/Day	Estimated Incidents of Harassment/ Animal/Day	Estimated # of Days of Potential Harassment
Southern sea otter	0.3	2	2	86
California sea lion	4	15	2	86
Eastern Pacific harbor seal	4	11	1 to 2	86

7. Anticipated Impact of the Activity on Marine Mammals

The waters and haul-out features within the Harbor do not provide rookery, mating, breeding, molting, or other habitat of a similar ecological significance for sea otters, California sea lion or Pacific harbor seal. Nevertheless, construction activities may impact marine mammals using the Harbor for foraging and haul-out activities.

Pile-driving activities within Harbor waters may deter otters from regular foraging in the project area. Disruption of movement may be considered temporary harassment and a direct project impact. Pile-driving activities within Harbor waters may deter sea lions from foraging or hauling-out in the project area. Disruption of movement may be considered temporary harassment and a direct project impact. No alterations to sea lion habitat are anticipated as a result of the project. No other direct or indirect impacts are anticipated.

Pile-driving activities will affect harbor seals congregating and foraging around Dock S, immediately downstream of the Work Area, as well as harbor seals using the nighttime haul-outs (Dock F and FF) immediately adjacent to the Bridge. Dock FF is slated to be removed temporarily for the duration of construction and a temporary dock FF--with fewer berths—will be constructed at the southern end of the current FF dock immediately adjacent to the work area. Pile driving, other in-water construction activities, and construction activities with a higher noise level than normal Harbor activities may deter harbor seals from regular foraging in the project area. Disruption of regular haul-out behavior and movement and foraging patterns may be considered temporary harassment and a direct project impact.

In addition, animals foraging in the Upper Harbor may be impacted by construction activities. During EcoSystems West Fall 2009 surveys Harbor seals were observed regularly in the Upper Harbor, while greater numbers of California sea lions were observed sporadically, largely depending on available prey resources. No southern sea otters were observed in the Upper Harbor, although an individual was observed immediately under the Murray Street Bridge. Marine mammals may travel into the Upper Harbor in the morning before construction begins for the day or during a lunch break, but one navigable channel will always be open for boats and

passage of animals. In addition, these animals may be likely to approach the work area and noise levels that may cause harassment or injury.

With implementation of avoidance and minimization efforts, potential effects will be minimized; however, temporary harassment may occur. With implementation of the proposed work restrictions, monitoring and other mitigation measures specified in the following section, disturbance from project-related construction activities is expected to have only a short-term impact. No long-term avoidance or permanent abandonment of work sites or nearby areas is expected. A NMFS Incidental Harassment Authorization will be required for all three species. A USFWS Biological Opinion will be required for the southern sea otter.

8. Anticipated Impact of the Activity on Availability of Marine Mammals for Subsistence Uses

Not applicable.

9. Anticipated Impact on the Habitat of Marine Mammals & Likelihood of Restoration

The proposed activities are not expected to have any long-term detrimental impact on the habitat of harbor seals, California sea lions or sea otters. Construction-related effects will be temporary and minimized with implementation of the proposed avoidance/minimization and mitigation measures. No permanent removal of habitat will occur. The project includes installation of temporary boat docks during construction and replacement of boat docks temporarily removed for construction upon completion of the bridge retrofit.

10. Anticipated Impact of Habitat Loss or Modification on Marine Mammal Population

There is no anticipated impact of habitat loss or modification of harbor seal, California sea lion or southern sea otter populations as a result of the Murray Street Bridge Seismic Retrofit Project.

11. Availability and Feasibility of Measures to Minimize Impacts

Avoidance/minimization and other mitigation measures will be implemented to avoid or minimize the potential construction-related effects to marine mammals at or near the Murray Street Bridge Seismic Retrofit site. These measures are outlined in the last section of this report, and generally include:

- Limitation on timing of pile driving;
- Pre-construction monitoring; and
- Establishment of a buffer and monitoring of noise levels.

12. Measures to Minimize Impacts on the Availability of Marine Mammals for Subsistence Uses

Not applicable.

13. Suggested Means of Monitoring and Reporting

To assess the level of project-specific impacts(s), the City will implement the following measures as a component of the Marine Mammal Mitigation Plan:

2. Prior to initiation of in-water construction, a qualified biological monitor, approved by the Caltrans and U.S. Fish and Wildlife Service, will conduct monitoring of marine mammals to update existing information on the animals' occurrence in and near the project area, their movement patterns, and their use of any haul-out sites. This preconstruction monitoring will take place at least five days prior to the start of in-water construction and will cover a period of at least one week (with at least 5 days of actual observation over a period of 4 hours each day), 2 hours in the morning at the time that construction activities would begin and 2 hours at midday, when construction activities would resume after a lunch break.

4. The qualified biological monitor will be present during in-water construction activities to search for target marine mammal species and halt project activities that could result in injury or mortality to these species. Each day, before pile driving (or other loud in-water construction activity) begins, the monitor will survey the buffer zone for marine mammals. The monitor will also scan for target species throughout the project vicinity, i.e., the areas adjacent to the project site and buffer zone.

11. The biological monitor will keep a record of all observations of the target species. The information on each observation will include: a) species identification and approximate number of animals observed; b)age and sex class of each animal (if possible); c) activity and direction of movement; d) ongoing project activities at the time of observation; e) responses of target species to project activities; f) any unusual behavior or circumstances observed (project- or non-project related); and g) location, date and time of each observation. Summary monitoring reports will be submitted to Caltrans, who will forward reports to NMFS and USFWS by December 31 of each year that in-water construction activities take place.

12. In the event that the monitor determines that a marine mammal has been injured by project activities, all work shall cease and Caltrans shall be notified. Caltrans will consult with NMFS and/or USFWS to determine if additional measures are necessary. Work may resume upon notification by Caltrans.

14. Post-construction monitoring will be conducted to determine if harbor seals resume their use of Dock F and FF as primary haul-out sites. NMFS may require additional project conditions, to be applied depending on the outcome of post-construction monitoring.

14. Suggested Means of Encouraging Research

All marine mammal monitoring data collected during the pre-construction and in-construction phases of the project will be submitted to Caltrans for submittal to NMFS. This information will also be made by the City available to the Santa Cruz Port District, other marine mammal researchers (i.e., at UCSC, Moss Landing Marine Lab), other interested agencies and the general public.

MARINE MAMMAL MITIGATION MEASURES

The following mitigation measures will be implemented to avoid or minimize potential project-related effects to southern sea otters, eastern Pacific harbor seals, and California sea lions. The term "target species" will be used below when referring to all these species collectively. Caltrans will initiate consultation with USFWS regarding potential harassment of southern sea otters during in-water construction activities to determine the need for additional project conditions. Caltrans will submit an application for an Incidental Harassment Authorization to NMFS for potential harassment of southern sea otters, eastern Pacific harbor seals and California sea lions during in-water construction activities.

1. In-water pile-driving activities in Harbor waters will be limited to the period of July 1 to mid-November, unless otherwise permitted by the National Marine Fisheries Service (NMFS).

2. Prior to initiation of in-water construction, a qualified biological monitor, approved by the National Marine Fisheries Service, will conduct monitoring of marine mammals to update existing information on the animals' occurrence in and near the project area, their movement patterns, and their use of any haul-out sites. This preconstruction monitoring will take place at least five days prior to the start of in-water construction and will cover a period of at least one week (with at least 5 days of actual observation over a period of 4 hours each day), 2 hours in the morning at the time that construction activities would begin and 2 hours at midday, when construction activities would resume after a lunch break.

3. All known and potential haul-out sites that occur in the construction work area shall be removed, preferably to a near-by location outside of the work area prior to construction. These sites could include floating docks (i.e. Dock FF) rubber docks, or boats, such as those used by UCSC.

4. Prior to in-water construction, the approved monitor will conduct a workers training to instruct construction crews regarding the status and sensitivity of the target species in the area and the actions to be taken to avoid or minimize impacts in the event of a target species entering the in-water work area.

5. The qualified biological monitor will be present during in-water construction activities to search for target marine mammal species and halt project activities that could result in injury or mortality to these species [an estimated 8 hour/day (or for the duration of in-water construction activities each day) during the estimated 10 months of in-water activities plus an additional 16 days of on-land pile driving]. Each day, before pile driving (or other loud in-water construction activity) begins, the monitor will survey the buffer zone for marine mammals. The monitor will also scan for target species throughout the project vicinity, i.e., the areas adjacent to the project site and buffer zone.

