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

# Biological 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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**July 2010**

Approved By: _____ Date: 8/26/2010

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# Summary of Findings, Conclusions and Determinations

- The existing Murray Street Bridge (Bridge # 36C-0108) crosses the Santa Cruz Small Craft Harbor at the eastern edge of 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 City also received approval from Caltrans to rehabilitate the bridge, including replacement of the deficient bridge barriers under the under the Highway Bridge Program (HBP).

- 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.

- Federally-listed species known from or with the potential to inhabit the project Biological Study Area include steelhead trout, green sturgeon, and southern sea otter . 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.

- The proposed 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 therefore not likely to adversely modify designated steelhead and green sturgeon critical habitat. The pile installation would not result in obstruction to fish passage or migration.

- The proposed project is unlikely to result in direct mortality of listed fish species, but construction activities may result in harassment in the form of disorientation, decreased predator and prey detection, or temporary avoidance of habitat.

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

- The proposed project may disrupt foraging activities or movement of southern sea otters within the Harbor waters. This temporary harassment would be a direct project impact. 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.

- Avoidance and minimization 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.

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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 |
| CNDDB | California Natural Diversity Database |
| CNPS | California Native Plant Society |
| CRLF | California red-legged frog |
| dB | decibels |
| DPS | Distinct Population Segment |
| EPA | U.S. Environmental Protection Agency |
| ESA | Federal Endangered Species Act |
| FHWA | Federal Highway Administration |
| ft | foot/feet |
| FWS | Fish and Wildlife Service |
| HBP | Highway Bridge Program |
| KP | kilometer post |
| LCP | Local Coastal Program |
| m | meter(s) |
| 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 |
| UCSC | University of California Santa Cruz |

# 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 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. Figure 3 provides a cross section showing the abutment and bents and proposed improvements. 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.

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.

**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 the 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.

## 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. 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. 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 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 road surface and above the piles. Concrete forms will be constructed on the new footings.

  *Equipment:* Equipment required for this part of the project would include concrete trucks and pumps, supply trucks, welding equipment, and other machinery.

- 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 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.