6. The commencement of pile driving activities will be delayed if marine mammals are present within a 500-foot radius of the work area. This 500-foot radius is based on pile-driving activities for similar projects (Sandholt Bridge) and on the feasibility of monitoring the area for animals entering the Harbor from the open waters of the Monterey Bay. The buffer radius may be reduced or increased based on a measurement of the distance the 160 db pressure travels in the underwater harbor waters and/or through the air. This radius will be visibly flagged on the banks of the harbor during these activities. Each day prior to the start of pile-driving, the approved monitor will survey the buffer zone for marine mammals. If a marine mammal is detected, pile driving will be delayed until the marine mammal(s) has moved beyond the buffer zone, verified by visual confirmation or lack of visual sighting within the next 15 minutes of the last sighting, to assume that the animal has moved beyond the buffer zone. If the animal should move back into the buffer zone after the commencement of pile-driving, no further work stoppage will be necessary, unless the animal comes within an unsafe distance of the work area that may result in injury to the animal. At this point, work will cease to avoid physical injury to the animal. This distance will be determined by USFWS and/or NMFS. The monitor will record the species, numbers and behaviors of any animal(s) entering the buffer zone after commencement of work and notify Caltrans, NMFS (regarding harbor seals or California sea lions) or USFWS (regarding sea otters) via telephone and in writing within 48 hours. The monitor will also submit a written description of the event to Caltrans (and in turn NMFS or USFWS, as applicable) within 7 days.

7. The buffer radius may be reduced or increased based on a measurement of the distance the 160 db pressure travels in the underwater harbor waters and/or through the air. This would be determined using approved in-water and in-air acoustic monitoring devices. The City of Santa Cruz shall notify Caltrans in writing of the proposed change in buffer zone area, who in turn will notify NMFS. An approved biological monitor will operate the monitoring devices during pile driving and any other loud construction activities, such as bridge demolition or use of hydraulic tools. The devices, placed at the

8. No disturbance or noise will be used to encourage the movement of the target species from the work area. The City will contact USFWS and NMFS to determine the best approach for exclusion of the target species from the in-water work area.

9. No intentional hazing will be used on eastern Pacific harbor seals, California sea lions, southern sea otters, or other state- or federally-listed threatened or endangered species. The City will contact the Caltrans, USFWS and CDFG if sea otters begin to occur in the vicinity of the bridge work, to determine whether any changes to this mitigation plan may be required.

10. Other in-water construction activities, such as the use of heavy equipment to construct bridge abutments (i.e., activities not involving loud, impulsive hammering sounds) will generate noise levels equivalent to that of a diesel truck. For these activities, a 50-foot radius buffer zone will be established. This buffer zone will be clearly marked by highly visible stakes securely placed into the banks. Each day, before construction begins, the monitor will search the 50-foot radius for marine mammals. If a marine mammal is sighted within the buffer zone, the monitor will require the contractor to delay in-water construction activities until the monitor determines that no marine mammals are present within the buffer area.

11. The biological monitor will keep a record of all observations of the target species. The information on each observation will include: a) species identification and approximate number of animals observed; b) age and sex class of each animal (if possible); c) activity and direction of movement; d) ongoing project activities at the time of observation; e) responses of target species to project activities; f) any unusual behavior or circumstances observed (project- or non-project related); and g) location, date and time of each observation. Summary monitoring reports will be submitted to Caltrans, who will forward reports to NMFS and USFWS by December 31 of each year that in-water construction activities take place.

12. In the event that the monitor determines that a marine mammal has been injured by project activities, all work shall cease and Caltrans shall be notified. Caltrans will consult with NMFS and/or USFWS to determine if additional measures are necessary. Work may resume upon notification by Caltrans.

13. All known and potential haul-out sites that were removed from the work area prior to construction will be returned to their approximate location.

14. Post-construction monitoring will be conducted to determine if harbor seals resume their use of Dock F and FF as primary haul-out sites. NMFS may require additional project conditions, to be applied depending on the outcome of post-construction monitoring.

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Appendix C. Essential Fish Habitat Assessment

Murray Street Bridge (# 36C-0108)
Seismic Retrofit Project

Essential Fish Habitat Assessment

Murray Street Bridge
Santa Cruz Yacht Harbor
City of Santa Cruz
Santa Cruz County, CA
Federal Project Number STPLX-5025 (048)

July 2010

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Murray Street Bridge
Seismic Retrofit Project(# 36C-0108)

Essential Fish Habitat Assessment

Murray Street Bridge
Santa Cruz Yacht Harbor
City of Santa Cruz
Santa Cruz County, CA
Federal Project Number STPLX-5025 (048)

July 2010

Approved By: _____ Date: _____
Chris J. Schneiter, Assistant Director
Phone Number: 831-420-5422
Office Name: Department of Public Works
District/Region: City of Santa Cruz

Approved By: _____ Date: _____
Gary Ruggerone, Senior Environmental Planner
Phone Number: 805-549-3182
Environmental Planning Branch
District 5, San Luis Obispo

List of Abbreviated Terms

BMP	Best Management Practice
Caltrans	California Department of Transportation
CDFG	California Department of Fish and Game
CIDH	cast-in-drilled-hole
CISS	cast-in-steel-shell
dB	decibels
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
FHWA	Federal Highway Administration
FMP	Fishery Management Plan
Ft	foot/feet
HAPC	Habitat Area of Particular Concern
HBP	Highway Bridge Program
MHHW	Mean higher high water
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
MSA	Magnuson Stevens Fishery Management and Conservation Act
PFMC	Pacific Fisheries Management Council
SEL	Sound Exposure Level
SFA	Sustainable Fisheries Act
SWPPP	Stormwater Pollution Prevention Plan
UCSC	University of California Santa Cruz
UPRR	Union Pacific Railroad

Introduction

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) on all actions, or proposed actions, authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH) (MSA §305(b)(2)). The MSA established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan. MSA was first enacted in 1976 and amended by the Sustainable Fisheries Act of 1996. The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 was signed January 12, 2007 (NOAA 2007).

EFH means ***those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.*** 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 (NOAA Fisheries 2002).

The purpose of this EFH assessment is to determine whether or not the Murray Street Bridge (Bridge # 36C-0108) Seismic Retrofit Project "may adversely affect" EFH designated by the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries), and the Pacific Fishery Management Council (PFMC). This assessment includes a description of the proposed action and an analysis of the potential direct, indirect, and cumulative effects on EFH for all managed fish species and their major food sources. The assessment also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the Murray Street Bridge (Bridge # 36C-0108) Seismic Retrofit Project.

Project Description

Project History

The existing Murray Street Bridge (Bridge # 36C-0108) crosses the Santa Cruz Small Craft Harbor in the City of Santa Cruz, California (Figure 1). Due to the structure's seismic vulnerability, the City in conjunction with the California Department of Transportation (Caltrans) has embarked upon development of retrofit design plans. The City also received approval from Caltrans to rehabilitate the bridge, including replacement of the deficient bridge barriers under the federal Highway Bridge Program (HBP), formerly the Highway Bridge Replacement and Rehabilitation Program. In order to bring the bridge up to current standards, the narrow shoulders will be widened as part of the project.

Project Description

The proposed project is located at the eastern edge of the City of Santa Cruz in the County of Santa Cruz. The project area includes the Murray Street Bridge which spans the Santa Cruz Harbor, portions of lands within the Santa Cruz Port District harbor area, portions of the harbor waters, and the area along the Murray Street road right-of-way, west of Lake Avenue (Figure 2).

The proposed project consists of a seismic retrofit of the existing Murray Street Bridge, which spans the Santa Cruz Small Craft Harbor and additional minor modifications to replace deficient bridge barriers (widening shoulders to standard widths and replacement and improvement of sidewalks and railings). The seismic retrofit project will provide the bridge with additional vertical support and resistance to lateral seismic forces by installing additional pilings and supplemental structural elements. In order to provide sufficient area for construction operations, some boats, Harbor facilities, and commercial businesses will require temporary relocation.

Bridge Seismic Retrofit. The nine-span bridge is supported by two abutments (identified as Abutments 1 and 10, located at the western and eastern ends of the bridge, respectively) and 8 "bents" (identified as Bents 2 through 9, located at 60-foot intervals between the abutments). The seismic retrofit project consists of the following basic elements:

(1) Installation of concrete infill walls at Bents 2, 3, 4, and 9. These walls will span the voids between the existing concrete support columns and will be anchored to the columns with bonded dowels.

(2) Installation of shear keys and seat extenders at Abutment 1 and Bents 2 through 9.

(3) Retrofit of foundations with 16-inch diameter CISS (cast-in-steel-shell) piles at Bent 9 and Abutment 10. These piles will extend to depths of approximately –55 feet to –85 feet at Bent 9 and to depths of approximately –30 feet to –50 feet at Abutment 10.

(4) Retrofit abutment with two 96-inch CIDH (cast-in-drilled-hole) piles behind Abutment 10 to a depth of -50 feet.

(5) Retrofit of both outriggers and bents with 30-inch diameter CISS piles at Bents 6, 7, and 8 and 30-inch diameter CIDH piles at Bent 5. These piles will extend to depths of approximately -55 feet to -80 feet at Bent 5 and at approximately –85 feet to –110 feet at Bents 6-8.

(6) Installation of fenders to protect new piles.

Figure 3 provides a cross section showing the abutment and bents and proposed improvements. The installation of new piles at Abutment 10 and Bents 5 through 9 will include two piles on each side for a total of 24 piles. Both the CISS piles and the CIDH piles will be installed at 1:12 angles.

Additional Bridge Improvements. The project also includes replacement of deficient bridge barriers. In order to bring the bridge up to current standards, the narrow shoulders will be widened to provide standard 5-foot shoulders. The shoulder widening will consist of approximately an additional 2 feet on the north side of the bridge and 5-6 feet on the south side of the bridge. It is not anticipated that any work other than an overhang extension will be required on the north side widening. In addition, the construction of new bridge railings is required to conform to current codes. Roadway lane widths will remain the same as currently exists.

The proposed project will include the following improvements:

(1) Removal of existing curbs, sidewalks, and barrier railings on the bridge.

(2) Installation of new girders, road foundations, and road surfacing along the entire southern edge of the bridge, providing 5.5 feet of additional width. (The girders will be supported by the new 30-inch piles at Bents 5 through 8 and the 16-inch piles at Abutments 1 and 10 and at Bents 2, 3, 4, and 9.

(3) Installation of a new cantilevered extension along the entire northern edge of the bridge, providing approximately two feet of additional width. (This will not require additional foundation work.)

(4) Repaving of the bridge surface, and construction of a new 7-foot, 6-inch wide sidewalk on the south side of the bridge. Class 2 bike lanes will be provided in the roadway shoulders.

(5) Installation of new metal bridge railings on both the southern and northern sides of the bridge.

Temporary Harbor Facility Relocation. The temporary use of portions of the eastern harbor boat yard and the western parking lot for contractor staging, in combination with provision of construction access to the bridge from the waterway, will result in temporary disruptions of harbor activities including boat berths, boat storage, buildings, and businesses. A total of 12 recreational boat berths will be removed during construction, which includes removal of 2 berths from dock T with replacement at end of Phase 2 and removal of 10 berths from dock FF. To accommodate the removed berths, 11 new berths will be constructed on the west side of the harbor at Docks A through F. A temporary dock FF – with fewer berths – will be constructed at the southern end of the dock, which will accommodate 6 boats during construction. Affected portions of Dock FF will be restored at the end of Phase 4. Additionally, the berth for the commercial "Chardonnay" boat will be temporarily unavailable for a period of approximately two weeks during Phase 4 construction.

Although design plans have not yet been completed for the reinstalled berths, it is expected that the docks would be plastic, wood or concrete over polyethylene floats and would be anchored with pilings. Piles would be drilled into the harbor floor by mechanical hammer. There would be no dredging or placement of fill in Harbor waters with reinstallation of docks and both berths.

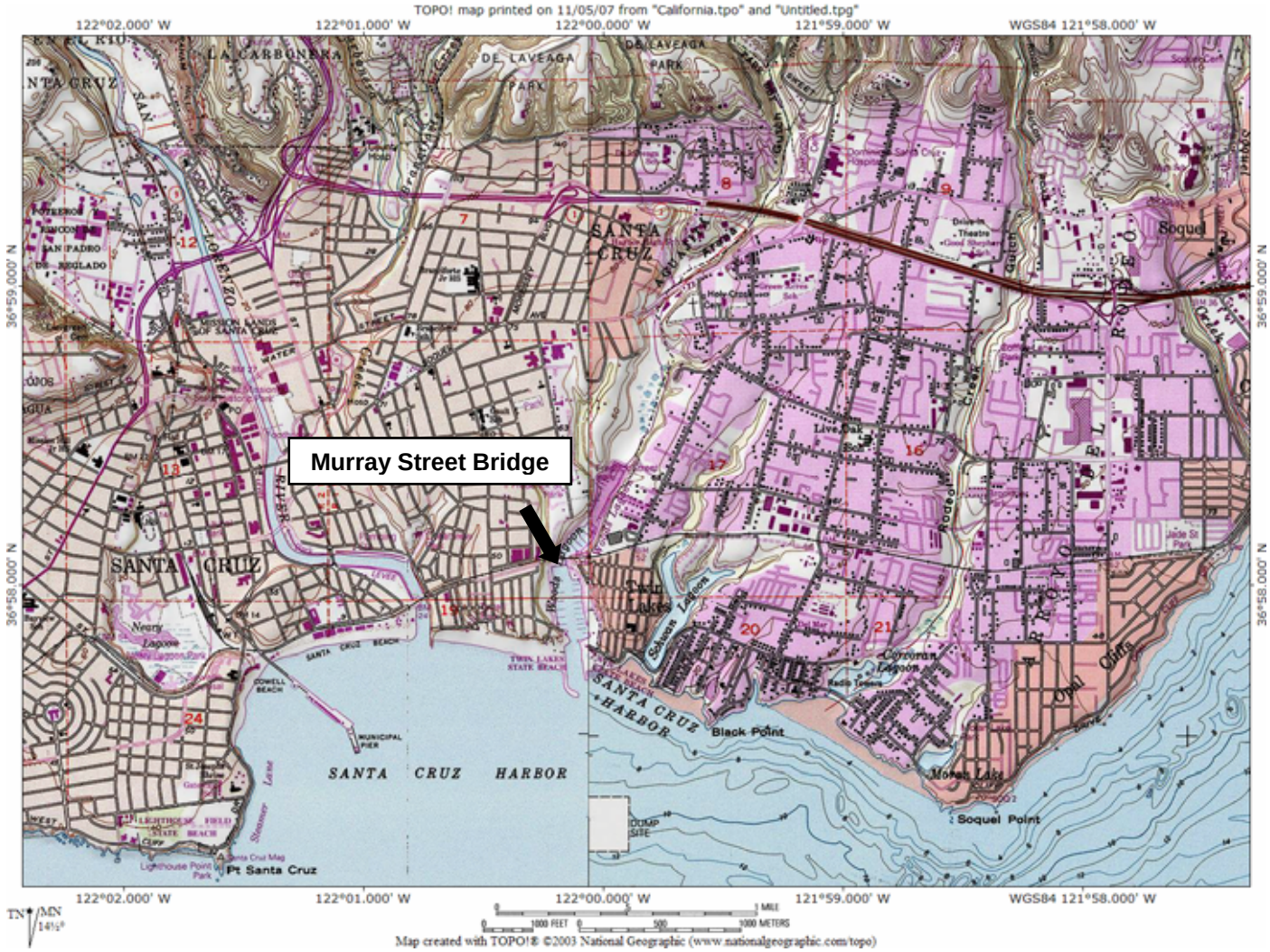
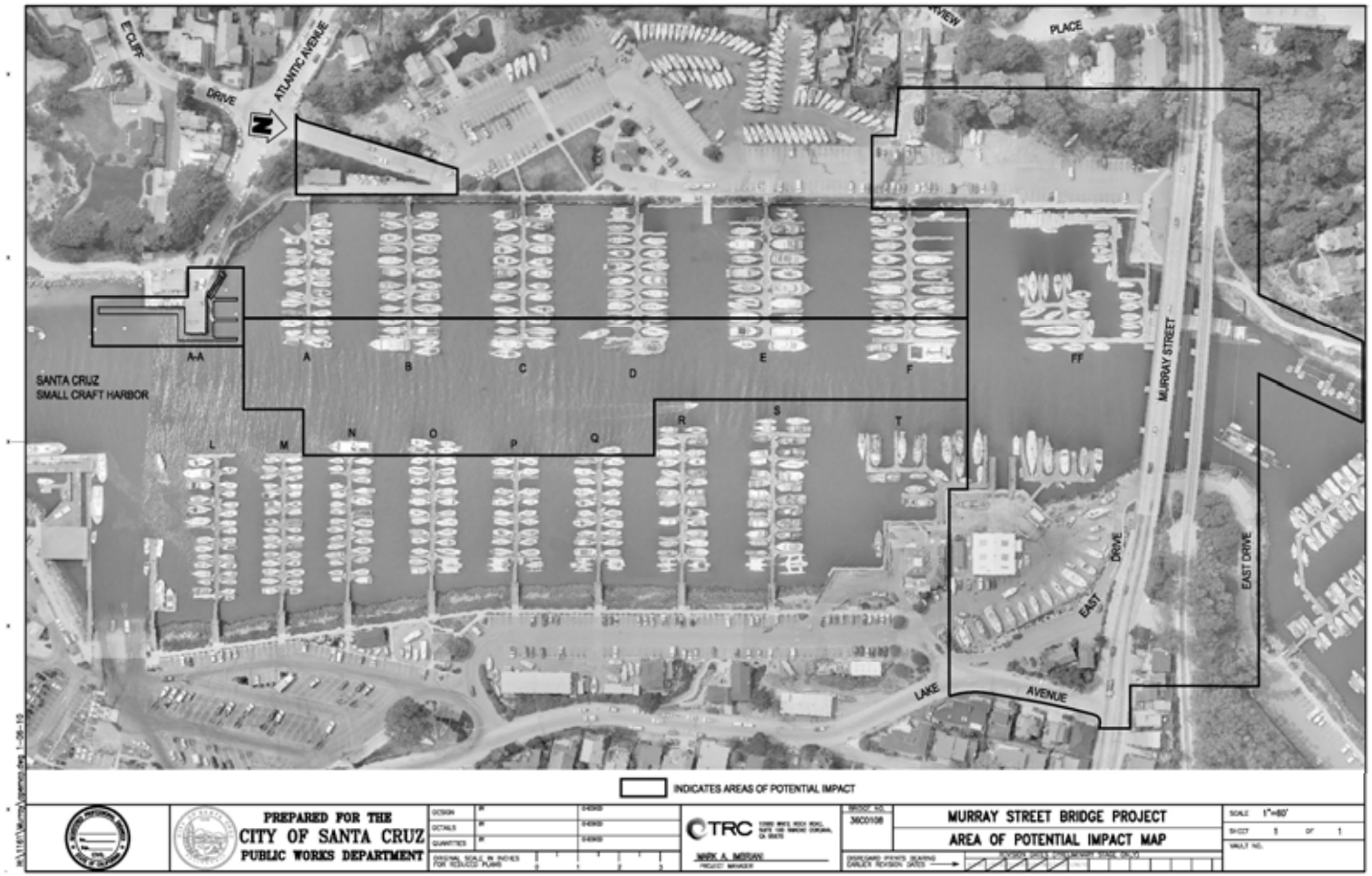