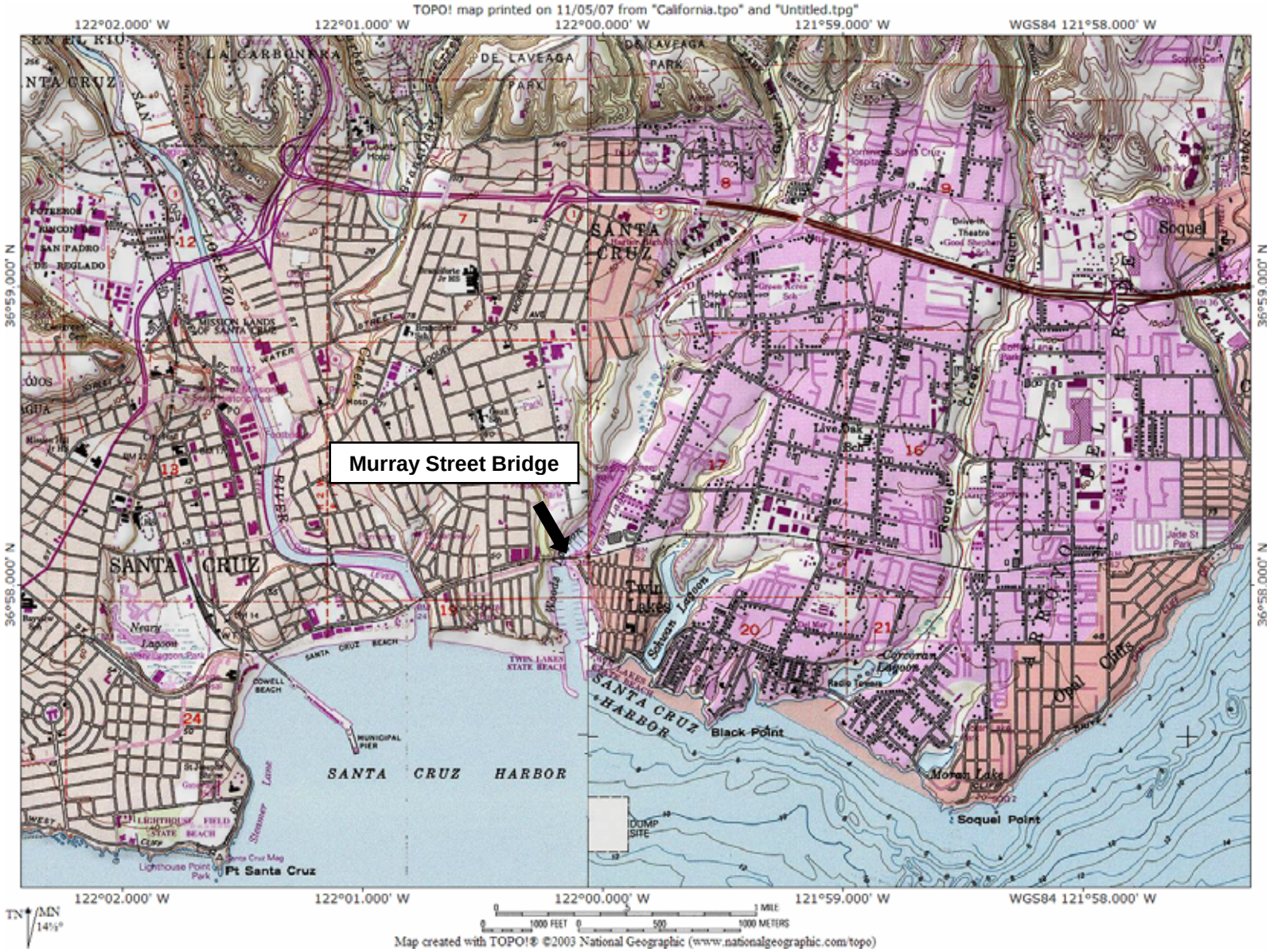
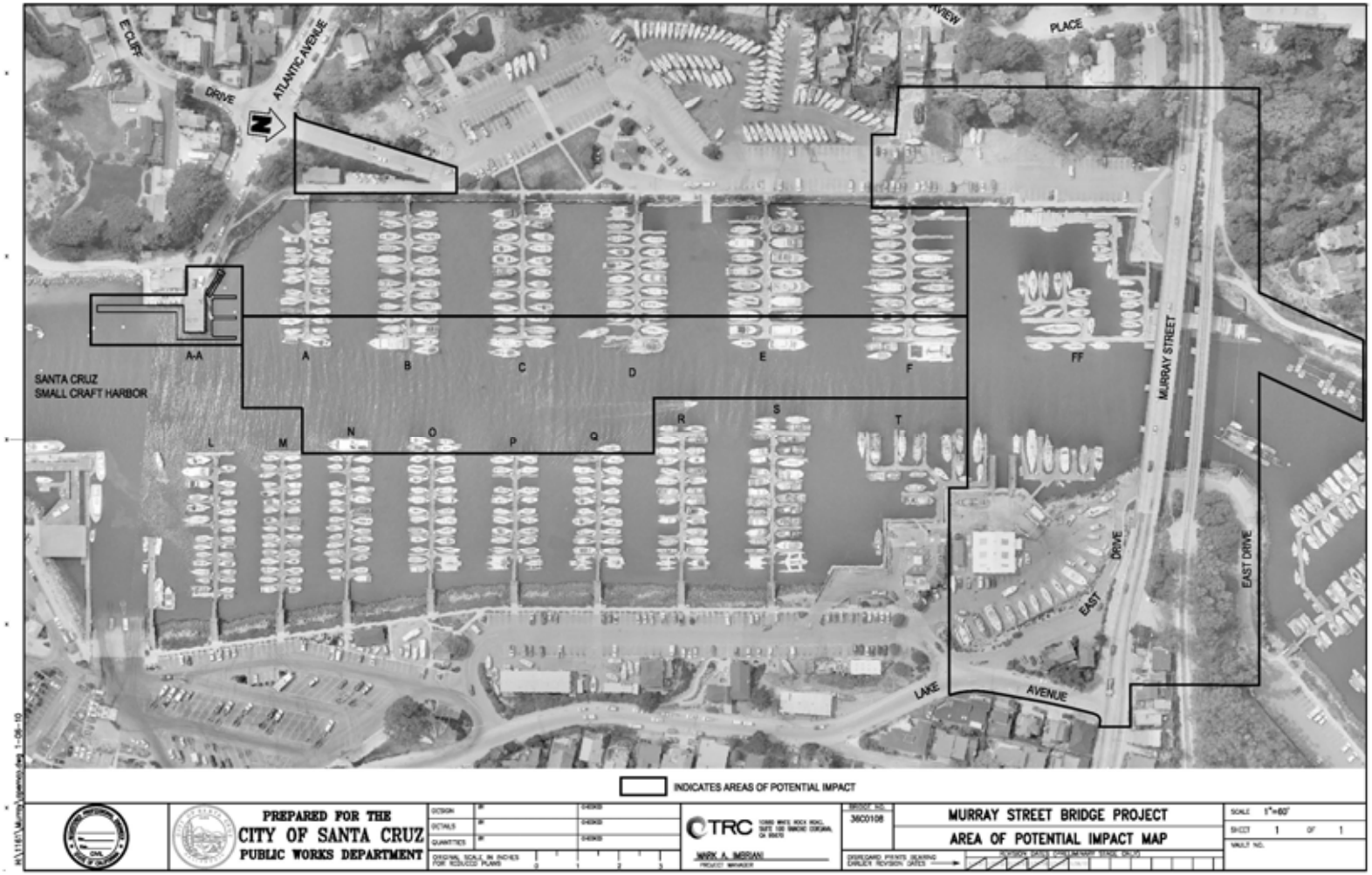
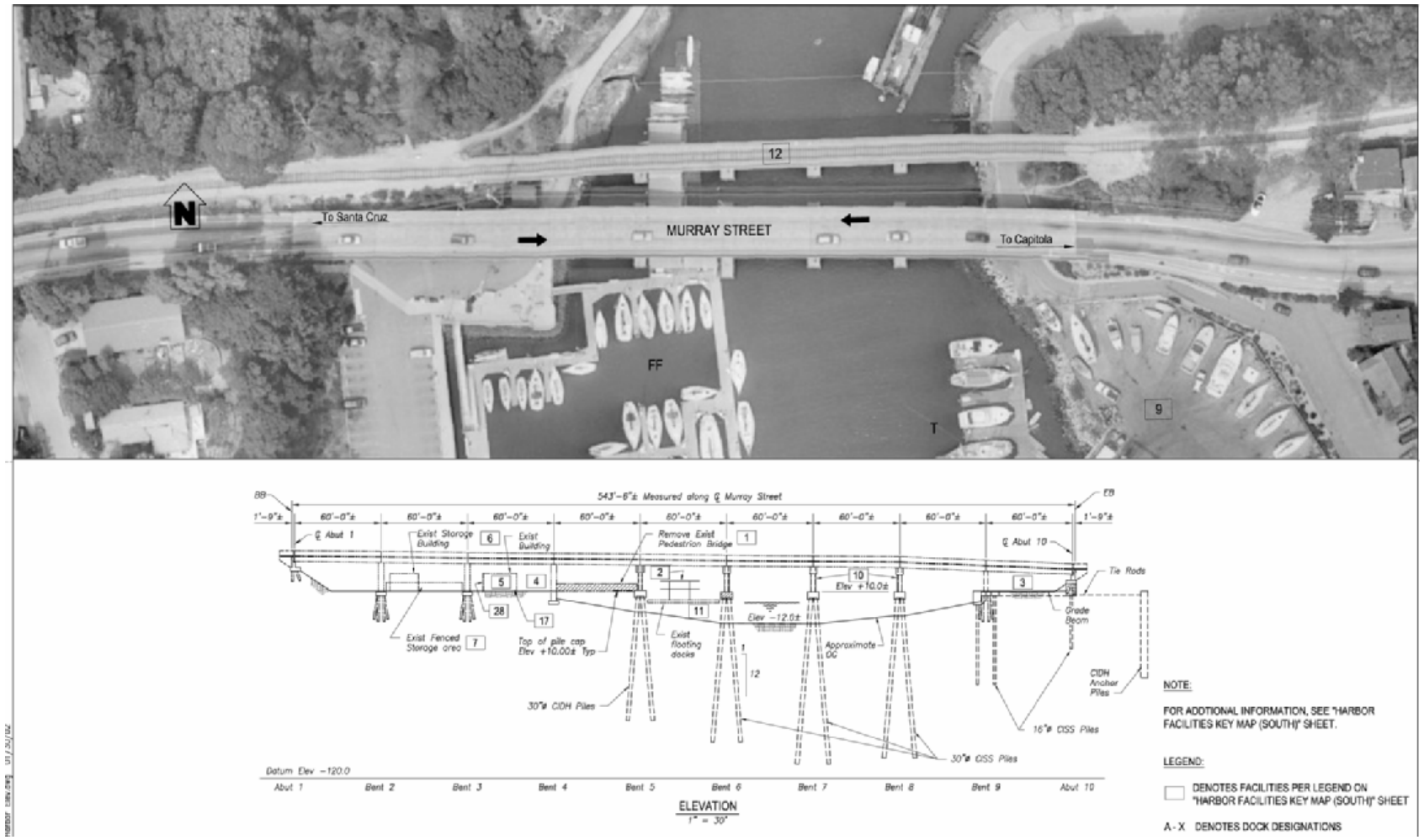



**Figure 1. Vicinity of the Murray Street Bridge (# 36C-0108) in the City of Santa Cruz, County of Santa Cruz, CA.**




**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.**




**SOURCE: TRC Engineers**

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

- 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. The access ramp to Dock FF will be temporarily closed (replaced by a temporary ramp at the southern end of the dock). Additionally, the pedestrian path beneath the bridge and the concrete stairway beneath the western edge of the bridge will be temporarily closed. 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 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.