Figure 1. Vicinity of the Murray Street Bridge (# 36C-0108) in the City of Santa Cruz, County of Santa Cruz, CA.



Source: TRC Engineers

Figure 2. Aerial Photo of Area Surrounding the Murray Street Bridge *(# 36C-0108)* and Area of Potential Impact, in the City of Santa Cruz, County of Santa Cruz, CA.

Description of Construction Activities.

Construction Schedule and Phasing. The Murray Street Bridge Retrofit project is tentatively proposed for construction in five partially overlapping phases. Generally, work will begin on the eastern side of the Harbor and progress to the western side. The timing of each phase and a brief description of work to be performed during each phase is provided in Table 1. Overall, the seismic retrofit work will be executed over a period of approximately 18 months within four construction phases as described in Table 1. The additional bridge improvements will be constructed over a period of approximately 6 months as part of Phase 5 of the construction. Due to need for large construction equipment and harbor access, as described in Table 1, there will be traffic control on Murray Street to include various measures such as temporary lane closures, temporary one-way traffic movement, and detours.

Construction Methods and Equipment. The proposed project includes the following construction activities and associated equipment.

- Demolition and Harbor Berth Removal/Replacement: The primary demolition activities include the removal of pilings at Bent 6, the temporary removal of the gangway under Bent 4, the removal of existing sidewalks and railings along the entire length of the bridge, the removal of pavement at both ends of the bridge, and the temporary removal of two berths at Dock T and 10 berths at the FF dock; approximately 17 piles will be removed. To accommodate removed boat berths, 11 new berths will be constructed on the west side of harbor with 12 associated piles, and 6 temporary berths with 6 piles will be relocated at Dock FF.

  Equipment: Demolition will require the use of equipment such as cranes, excavators, front-end loaders, dump trucks, concrete saws, and jackhammers. The dock piles will either be driven in with a vibratory pile driver or a pile driver if needed.

- Work Platforms within the Waterway: Work within the waterway will require either the use of barges or construction of trestles to provide work platforms. If barges are utilized, prefabricated modular units may be brought to the site and locked together. This type of platform can be installed, reconfigured, and removed relatively quickly, but the system is not suitable for areas that are too narrow to accommodate the modules. For example, footings from the Union Pacific Railroad Bridge to the north and footings from the Murray Street Bridge appear too close together to allow use of a modular barge between footings. In these areas, a trestle likely will need to be constructed.

  Construction of a trestle could vary depending on materials available to contractors. One possible trestle configuration would be 60-foot long steel girders over the Harbor navigation channel. The spans would be supported on falsework bents, perhaps constructed of steel piles which are a fairly common falsework material. Piles would be driven in the water by a crane sitting over the land. Preliminary estimates by the project engineer indicate that up to 120 12-inch steel beams would be required for a trestle spanning the bridge; vibratory drivers would be used. Approximately 6-8 of these small

size piles could be installed per day. All piles would be removed at the end of construction. The trestle could be made of "Bailey Bridge" panels that can be used to provide bents or towers. The deck might be made of heavy timbers or open-grid panels with a safety railing to keep people and materials on the deck.

- Pile Installation within the Waterway: The CISS piles at Bents 5 through 8 will be installed within the waterway by driving 30-inch steel casings either to refusal at rock or into a shaft drilled within rock (depending on the location). The shaft and/or casing will be dewatered and concrete will be poured into the casings, which will be left in place. The 30-inch CIDH piles at Bent 5 will also be constructed by pouring concrete into permanent steel casings; dewatering is not expected to be achievable at this location, and a "wet" installation is planned. The installation of new piles at Bents 5 through 8 will include two piles on each side for a total of 16 piles. Overall the installation of piles is expected to take approximately 2 days for each pile. The pile driving is not expected to occur concurrently.

  Equipment: The installation of these piles requires the use of a crane(s), a drilling rig, a pile driver, excavation and earthmoving equipment, concrete trucks and pumps, concrete vibrators, supply trucks, welding equipment, and other machinery. The piles will either be driven in with a pile driver or a vibrator.

- Pile and Anchor Installation outside the Waterway: The CISS piles at Bent 9 and Abutment 10 will be installed by driving 16-inch steel casing to depths of approximately –30 to –85 feet and filling them with concrete. These piles will be installed perpendicular to the ground surface. The 96-inch diameter anchor pile for Abutment 10 will require excavation and installation of a temporary steel casing, which will be filled with concrete. The anchor pile excavation will be dewatered by pumping, if necessary. The installation of new piles at Bent 9 and Abutment 10 include two piles on each side for a total of 8 piles. Overall the installation of piles is expected to take approximately 2 days for each pile. The pile driving is not expected to occur concurrently.

  Equipment: The installation of these piles will require the use of excavation equipment, soil tamper equipment, and the other construction equipment described above for installing piles within the waterway.

- Construction of Concrete Pile Caps, Infill Walls, Shear Keys, Bent Caps, etc.: This part of the project will include the installation and construction of various project features below the bridge roadway surface and above the piles. Sheet piling will be placed around the piles, the area dewatered and pile caps formed. Wooden forming supported from the piling would be placed for the pile caps. Wooden forming will be placed on existing footings to place infill walls. Forms would be placed atop pile caps for columns, and attached to the tops of columns for bent caps and shear keys.

  Equipment: Equipment required for this part of the project would include a crane to place sheet piling, pumps for dewatering, light duty equipment to place wooden forming, concrete trucks and a concrete pump to place concrete, welding equipment, supply trucks and other machinery/equipment.

- Superstructure Construction: This part of the project will include the installation of new girders on the southern edge of the bridge, the installation of a cantilevered extension along the northern edge of the bridge, and the construction of barrier railings.

  Equipment: Equipment required for this part of the project would include a crane, concrete trucks and pumps, paving equipment, trucks to haul supplies, welding equipment, and other machinery.

- Roadway Approach Construction: Excavation of existing road approaches will be performed. Gravel base and asphalt concrete will be placed to match the new widened bridge deck. The roadway approach work will be limited to less than 200 feet from each end of the bridge. Sidewalks, guardrails and streetlights will be constructed.

  Equipment: Equipment used will be typical paving equipment including graders, loaders, bulldozers, sheep's-foot rollers, dump trucks, and a paving machine.

Contractor Staging. Contractor staging activities for Phases 1 and 2 of the project will take place in an approximately 8,000 square-foot portion of an existing boat yard beneath the eastern edge of the bridge. At the end of Phase 2, the boat yard will be restored. Contractor staging activities for Phases 3, 4, and 5 of the project will take place in the northern portion (approximately 11,000 square feet) of a parking lot situated at the western edge of the bridge. Adjacent existing offices, bathroom facilities, and storage areas will be relocated, as described below. This staging area will be used through the end of Stage 5, when original facilities will be restored.

Temporary Harbor Facility Relocation. The temporary use of portions of the eastern harbor boat yard and the western parking lot for contractor staging as described above, in combination with provision of construction access to the bridge from the waterway, will result in temporary disruptions of harbor activities including boat berths, boat storage, buildings, and businesses. As discussed above, 12 recreational boat berths will be removed and replaced. The contractor staging area on the east side of the Harbor will require that nine boats in the boat yard be temporarily relocated to boat storage for approximately four months. On the west side, 60 rowing boats stored under the existing Murray Street bridge will be temporarily relocated to a recently constructed onland dry boat storage facility near docks A and B. An additional 200± square feet of storage area would be constructed to accommodate the temporary row boat storage. Row boats stored under Span 2 and University of California Santa Cruz (UCSC) Rowing Facility boats under Span 1 will be temporarily relocated to the U.S. Coast Guard parking lot and fenced.

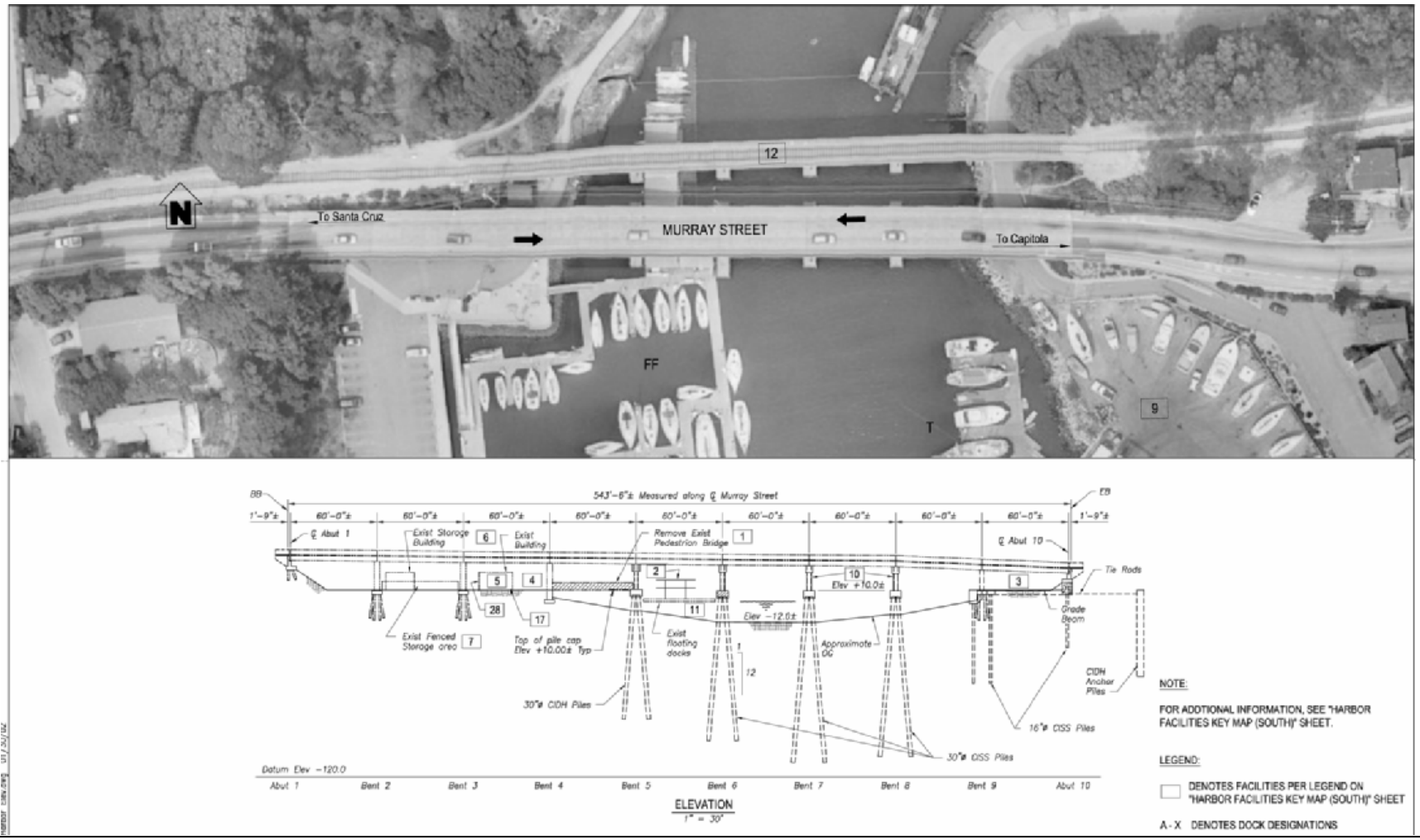
Existing offices, bathroom facilities, and storage areas located north of the western staging area (and within the City's right-of-way) will be displaced during Phases 3, 4, and 5 of the project. These facilities include: the UCSC storage building, the Lighthall Yacht Charters office, rowing equipment storage, the Santa Cruz Rowing Club Oar House, the Chardonnay Sailing Charters

office, the Pacific Yachting Sailing School Charters office, and men's and women's restrooms. The buildings will be protected during construction, and a temporary 600 square foot facility (modular) will be installed on the U.S. Coast Guard parking area for a period of approximately six months, which will temporarily house these businesses. An existing memorial bench and plaque will be removed, properly stored, and reinstalled in the West Harbor upon completion of construction.

In addition, as indicated above, traffic on Murray/Eaton will be subject to temporary controls. A portion of Lake Avenue may be also be subject to temporary traffic controls during setup of the construction staging area on the east side of the Harbor. The existing pedestrian path on both sides of the Harbor, the western concrete stairway, and the access ramp to Dock FF also will be closed during certain phases of construction. Approximately 30-50 Harbor parking spaces (for permit users) on the west side of the Harbor will be temporarily unavailable when the construction staging area is setup in that location.

Railroad Right-of-Way Encroachment. The Union Pacific Railroad (UPRR) maintains a bridge and track located approximately 20 to 30 feet north of the Murray Street Bridge (as measured from edge of deck to edge of deck, with the distance increasing west to east). Construction on the northern side of the bridge will require railroad flaggers for the protection of workmen and railroad traffic. The UPRR tracks and right-of-way border Murray Street on the north and are within the Area of Potential Impact. It appears that a northwestern sliver of Murray Street is within the railroad right-of-way. Any encroachment into the right-of-way during project construction will need to be coordinated with and approved by UPRR and potentially the California Public Utilities Commission.

Figure 3. Cross Section of the Murray Street Bridge *(# 36C-0108)* in the City of Santa Cruz, County of Santa Cruz, CA



able 1. Murray Street Bridge Retrofit Project: Construction Phasing & Approximate Schedule.