**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<br>* Prepare construction staging area (8,000 sq.ft.) at harbor boat yard<br>* Retrofit Bent 9 & Abutment 10; install anchor piles<br>* Erect Girder Span 9<br>* Remove existing south rail | * Install traffic control system with alternating 1-way traffic<br>* Close Murray for 7 days for driving anchor piles<br>* Temporary relocation (dry storage) of 9 dry-docked boats from boat yard<br>* Traffic controls along Lake Avenue during construction staging area setup<br>* Close east walkway under bridge<br>* Close bridge sidewalk |
| **Phase 2: Construction in Eastern Waterway** | |
| **5 months (July-December)** | |
| * Construct new berths (8) at ends of docks A through F<br>* Remove berths (12) at docks T and FF<br>* Construct work platform(s) (trestle or barge) for Stage 2 work [2]<br>* Retrofit Bents 7 & 8 (includes installing anchor piles at Bents 7 & 8)<br>* Erect Girder Spans 7 & 8 and construct Deck Spans 7, 8, & 9<br>* Construct north and south rails (optional) [3]<br>* Restore boat yard; reopen pedestrian path<br>* Remove east work platform<br>* 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<br>* Temporary closure of East Drive & part of harbor boat yard<br>* 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<br>* Install temporary building at USCG area<br>* Temporarily relocate existing offices and row boats to above [2]<br>* Close portion of western parking lot [2]<br>* Construct temporary access ramp to Dock FF<br>* Retrofit Abutment 1 and Bents 2, 3, & 4<br>* 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<br>* 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.

## 1.3. Summary of Consultation to Date

No consultations have taken place to date.

## 1.4. Document Preparation History

The Biological Assessment was completed in conjunction with biological studies conducted for the Natural Environment Study and the Initial Study that was prepared pursuant to the California Environmental Quality Act (CEQA). The study participants include:

- Caltrans District 5, Cathy Stettler and Tom Edell
- City of Santa Cruz Public Works Department, Chris Schneiter and Josh Spangrud
- Consultants:
  - EcoSystems West Consulting Group, Bill Davilla and Erin McGinty
  - Strelow Consulting, Stephanie Strelow

Staff that conducted, prepared and supplied survey or other data but who did not assist in the assembly of the BA are identified in section 2.3.

Documents that have been prepared to date and include biological resource data include:

- "Mitigated Negative Declaration / Initial Study, Murray Street Bridge Seismic Retrofit Project," November 2007 and Response to Comments, January 10, 2008. Prepared by Strelow Consulting with assistance of EcoSystems West Consulting Group and Hagar Environmental Science. Prepared for TRC Engineers and City of Santa Cruz Public Works Department.
- "Murray Street Bridge (#36C-0108) Seismic Retrofit Project Natural Environment Study," November 2007; revised November 2008 and January 2010. Prepared by EcoSystems West Consulting Group.

# Chapter 2. Study Methods

## 2.1. Listed and Proposed Species Potentially in the Biological Study Area

Tables 2 and 3 list all plant and wildlife species (respectively) under federal jurisdiction which have the potential to occur in the vicinity of the Murray Street Bridge Seismic Retrofit project area. The text that follows the tables describes the likelihood of occurrence and a rationale for this determination. 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.

### 2.1.1. Potential Occurrence of Federally Listed Plants

No habitat exists for any of the plant species listed in Table 2 due to the highly disturbed nature of the project site. No plants with federal jurisdiction are expected to occur.

### 2.1.2. Potential Occurrence of Federally Listed Wildlife

Several wildlife species listed in Table 3 have potential or are known to occur in the vicinity of the project area, as described in the sections below:

**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 does not occur in 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 does not occur in 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).

**Table 2. Status, distribution and habitat of federally-listed, proposed, and candidate 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] |
|---|---|---|---|---|---|---|
| *Arenaria paludicola* marsh sandwort | Endangered | Endangered | List 1B.1 | Freshwater marshes | SBD*, SCR*, SFO*, SLO, Washington* | May-August |
| *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 |
| *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 |
| *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 |
| *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 |
| *Lupinus tidestromii* Tidestrom's lupine | Endangered | Endangered | List 1B.1 | Coastal dunes | MRN, MNT, SON | April-June |

| Species **Common Name**[1] | USFWS Listing[2] | State Status[3] | CNPS Status[4] | Habitat Type[5] | Distribution by County[6] | Flowering Period[7] |
|---|---|---|---|---|---|---|
| *Pentachaeta bellidiflora* white-rayed pentachaeta | Endangered | Endangered | List 1B.1 | Valley and foothill grassland, coastal scrub, coastal prairie | MNT, MRN*, SCR*, SMT | March-May |
| *Polygonum hickmanii* Scotts Valley polygonum | Endangered | Endangered | List 1B.1 | Valley and foothill grassland | SCR | May-August |

[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
CCA: Contra Costa
MNT: Monterey
MRN: Marin
SBD: San Bernardino
SCL: Santa Clara
SCR: Santa Cruz
SFO: San Francisco
SLO: San Luis Obispo
SMT: San Mateo
SON: Sonoma
* Presumed extinct in these counties or states.

**Table 3: Federally-listed, Proposed and Candidate Wildlife Species 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 |
| **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 |
| 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 systems from the Central Valley northward. | HP, CH |

| Species Name | Status: Federal/State/Other | Habitat Characteristics | Occurrence Potential |
|---|---|---|---|
| **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 |
| 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 )** | | | |

| Species Name | Status: Federal/State/Other | Habitat Characteristics | Occurrence Potential |
|---|---|---|---|
| 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 |
| 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 |
| 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 |
| **Mammals** | | | |
| 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 75 feet or less . | 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 = "California 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 = State ranking - Extremely endangered.
S2 = State ranking - Endangered.
S3 = State ranking - Restricted range, Rare; based on the number of individuals per area of occupied habitat.
(CDFG 2006b)

MMPA = Marine Mammal Protection Act protects all marine mammals and haul out sites (NOAA NMFS 2004).

[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.

**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 the California Department of Fish and Game (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 recently 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). The California Natural Diversity Database (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 be noted also that harbors are typically not inhabited by tidewater gobies (Entrix 2004b) as they do not provide the protected lagoon habitat preferred by the species. 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 is comprised 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 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 are 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.

**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).

**California Clapper Rail (CCR) (*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).

**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).

**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).

**Southern Sea Otter *(Enhydra lutris nereis)*.** Southern sea otters are commonly observed in the open waters of the study area (A. Church pers. comm.). The waters under Murray Street Bridge do not provide rookery habitat, mating grounds, 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.

## 2.2. Studies Required

The project site was evaluated for potential impacts to plants and animals, and their habitats, that have been formally listed or proposed as endangered or threatened under the federal Endangered Species Act (ESA). Listed species known or with potential to occur were identified through literature and database review and review of existing biological documents addressing the project area and the vicinity. Additional details are given below. The Biological Study Area for the Project was defined by identifying the Area of Impact, including access, staging areas, roadways, and waterways, and where feasible, adding a surrounding buffer to address potential impacts (in particular, noise-related impacts) of 300 feet from the work area for birds nesting in the vicinity and of 500 feet for marine mammals.