Work Tasks	Effects on Harbor and Road Operations
Phase 1: Construction in East Zone	
2 months [1]	
* Temporarily relocate overhead utilities north of bridge	* Install traffic control system with alternating 1-way traffic
* Prepare construction staging area (8,000 sq.ft.) at harbor boat yard	* Close Murray for 7 days for driving anchor piles
* Retrofit Bent 9 & Abutment 10; install anchor piles	* Temporary relocation (dry storage) of 9 dry-docked boats from boat yard
* Erect Girder Span 9	* Traffic controls along Lake Avenue during construction staging area setup
* Remove existing south rail	* Close east walkway under bridge
	* Close bridge sidewalk
Phase 2: Construction in Eastern Waterway	
5 months	
* Construct new berths (8) at ends of docks A through F	* Temporary relocation of 2 boats from Dock T to AA or new dock N-Q
*Remove berths (12) at docks T and FF	* Temporary closure of East Drive & part of harbor boat yard
* Construct work platform(s) (trestle or barge) for Stage 2 work [2]	* Availability of only one boat channel under the bridge for 6 non-consecutive half-days
* Retrofit Bents 7 & 8 (includes installing anchor piles at Bents 7 & 8)	
* Erect Girder Spans 7 & 8 and construct Deck Spans 7, 8, & 9	
* Construct north and south rails (optional) [3]	
* Restore boat yard; reopen pedestrian path	
* Remove east work platform	
* Replace berths (2) at Dock T upon construction in the eastern waterway and only between July and mid-November	
Phase 3: Construction in West Zone	
6 months	
* Install row boat storage at docks A/B & USCG area	* Closure of West Path, western concrete stairway and access ramp to Dock FF
* Install temporary building at USCG area	* Temporary relocation of affected facilities (offices, storage, restrooms, etc.)
* Temporarily relocate existing offices and row boats to above [2]	
* Close portion of western parking lot [2]	
* Construct temporary access ramp to Dock FF	
* Retrofit Abutment 1 and Bents 2, 3, & 4	
* Erect Girder Spans 1, 2, & 3 [and construct Deck Spans 1, 2, & 3]	

Phase 4: Construction in Western Waterway

5 months

* Construct modifications to Dock FF; move 7 boats to new Dock FF
* Construct work platform(s) (trestle or barge) for Stage 4 work
* Retrofit Bents 5 & 6 (including installation of anchor piles)
* Erect Girder Spans 4, 5, & 6 [and construct Deck Spans 4, 5, & 6]
* Construct north and south rails [3]
* Remove work platform(s)
* Closure of West Path, western concrete stairway and access ramp to Dock FF
* Temporary relocation of affected facilities (offices, storage, restrooms, etc.)
* Temporary relocation of 8 boats from Dock FF
* Availability of only one boat channel under the bridge for 6 non-consecutive half-days

Phase 5: Construction of Superstructure and Barrier Rails

[no timing provided]

* Remove sidewalks & temporary barrier rails
* Construct new barrier rails
* Restore Dock FF, parking lot, existing offices and related facilities
* Restore all remaining facilities to original condition
* Repair deck

Footnotes:

[1] Note that construction phases overlap; the sum of the construction periods specified is therefore greater than the total period indicated by start and finish dates.

[2] These tasks could be initiated and/or completed during the prior stage.

[3] [These tasks could be completed either in Phase 2 or 4.

[4] Temporary closure of Murray Street bridge roadway to all traffic is possible during any phase for a short duration. The alternating one-way traffic with sign control will occur during the construction, but not during the full duration of construction activities.

Managed Fisheries, Species, and EFH

The EFH mandate applies to ***all species managed under a federal Fishery Management Plan (FMP)***. In California, there are three FMPs, covering groundfish, coastal pelagic species, and Pacific salmon that surface transportation projects may affect depending on the nature of a project. This chapter summarizes the federally-managed fish species that exhibit EFH designations for all or part of their life cycles within the proposed Project location.

Habitat Areas of Particular Concern (HAPCs) are a subset of the much larger area identified as EFH, that play a particularly important ecological role in the fish life cycle or that are especially sensitive, rare or vulnerable. HAPCs are identified differently from EFH. EFH is identified for each species and life stage; in contrast, HAPCs are identified on the basis of habitat level considerations: 1) The importance of the ecological function provided by the habitat, 2) The extent to which the habitat is sensitive to human-induced environmental degradation 3) Whether and to what extent development activities are or will be stressing the habitat, and; 4) The rarity of the habitat type. Estuaries, sea grass beds, canopy kelp, rocky reefs, and other "areas of interest" (*e.g.*, seamounts, offshore banks, canyons) are designated HAPC for managed groundfish species (PFMC 2006).

Project Site Overview

Santa Cruz Harbor waters support a variety of benthic and pelagic fish species. The intertidal environment is characterized by shore bottom substrates and rocky shores. The floating docks also provide some substrate. Sandy and muddy shores are populated with burrowers and mobile surface dwellers. The bottom substrate is affected by seasonal deposition of silt from streams that flow into the harbor. Although recent species inventories have not been conducted, species that have been observed in the Harbor include green algae, barnacles, and cancer crabs. Other species that have been found in Harbor waters include periwinkles, limpets, mussels, chitons, black turban snails, various shore crabs, anemones, sea sponges, and worms. Fish species that have been found in the Harbor include white croaker, speckled sandperch, jacksmelt, varieties of surfperch and rockfish, and starry flounder. The Harbor also experiences periodic invasion by large schools of northern anchovies, which can deplete food and oxygen supplies (Santa Cruz Port District 1980).

The Santa Cruz Harbor is located within areas designated as EFH for various life stages of marine and estuarine fish species managed under the following FMPs: Pacific Coast Salmon FMP, Coastal Pelagic Species FMP, and Pacific Coast Groundfish FMP. However, the Santa Cruz Harbor is not located within a designated HAPC.

Pacific Coast Salmon FMP and EFH

Three species are managed under the Pacific Coast Salmon FMP: Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*O. kisutch*), and pink salmon (*O. gorbuscha*). Of these, Chinook salmon and coho salmon are known to occur within the vicinity of the proposed Project site.

The Pacific coast salmon fishery EFH includes those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. In the estuarine and marine areas, salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (EEZ) (200 nautical miles) offshore of Washington, Oregon, and California north of Point Conception (PFMC 2003). Designated estuarine EFH for adult and juvenile Chinook and coho salmon may be affected by the proposed project.

Chinook salmon

Chinook are the largest of the salmon species. Historically, juvenile Chinook salmon have been reported in coastal streams as far south as the Ventura River in southern California. Currently, they spawn in suitable rivers from the Sacramento-San Joaquin system northward. Chinook salmon are divided into four distinct races, or runs, according to spawning migration timing and reproductive behavioral differences: winter run, spring run, fall run, and late fall run. Fall-run Chinook salmon are the most numerous salmon in California today. They arrive in spawning areas between September and December, depending upon the river system, but peak arrival time is usually during October and November. Under current ocean harvest rates, the fall Chinook runs are dominated by three-year-old fish followed by jacks and four-year-olds. Five-year-old fish are rare. Spawning occurs in the main stem of rivers, as well as in tributaries, from early October through December. In general, there is a large outmigration of fry and fingerlings from the spawning areas between January and March. An additional outmigration from the spawning areas, consisting primarily of smolts, occurs from April through June. The juveniles enter the ocean as smolts between April and July (CDFG 2001).

Coho salmon

In California, coho salmon spawn in suitable streams from northern Monterey Bay northward, but they rarely enter the Sacramento-San Joaquin River system. Coho salmon enter many small coastal streams that are not utilized by Chinook salmon, but they also

spawn in some larger river systems where Chinook salmon occur. Compared to Chinook salmon, there are relatively few coho salmon in California today. Most California streams utilized by coho salmon are short in length, but some coho do make relatively long migrations, particularly into the Eel River system. Many smaller coastal rivers have runs of coho salmon that enter during brief periods after the first heavy fall rains and move upstream. Within California river systems, coho salmon populations include only one race, or run, which is generally consistent as to spawning area used and time of spawning. Most spawning occurs between December and February. The juveniles usually spend a little more than a year in fresh water before migrating to the ocean; a few spend two years. Most coho mature at the end of their third year of life. Coho salmon older than three years are relatively rare. A few males, or grilse, mature at age two (CDFG 2001).