### 2.2.1. Botany

EcoSystems West botanists conducted a focused review of literature and special-status species databases in order to identify federally-listed special-status plant species with potential to occur in the Murray Street Bridge study area. Sources reviewed include 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 FWS (2008 a, b, c) for federally listed species (including federal Proposed and Candidate species) and the mandatory FWS regional species list.

Following the review of available information, a botanical survey of the site was conducted on 25 January 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.

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) 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.

### 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 as well as the mandatory FWS regional species list.

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 the 20 and 22 December 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 (biological study area) 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.

Ecosystems West conducted follow-up surveys southern sea otter in Fall 2009. The objective of additional surveys was to estimate the numbers of 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 Project. EcoSystems West conducted nineteen surveys between 17 September and the 21 October, 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 of the Harbor from the Harbor Launch Ramp area to 500 feet upstream of the boundary of the Area of Influence. We conducted a total of 40 survey hours, including early morning, midday, evening and nighttime surveys with an emphasis on early morning and midday surveys. We initially conducted 3-4

site visits/day, 2 times/week to gain a general understanding of the animals' use of the area. We then focused our surveys 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). During one survey (17 October midday), EcoSystems West biologists surveyed the entire Upper Harbor, upstream (north) of the Bridge in an effort to determine if marine mammals were present in upper reaches of the Harbor.

For each survey, we 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 southern sea otters. We took a general census of the area on each site visit, counting each individual, noting the activity of the animals, as well as their location, with reference to an aerial map of the Area of Influence and vicinity. We made notations on the aerial map of the site, when necessary, to clarify locations of observed animals. We recorded all observations on a standard data sheet designed for the Project's marine mammal surveys.

### 2.2.3. Recovery Plans

There are two current recovery plans in the project area for: tidewater goby and the southern sea otter. The tidewater goby recovery area extends throughout California. The proposed project is not located within the nearest recovery units for the tidewater goby – 8a, 8b, or 8c (the San Lorenzo River, Corcoran Lagoon and Moran Lake, respectively).

The southern sea otter population presently contains about 2,150 animals and ranges between Half Moon Bay and Point Conception along the coast of central and southern California. Range-wide population counts declined at a rate of approximately 5 percent per year between 1995 and 1999, although this declining trend has been less certain in recent years. The translocated colony at San Nicolas Island contains about 27 individuals, including pups. Although more than 70 births are known to have occurred at San Nicolas Island from 1987 to 2002, the population size has remained small and its future prospects are uncertain.

The main threats to the southern sea otter are habitat degradation (including oil spills and other environmental contaminants) and human take (including shooting, entanglement in fishing gear, and harassment). Oil spills, which could occur at any time, could decimate the sea otter population. The reasons for the recent decline in abundance are unknown, but it may be in part related to one or more of the following factors: 1) infectious disease resulting from increased immune deficiencies or elevated parasite and pathogen exposure; 2) incidental mortality caused by commercial fishing activities; or 3) food resource limitation.

Sea otters occupy hard- and soft-sediment marine habitats from the littoral zone to depths of less than 100 meters (330 feet), including protected bays and exposed outer coasts. Most individuals occur between shore and the 20-meter (65-foot) depth contour. The southern sea otter population was exploited to near extinction from an estimated historical population (in California) of approximately 16,000 animals (Laidre *et al.* 2001). Since the early 1970s, population counts have ranged between 1,250 and 2,300 animals. Population counts declined from the mid-1970s to the early 1980s, then increased from the mid-1980s to the mid 1990s. There was little range expansion during the latter period. Between 1995 and 1999, population counts declined, but the population's range expanded both to the south and the north. The current population status is less certain, with recent counts being relatively stable. The decline

from the mid 1970s to the early 1980s apparently resulted from entanglement mortality in fishing gear. Once the entanglement problem was identified and rectified through State regulations, the population immediately began to increase again. The cause of the recent decline remains uncertain. In the 20th century, the southern sea otter population never increased at the species' maximum potential of 17 to 20 percent per year, although this rate of increase is typical of recovering populations in Washington, British Columbia, and Alaska (Estes 1990*a*).

The depressed population growth rate for the southern sea otter population is largely due to elevated mortality, as opposed to reproductive depression or emigration Infectious disease is the single most important known cause of mortality. Other known sources of mortality include shark attacks, shooting, entanglement in fishing gear, and starvation.

The recovery objective for the southern sea otter is to manage human activities that may jeopardize the continued existence of the species or damage or destroy habitat critical to its survival. Recommended actions include:

- Monitor southern sea otter demographics and life history parameters to determine population size, rate of change, and distribution. Evaluate supporting habitat for changes in types, abundance, distribution, and use (*e.g.* resting, haul out, feeding, breeding, natal area, peripheral feeding/resting areas, offshore areas) and changes in its estimated carrying capacity by mapping habitat types.
- Protect the population and reduce or eliminate the identified potential limiting factors related to human activities, including: managing petroleum exploration, extraction, and tankering to reduce the likelihood of a spill along the California coast to insignificant levels; minimizing contaminant loading and infectious disease; and managing fishery interactions to reduce sea otter mortality incidental to commercial fishing to insignificant levels.
- Conduct research to understand the factor, or factors, limiting the current growth rate of the California population and refine recovery goals from which management actions can be identified and implemented.
- Evaluate failure criteria for the translocation program to determine if the experimental population at San Nicolas Island has met one or more failure criteria and whether continuation of sea otter containment may jeopardize the sea otter population or hinder recovery.

## 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. 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; however, due to the highly disturbed nature of the project area, lack of suitable nesting habitat for listed birds, large distances to known nesting habitat, and/or historical nature of local occurrences, it is believed that no listed wildlife species or habitat were overlooked. Protocol surveys for amphibians and reptiles were not conducted due to the lack of suitable habitat and large distances to known occurrence locations for listed species. Protocol surveys for tidewater goby were not conducted because recent survey data and conclusions drawn by experts were available for review.

# 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.

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).

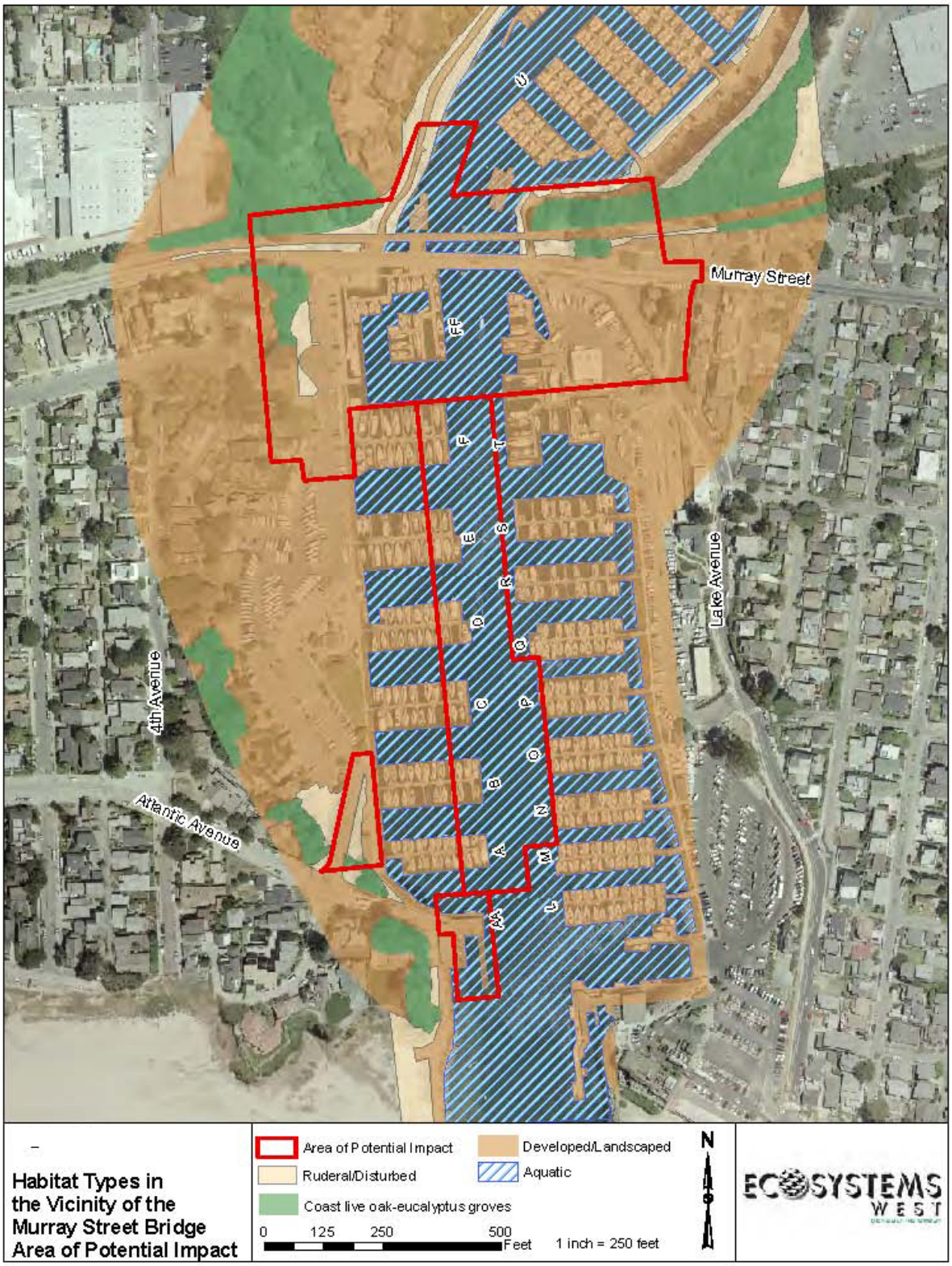
### 3.1.1. Botany

Habitat types within the Study Area are presented in Figure 5. 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 consists 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. 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. The docks in the study area are haul-out sites for harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*), and roosts for gulls, cormorants (*Phalacrocorax* sp.), and herons (*Ardea* sp.).

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 haul-out sites for harbor seals and roosts for gulls, cormorants and herons. The open water of the study area provides habitat for marine mammals, including the southern sea otter, the eastern Pacific harbor seal, and the California sea lion.

Harbor waters support a variety of benthic and pelagic fish species. The intertidal environment is characterized by shore bottom substrates, rocky sores 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) pursuant to 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.

Potential adverse effects of the proposed project on designated EFH are discussed in the *Essential Fish Habitat Assessment* prepared for the project (Podlech, February 2010).

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

### 4.1. Federally-Listed/Proposed 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. However, the January site visit did not reveal potential habitat for this or any other special status plant species. As a result, we determined that no additional focused botanical surveys are necessary for the project area.

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 Ano 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 project effects or cumulative effects to sensitive botanical resources are anticipated.

## 4.2. Federally-Listed or Proposed Animal Species Occurrences

### 4.2.1. Steelhead (*Oncorhynchus mykiss*)

#### 4.2.1.1. SURVEY RESULTS

Steelhead have been found within Harbor waters, and upstream Arana Gulch currently supports steelhead (Podlech, 2008). *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 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). 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 (D.W. Alley & Associates 2000). 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.

#### 4.2.1.2. CRITICAL 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).

#### 4.2.1.3. AVOIDANCE AND MINIMIZATION EFFORTS

- Conduct pile driving activities in Harbor waters from July 1 to mid-November, 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 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.

- Based on the geotechnical site characteristics, 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.

#### 4.2.1.4. PROJECT EFFECTS

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 that would occur with 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 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 $\mu Pa^2$ •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.

#### 4.2.1.5. MODIFICATIONS TO THE PROJECT TO MITIGATE EFFECTS

No modifications to mitigate effects are required.

#### 4.2.1.6. CUMULATIVE EFFECTS (FESA)

Cumulative effects on steelhead and critical habitat are not anticipated. Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in the biological assessment. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act.

The project site is within the Santa Cruz Harbor which is dredged annually by the Santa Cruz Port District subject to permits and authorizations from the U.S. Army Corps of Engineers. 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.

### 4.2.2. North American Green Sturgeon (*Acipenser medirostris*)

#### 4.2.2.1. SURVEY RESULTS

The southern DPS of the species is comprised 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, 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.

#### 4.2.2.2. CRITICAL HABITAT

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 2009). The Harbor waters provide estuarine habitat for subadult and adult green sturgeon.

#### 4.2.2.3. 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 4.2.1.3 will also avoid and minimize adverse effects to green sturgeon and designated critical habitat, and no additional measures are required.

#### 4.2.2.4. PROJECT EFFECTS

Potential impacts to green sturgeon and designated critical habitat are similar to those discussed above for steelhead under Section 4.2.1.4. 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 is available at this time. 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).

#### 4.2.2.5. MODIFICATIONS TO THE PROJECT TO MITIGATE EFFECTS

No modifications to mitigate effects are required.

#### 4.2.2.6. CUMULATIVE EFFECTS (FESA)

Cumulative effects on green sturgeon and critical habitat are not anticipated. Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in the biological assessment. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act.

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.

### 4.2.3. Southern Sea Otter

#### 4.2.3.1. 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 Fall 2009 marine mammal surveys, 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. 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. The spatial distribution of observations of sea otters within the study area is shown in the Marine Mammal Mitigation Plan.

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.

#### 4.2.3.2. CRITICAL HABITAT

The proposed project site is not located within federally-designated critical habitat for the southern sea otter.

#### 4.2.3.3. AVOIDANCE AND MINIMIZATION EFFORTS

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.

- 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 y, 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 4.2.1.3.

#### 4.2.3.4. PROJECT EFFECTS

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.

A total of 24 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. 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, and potential effects will be minimized. No other direct or indirect impacts are anticipated. USFWS and NMFS will determine if additional avoidance and minimization measures are necessary to further reduce this impact. A NMFS Incidental Harassment Authorization will be required for this project. A USFWS Biological Opinion or other formal consulation with USFWS may be required for otters known to occur in the project area.

#### 4.2.3.5. MODIFICATIONS TO THE PROJECT TO MITIGATE EFFECTS

No modifications to mitigate effects are required.

#### 4.2.3.6. CUMULATIVE EFFECTS (FESA)

No cumulative effects are anticipated. Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in the biological assessment. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act. No alterations to otter habitat or water quality are anticipated as a result of the project.