California represents the southern margin of the species' natural distribution and coastal streams of Santa Cruz County constitute the very southern extent of the coho salmon range. Historically, coho salmon are believed to have used all or most of the accessible coastal streams along the San Mateo and Santa Cruz County coastline. However, habitat destruction and degradation, water diversions as well as changes in oceanic conditions, among other reasons, have brought coho salmon to the brink of extinction in this area (CDFG 1998).

Coastal Pelagic Species FMP and EFH

Four fish species, Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), Pacific mackerel (*Scomber japonicus*), and Jack mackerel (*Trachurus symmetricus*), and one invertebrate species, California market squid (*Loligo opalescens*), are managed under the Coastal Pelagic Species FMP. All five species are known to occur in Monterey Bay and have the potential to occur within the Project area.

The EFH designation for coastal pelagic species groups the managed species into one complex due to similarities in their life histories and habitat requirements. EFH is based upon a thermal range bordered within the geographic area where a coastal pelagic species occurs at any life stage, where the species has occurred historically during periods of similar environmental conditions, or where environmental conditions do not preclude colonization by the coastal pelagic species (PFMC 1998a). Designated estuarine EFH for all life stages of the five species managed under Coastal Pelagic Species FMP may be affected by the proposed Project.

Pacific sardine

The northern population of Pacific sardine occurs primarily off central and southern California and Baja California, but extends as far north as Vancouver, British Columbia. Spawning occurs in loosely aggregated schools in the upper 165 feet of the water column, probably year-round, with peaks from April to August. The main spawning area for the northern subpopulation is between San Francisco and San Diego, out to about 150 miles offshore, with evidence of spawning as far as 350 miles offshore (CDFG 2001).

Maximum sustained yield of Pacific sardine in the historical northern subpopulation was estimated to be 250,000 tons or about 22 percent per year, far less than the catch of sardines during the height of the commercial fishery (CDFG 2001).

Northern anchovy

Northern anchovy are distributed from the Queen Charlotte Islands, British Columbia to Magdalena Bay, Baja California. The population is divided into northern, central, and southern subpopulations or stocks. The central subpopulation ranges from approximately San Francisco, California to Punta Baja, Baja California, with the bulk being located in the Southern California Bight. Northern anchovies are small, short-lived fish typically found in schools near the surface. They rarely exceed four years of age and seven inches total length. Anchovy are all sexually mature at age two. Northern anchovy spawn during every month of the year, but spawning increases during late winter and early spring and peaks during February to April. Individual females spawn batches of eggs throughout the spawning season at intervals as short as seven to 10 days. Eggs and larvae are both found near the surface (CDFG 2001).

Total anchovy harvests and exploitation rates since 1983 have been below the theoretical levels for maximum sustained yield, and stock biomass estimates are unavailable for recent years but, based on abundance index data, the stock is thought to be stable at a modest biomass level. The size of the anchovy resource is now being determined mostly by natural influences such as ocean temperature (CDFG 2001).

Pacific mackerel

Pacific mackerel occur worldwide in temperate and subtropical coastal waters. They are common from Monterey Bay to Cape San Lucas, Baja California, but are most abundant south of Point Conception. Pacific mackerel usually occur within 20 miles of shore. Adults occur from the surface to 1,000 feet deep. Sub-adult and adult Pacific mackerel in the

northeastern Pacific move northward along the coast during the summer. There is an inshore-offshore migration off California, with increased abundance inshore from July to November and increased abundance offshore from March to May. Pacific mackerel are typically found near shallow banks, and juveniles are commonly found off sandy beaches, around kelp beds, and in open bays. Off California, spawning occurs from late April to July at depths to 300 feet. Individual fish may spawn eight times or more per year and release at least 68,000 eggs per spawning. Some Pacific mackerel mature as one-year olds, although most are not sexually mature until age two or three (CDFG 2001).

It is estimated that the maximum long-term yield of Pacific mackerel might be 29,000 to 32,000 tons under management systems similar to that in current use. It is difficult to assess the effects on the catch of recent warm temperatures, possible changes in availability of young fish, and deteriorating markets for the species (CDFG 2001).

Jack mackerel

Jack mackerel are actually members of the jack family, Carangidae, and are not true mackerel. They are widely distributed throughout the northeastern Pacific Ocean, where young fish (up to six years and 12 inches long) are found schooling over shallow rocky reefs, generally less than 200 feet deep, and along rocky shorelines of the coast and islands off southern California and Baja California. Large fish (16 years and older and 20 long) are found offshore and farther north, east of a line that goes from Cabo San Lucas to the eastern Aleutian Islands, and includes the Gulf of Alaska. Jack mackerel spawn in the offshore waters (60 – 300 miles) between Punta Eugenia and Point Conception from March through July. The center of offshore spawning activity moves north as the season progresses, but little is known about the seasonal and geographic limits of the offshore and northern spawning areas. Like anchovy and Pacific mackerel, jack mackerel appear to be multiple spawners, with females spawning on average every five days and 25 times per year. Eggs float free in the ocean for three to five days before hatching (CDFG 2001).

There has been a decrease in the percentage of older fish (three to six years) in the catch since the 1960s, which has caused some concern. It is unclear whether this change is due to a decrease in the number of older fish or to a change in the distribution of these fish (CDFG 2001).

California market squid

The California market squid ranges from southeastern Alaska to Baja California, Mexico. This pelagic mollusk attains a length of 12 inches, including its eight arms and two feeding tentacles. Several other squid species occur off the California coast, but these are normally associated with deeper offshore waters. Spawning market squid tend to congregate in semi-protected bays, usually over a sand bottom with rocky outcroppings. Mass spawning starts around April in central California waters and ends about November. The eggs are laid within elongated, cigar-shaped capsules, each of which may contain as many as 300 eggs embedded in a gelatinous matrix. Each female produces from 20 to 30 egg capsules, attaching one end of each capsule to the sea floor or other suitable site (CDFG 2001).

Little is known about the present size, structure or status of the population, but historical evidence from research cruises, as well as recent catch data, indicate the biomass is large. Commercial fishing of market squid in California targets only spawning populations and in limited geographic areas, mostly in central and southern California (CDFG 2001).

Pacific Coast Groundfish FMP and EFH

A total of 82 species of groundfish, consisting primarily of rockfish, flatfish, roundfish, and sharks/skates, are managed under the Pacific Coast Groundfish FMP. The managed groundfish species range throughout the EEZ and occupy diverse habitats at all stages in their life histories. Some species are broadly dispersed during specific life stages, especially those with pelagic eggs and larvae. The distribution of other species and/or life stages may be relatively limited, as with adults of many nearshore rockfish which show strong affinities to a particular location or substrate type.

Of the 82 managed groundfish species, the following 23 species are identified within the estuarine composite EFH (PFMC 1998b) (see below) and are most likely to be found in Project area: leopard shark (*Triakis semifasciata*), soupfin shark (*Galeorhinus zyopterus*), spiny dogfish (*Squalus acanthias),* California skate (*Raja inornata*), ratfish (*Hydrolagus colliei*), lingcod (*Ophiodon elongates*), cabezon (*Scorpaenichthys marmoratus*), kelp greenling (*Hexagrammos decagrammus*), Pacific cod (*Gadus macrocephalus*), Pacific whiting (*Merluccius productus*), sablefish (*Anoplopoma fimbria*), black rockfish (*Sebastes melanops*), bocaccio (*Sebastes paucispinis*), brown rockfish (*Sebastes auriculatus*), calico rockfish (*Sebastes dallii*), California scorpionfish (*Scorpaena guttata*), copper rockfish (*Sebastes caurinus*), kelp rockfish (*Sebastes atrovirens*), quillback rockfish (*Sebastes maliger*), English sole (*Parophrys vetulus*), Pacific sanddab (*Citharichthys sordidus*), Rex

sole (*Glyptocephalus zachirus*), and starry flounder (*Platichthys stellatus*). Detailed accounts of the distributions and life histories of these species can be found in Appendix B, Part 2 of the Pacific Coast Groundfish FMP (PFMC 2005). Life stages of these 23 species with a potential to occur within the project area are listed in Table 2, based on information provided by PFMC (1998b).