No cumulative effects are anticipated. The project site is within the Santa Cruz Harbor which is dredged annually by the Santa Cruz Port District subject to permits and authorizations from the U.S. Army Corps of Engineers. 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).

# Chapter 5. Conclusions and Determination

## 5.1. Conclusions

The proposed Murray Street Bridge Retrofit will have no effect on most of the federally listed species with potential to occur in the vicinity because of the marginal habitat conditions in the project area. For federally-listed wildlife species known or presumed to occur in the waters beneath the Murray Street Bridge, the project has been designed to avoid and minimize effects during the construction period; therefore the project may affect, but is not likely to adversely affect these species (steelhead and green sturgeon). The proposed project is unlikely to result in direct mortality of listed species, but construction activities may result in harassment in the form of disorientation, decreased predator and prey detection, temporary avoidance of habitat disruption of movement and loss of foraging opportunities.The proposed project may disrupt foraging activities or movement of southern sea otters within the Harbor waters. This temporary harassment would be a direct project impact. With implementation of avoidance and minimization efforts, potential effects on the federal listed southern sea otter will be minimized; however, temporary harassment may occur. No long-term effects are anticipated.

## 5.2. Determination

### 5.2.1. Steelhead

Project activities may affect, but are not likely to adversely affect central California coast steelhead. The proposed project is unlikely to have direct or indirect effects on the species as pile driving activities will be conducted in Harbor waters from July 1 to mid-November, outside of the steelhead migration period, unless otherwise permitted by the National Marine Fisheries Service (NMFS). Furthermore, avoidance and minimization measures will be implemented to further reduce the likelihood of underwater sound pressure or water quality impacts to steelhead.

### 5.2.2. Steelhead Critical Habitat

The proposed project will modify, but is not likely to adversely modify designated critical habitat for central California coast steelhead. The project will result in direct loss of critical habitat due to the installation of bridge-support piles, with a total fill area of approximately 430 square feet. Although this alteration would be permanent, the area of critical habitat loss is minimal compared to the remaining harbor area. Furthermore, the Harbor does not provide spawning or rearing habitat, and the piles would not result in obstruction to fish passage or migration. Due to the negligible magnitude of permanent impacts, the project is not likely to adversely modify critical habitat to the extent that it would lead to an appreciable reduction in the function and conservation condition of the affected habitat.

### 5.2.3. Green Sturgeon

Project activities may affect, but are not likely to adversely affect the southern DPS of North American green sturgeon. No green sturgeon occurrences have been reported from the Harbor, but the species could potentially occur within the project area at any time. However,

avoidance and minimization measures will be implemented to reduce the likelihood of underwater sound pressure or water quality impacts to green sturgeon.

### 5.2.4. Green Sturegon Critical Habitat

The proposed project will modify, but is not likely to adversely modify designated critical habitat for southern DPS green sturgeon. The project will result in direct loss of estuarine critical habitat due to the installation of bridge-support piles, with a total fill area of approximately 430 square feet. Although this alteration would be permanent, the area of critical habitat loss is minimal compared to the remaining harbor area. Furthermore, the Harbor does not provide spawning or rearing habitat, and the permanent loss of 430 square feet of foraging habitat is expected to be largely inconsequential. Due to the negligible magnitude of permanent impacts, the project is not likely to adversely modify critical habitat to the extent that it would lead to an appreciable reduction in the function and conservation condition of the affected habitat.

### 5.2.5. Southern Sea Otter

Project activities may affect southern sea otter. 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 regular foraging habitat for the observed otters. Project construction activities may disrupt movement and deter otters from regular foraging in the project area. This temporary harassment of otters may be considered a direct project effect. A Marine Mammal Mitigation Plan will be implemented 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. A qualified biological monitor will be present during in-water construction activities to search for otters within a Safety Zone and halt project activities that could result in injury or mortality to this species. With implementation of avoidance and minimization efforts, no killing or injuring an individual and no alterations to otter habitat are anticipated as a result of the project. No alterations to otter habitat are anticipated as a result of the project. No other direct or indirect effects are anticipated. An application for NMFS Marine Mammal Incidental Harassment Authorization will be submitted and consultation with USFWS initiated. A USFWS Biological Opinion may be required for otters known to occur in the project area.

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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.

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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