Table 2: Federally managed groundfish species and life stages within the Estuarine Composite EFH (PFMC 1998b) potentially occurring within the Project Area

Managed Groundfish Species		Life Stage Estuarine Composite EFH				
Common Name	**Scientific Name**	**Eggs**	**Larvae**	**Juvenile**	**Adult**	**Spawning**
Leopard Shark	*Triakis semifasciata*	X		X	X	X
Soupfin shark	*Galeorhinus zyopterus*	X		X	X	X
Spiny dogfish	*Squalus acanthias*	X		X	X	
California skate	*Raja inornata*	X		X	X	X
Ratfish	*Hydrolagus colliei*			X	X	X
Lingcod	*Ophiodon elongates*	X	X	X	X	X
Cabezon	*Scorpaenichthys marmoratus*	X	X	X	X	X
Kelp greenling	*Hexagrammos decagrammus*	X	X	X	X	X
Pacific cod	*Gadus macrocephalus*	X	X	X	X	X
Pacific whiting	*Merluccius productus*	X	X	X	X	X
Sablefish	*Anoplopoma fimbria*			X		
Black rockfish	*Sebastes melanops*			X	X	
Bocaccio	*Sebastes paucispinis*		X	X		
Brown rockfish	*Sebastes auriculatus*	X		X	X	X
Calcico rockfish	*Sebastes dallii*			X	X	
California scorpionfish	*Scorpaena guttata*	X				
Copper rockfish	*Sebastes caurinus*	X		X	X	
Kelp rockfish	*Sebastes atrovirens*			X		
Quillback rockfish	*Sebastes maliger*	X	X	X	X	
English sole	*Parophrys vetulus*	X	X	X	X	X
Pacific sanddab	*Citharichthys sordidus*	X	X	X		
Rex sole	*Glyptocephalus zachirus*				X	
Starry flounder	*Platichthys stellatus*	X	X	X	X	X

SOURCE: PFMC 1998b.

EFH for Pacific coast groundfish is defined as the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem. Descriptions of groundfish EFH for each of the 82 species and their life stages result in more than 400 EFH identifications. When these EFHs are taken together, the groundfish EFH includes all waters from the mean higher high water line, and the upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California seaward to the boundary of the U.S. EEZ.

The Pacific Coast Groundfish FMP (PFMC 2006) divides EFH into seven composite habitats including their waters, substrates, and biological communities, and includes:

Estuarine - Those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW, which is the high tide line) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary as defined in 33 CFR 80.1 (Coast Guard lines of demarcation).

Rocky Shelf - Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying rocky areas, including reefs, pinnacles, boulders and cobble, along the continental shelf, excluding canyons, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

Non-rocky Shelf - Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms), overlying the substrates of the continental shelf, excluding the rocky shelf and canyon composites, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

Canyon - Those waters, substrates, and associated biological communities living within submarine canyons, including, the walls, beds, seafloor, and any outcrops or landslide morphology, such as slump scarps and debris fields.

Continental Slope/Basin - Those waters, substrates, and biological communities living on or within 20 meters (11 fathoms) overlying the substrates of the continental slope and basin below the shelf break (~200 meters or 109 fathoms) and extending to the westward boundary of the EEZ.

Neritic Zone - Those waters and biological communities living in the water column more than ten meters (5.5 fathoms) above the continental shelf.

Oceanic Zone - Those waters and biological communities living in the water column more than 20 meters (11 fathoms) above the continental slope and abyssal plain, extending to the westward boundary of the EEZ.

Furthermore, estuaries, sea grass beds, canopy kelp, rocky reefs, and other “areas of interest” (*e.g*., seamounts, offshore banks, canyons) are designated HAPC for managed groundfish species.

Historically, the Santa Cruz Harbor (formerly known as Woods Lagoon) likely provided a productive, albeit small, estuarine environment for Pacific groundfish species. In its current form, the Santa Cruz Harbor is a highly modified and degraded version of estuarine habitat. Canopy kelp and rocky reef HAPCs have been identified in close proximity to Santa Cruz Harbor, but no HAPC designations occur within the Harbor or the Project Area.

Potential Adverse Effects of Proposed Project

Adverse effect means any impact, which reduces quality and or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Adverse effects include: 1) Direct or indirect physical, chemical, or biological alterations of the waters or substrate; and, 2) Loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH.

The proposed project area is located within an area identified as EFH for Pacific coast salmon, coastal pelagic species, and Pacific coast groundfish. The potential adverse effects of the proposed project are essentially identical for all three groups of species and are discussed collectively below.

Construction activities would result in localized, temporary adverse effects to EFH through disturbance of water quality, if not properly managed. Project construction may result in temporary increases in ambient turbidity levels. Accidental spills of hazardous materials such as equipment fuels and fluids may temporarily affect water quality. Water quality effects may temporarily reduce quality of EFH, including disturbance to or loss of foraging prey, during the construction phase.

Similarly, underwater sound pressures produced during pile driving activities would temporarily reduce the quality of EFH during construction activities through disturbance or loss of prey species and creating habitat conditions that may prove to be distracting, disorienting, and otherwise unsuitable for FMP-managed species.

The proposed project would also result in permanent but minor adverse effect to EFH due to installation of 24 30-inch steel casing piles to support and reinforce Murray Street Bridge. The piles would cover a total of approximately 430 square feet. Although this alteration would be permanent, the project would not appreciably diminish the value of EFH within the proposed project area. Existing conditions of fish habitat within Santa Cruz Harbor are considered highly disturbed because the area has been dredged in the past and it is continually utilized by recreational boaters. Dredging of the harbor entrance area has occurred since 1965, and periodic dredging of the inner harbor has occurred since 1983. Additionally, the area to be permanently occupied by piles is minimal compared to the remaining harbor waters that cover over 30 acres. The piles would not result in obstruction to fish passage or migration.

Conservation Measures

The following measures will be implemented to minimize the potential adverse effects to designated EFH described above.

- Based on the geotechnical site characteristics, the permanent bridge piles will be partially or entirely vibrated into the Harbor substrate rather than driving them by means of “hammering”; a vibratory driver will be used for the dock piles and temporary trestle piles, if a construction trestle is erected. Vibratory pile driving does not generate peak sound pressure levels that cause direct impacts to fish species.
- Pile driving activities that rely on impact hammers rather than vibratory techniques shall be designed to assure compliance with the interim criteria for Sound Exposure Levels (SEL) less or equal to 187 decibels (dB) in any single strike, and peak sound pressure less or equal to 208 dB in any single strike, measured at a distance of 32.8 feet from the source. In addition, to reduce sound pressure levels to the greatest extent feasible, a cushioning block between hammer and pile shall always be used.
- Bubble curtains shall be used at all piles driven by impact hammers.
- Incorporate Best Management Practices (BMPs) into construction specifications, including, but not limited to:
    - To protect water quality, require all excavated soils, fill and construction materials be stored and contained in a designated area away from Harbor waters, and cover stockpiled soils to prevent release of sediments.
    - Prohibit fueling, cleaning, or maintenance of equipment except in designated areas located as far from Harbor waters as possible. As a precaution, require contractor to maintain adequate materials onsite for containment and clean-up of any spills.
    - Install temporary erosion and sedimentation control devices.
    - Locate equipment and spoils in designated staging areas.
    - Control of dewatering process to limit turbidity.
    - Prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) that further details measures for erosion, sediment and water quality control.
    - All fill material would be clean material that would meet applicable water quality standards.

Conclusion

Construction of the proposed project would result in minor, temporary adverse impacts to EFH for Pacific coast salmon, coastal pelagic species, and Pacific coast groundfish through localized effects to water quality (e.g., increased turbidity, accidental spills of hazardous materials). Similarly, underwater sound pressures produced during pile driving activities would temporarily reduce the quality of EFH during construction activities. However, implementation of the proposed avoidance and minimization measures would reduce the likelihood, extent, and duration of these impacts.

The proposed project would also result in the minor but permanent alteration of EFH through the construction of bridge support piles that would eliminate approximately 430 square feet of currently available habitat. However, existing conditions of fish habitat within Santa Cruz Harbor are considered highly disturbed and the area to be permanently occupied by piles is minimal compared to the remaining harbor waters.

Caltrans believes that the proposed action will not adversely affect EFH for Pacific coast salmon, coastal pelagic species, and Pacific coast groundfish due to the localized and temporary nature of construction-related impacts and the minor extent of permanent habitat loss.

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