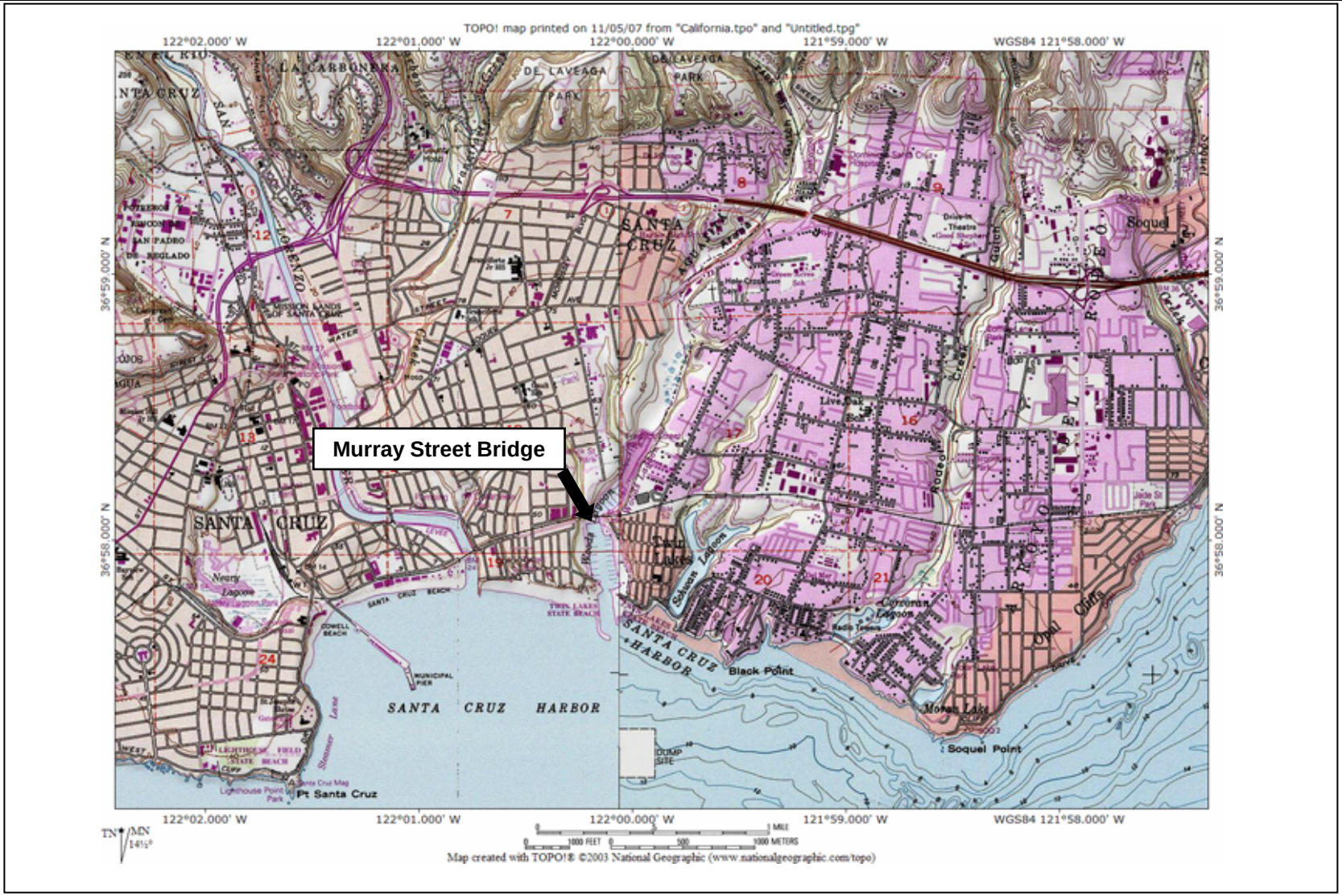
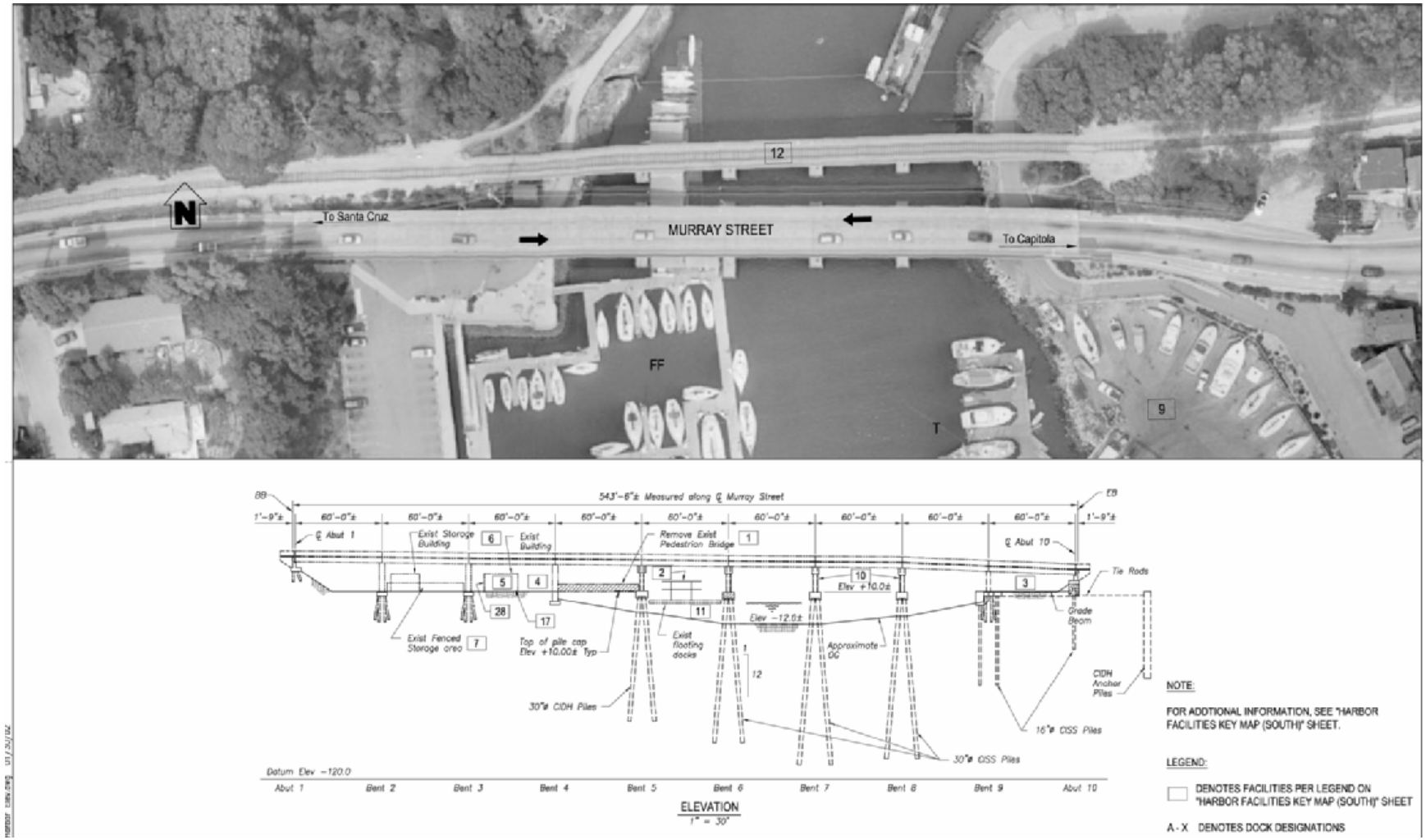


**FIGURE 2: Area of Potential Impact**

**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<br>* Prepare construction staging area (8,000 sq.ft.) at harbor boat yard<br>* Retrofit Bent 9 & Abutment 10; install anchor piles<br>* Erect Girder Span 9<br>* Remove existing south rail | * Install traffic control system with alternating 1-way traffic<br>* Close Murray for 7 days for driving anchor piles<br>* Temporary relocation (dry storage) of 9 dry-docked boats from boat yard<br>* Traffic controls along Lake Avenue during construction staging area setup<br>* Close east walkway under bridge<br>* Close bridge sidewalk |
| **Phase 2: Construction in Eastern Waterway** | |
| **5 months (July-December)** | |
| * Construct new berths (8) at ends of docks A through F<br>* Remove berths (12) at docks T and FF<br>* Construct work platform(s) (trestle or barge) for Stage 2 work [2]<br>* Retrofit Bents 7 & 8 (includes installing anchor piles at Bents 7 & 8)<br>* Erect Girder Spans 7 & 8 and construct Deck Spans 7, 8, & 9<br>* Construct north and south rails (optional) [3]<br>* Restore boat yard; reopen pedestrian path<br>* Remove east work platform<br>* 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<br>* Temporary closure of East Drive & part of harbor boat yard<br>* 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<br>* Install temporary building at USCG area<br>* Temporarily relocate existing offices and row boats to above [2]<br>* Close portion of western parking lot [2]<br>* Construct temporary access ramp to Dock FF<br>* Retrofit Abutment 1 and Bents 2, 3, & 4<br>* 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<br>* 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**

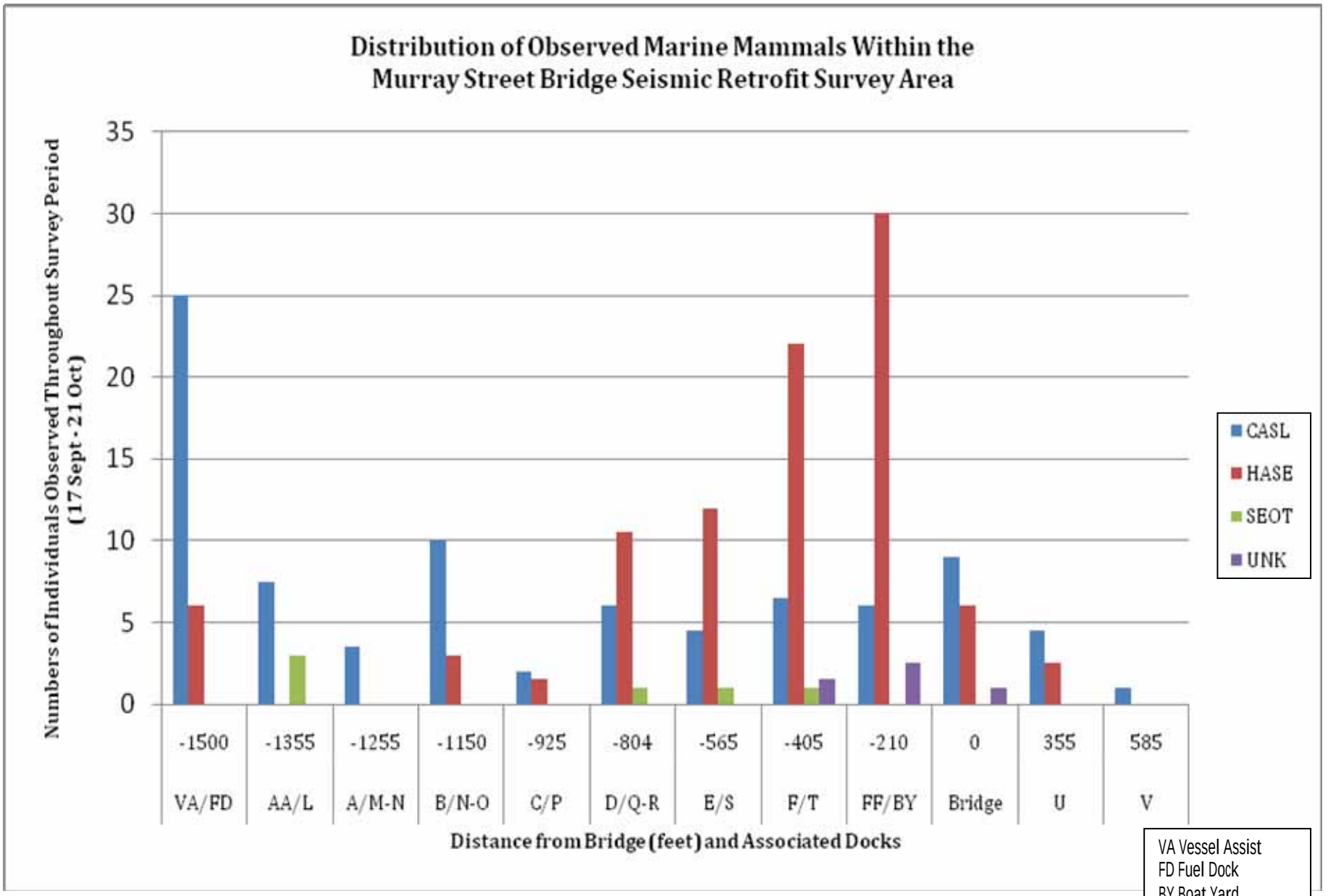
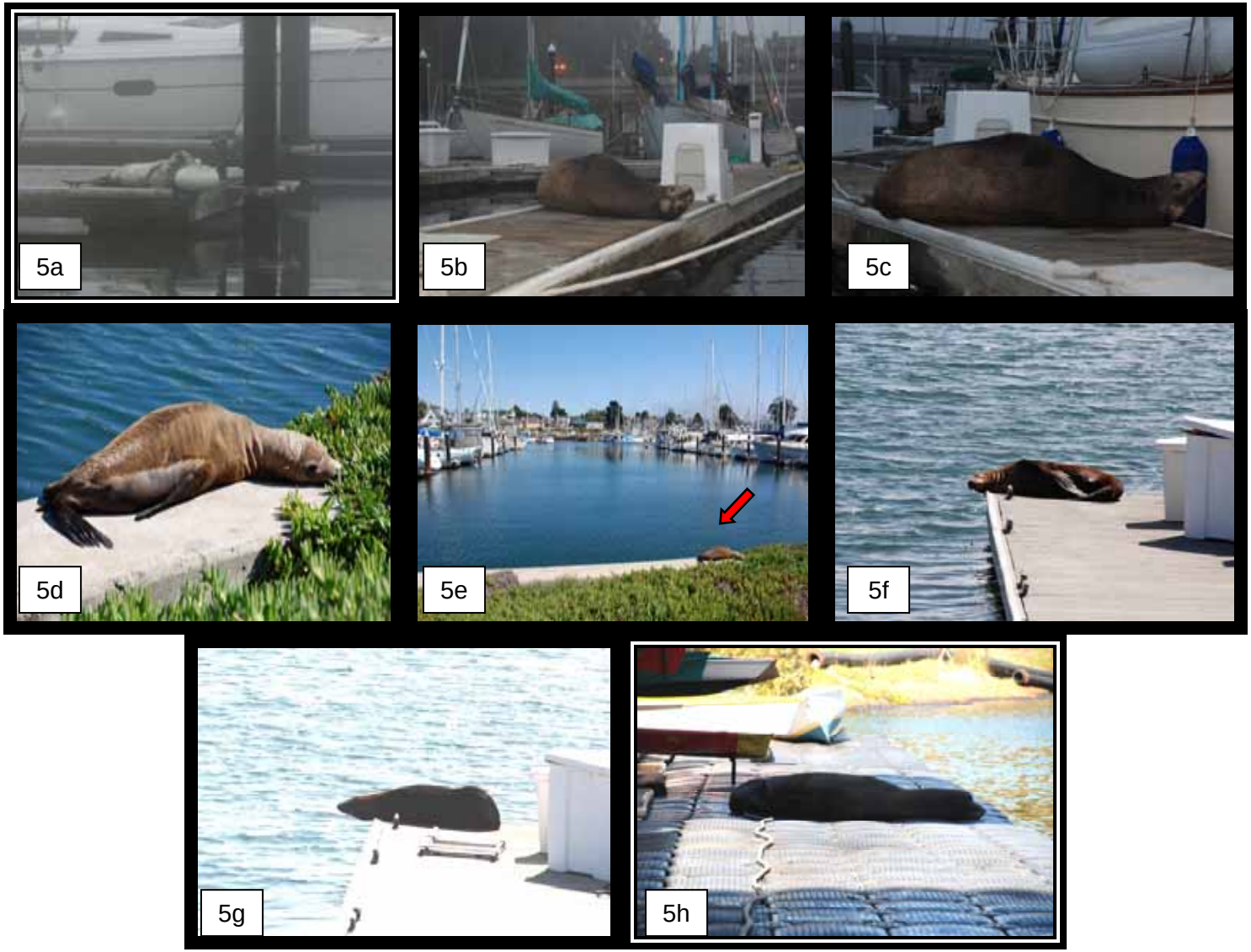


**FIGURE 5: PHOTOGRAPHS OF HAULED-OUT MARINE MAMMALS DURING FALL 2009 SURVEYS OF THE MURRAY STREET BRIDGE SEISMIC RETROFIT SURVEY AREA.**



**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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