Environmental Assessment

Issuance of an Incidental Harassment Authorization to America's Cup Event Authority and Port of San Francisco to Take Marine Mammals by Harassment Incidental to Construction and Race Event Activities for the 34th America's Cup in San Francisco Bay, California

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Abstract: The National Marine Fisheries Service proposes to issue an Incidental Harassment Authorization to America's Cup Event Authority and Port of San Francisco for the taking, by Level B harassment, of small numbers of marine mammals, incidental to conducting construction and race activities in San Francisco Bay, California.

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µPa	micropascal
AC34	34th America's Cup
ACZA	ammoniacal copper zinc arsenate
asl	above sea level
BA	Biological Assessment
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
dB	decibel
dBA	A-weighted decibel
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
EA	environmental assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Assessment
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FMP	Fish Management Plan
GGCR	Golden Gate Cetacean Research
HAPC	Habitat Areas of Particular Concern
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Protection Act
MMSZ	Marine Mammal Safety Zone
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
OMB	Office of Management and Budget
OPR	Office of Protected Resources
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
Port	Port of San Francisco
POP	persistent organic pollutant
PR1	NMFS OPR, Permits and Conservation Division
PRD	NMFS Southwest Regional Office, Protected Resources Division
RMP	Regional Monitoring Program
RMS	root mean square
SAV	submerged aquatic vegetation
SFEI	San Francisco Estuary Institute
SF-DODS	San Francisco Offshore Disposal Site
SFOBB	San Francisco/Oakland Bay Bridge
SWRO	NMFS Southwest Regional Office
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish & Wildlife Service

CHAPTER 1. PURPOSE AND NEED FOR ACTION

1.1 Description of Action

National Marine Fisheries Service (NMFS) has received an application from America's Cup Event Authority (Event Authority) and Port of San Francisco (Port) for an Incidental Harassment Authorization (IHA) to take marine mammals, by Level B harassment, incidental to conducting construction and racing activities for the 34th America's Cup (AC34) in San Francisco Bay, California. The Event Authority's and Port's activities have the potential to cause temporary changes in behavior of marine mammals and warrant an incidental take authorization from NMFS under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA) of 1972, as amended (MMPA: 16 U.S.C. 1631 *et seq*.).

The proposed action considered in this Environmental Assessment (EA) is NMFS' issuance of an IHA under section 101(a)(5)(D) of the MMPA, for taking, by Level B harassment only, of a small number of marine mammals incidental to conducting construction and race event activities. This EA, titled "*Issuance of an Incidental Harassment Authorization to America's Cup Event Authority and Port of San Francisco to Take Marine Mammals by Harassment Incidental to Construction and Race Event Activities for the 34th America's Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza in San Francisco Bay, California"* (hereinafter, EA) addresses the impact on the human environment that would result from issuance of this IHA for authorization of incidental takes of marine mammals during project construction and race event activities, taking into account the mitigation measures required in the IHA.

1.1.1 Background

To comply with the MMPA, the Event Authority and Port have submitted an IHA application due to the potential incidental harassment of four marine mammal species that may be present in San Francisco Bay; harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), Harbor porpoise (*Phocoena phocoena*), and elephant seal (*Mirounga angustirostris*). On April 27, 2012, NMFS received an adequate and complete request for the authorization of incidental take, by Level B harassment only, of marine mammals associated with construction and race event activities along the San Francisco shoreline and on San Francisco Bay, California. Details regarding construction and race event activities are provided in Section 2 of this EA. This EA is intended to fulfill NMFS' responsibilities under NEPA to analyze the potential effects to the human environment resulting from the proposed action (i.e., issuance of an IHA to the Event Authority and Port).

The Event Authority and Port have regulatory requirements that they must satisfy in addition to those under the MMPA. They require a permit from the U.S. Army Corps of Engineers (USACE) under Section 10 of the Rivers and Harbors Act to place temporary structures within the bay, as well as a Marine Event Permit from the U.S. Coast Guard (USCG) to hold the AC34 race events. The project is currently being evaluated by NMFS under Section 7 of the federal Endangered Species Act (for potential effects to ESA-listed fish species) and for Essential Fish Habitat under Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act.

The National Park Service (NPS) and USCG are federal co-lead agencies for preparation of a separate Environmental Assessment under the National Environmental Policy Act (NEPA) to support the federal permitting actions described above.

1.1.2 Purpose and Need

In response to the receipt of an IHA application from the Event Authority and Port, NMFS proposes to issue an IHA pursuant to the MMPA section 101(a)(5)(D). The primary purpose of the IHA is to provide an exception from the take prohibitions under the MMPA to allow "take" by "Level B harassment" of marine mammals for the construction and the 2012 and 2013 race event activities associated with the proposed project. Specifically, the MMPA prohibits take of marine mammals, with specific exceptions, including the incidental, but not intentional, taking of marine mammals. Under the MMPA, NMFS must issue the IHA if certain findings are made IHA issuance criteria require that activities authorized by an IHA will have a negligible impact on the species or stock(s); and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. In addition, the IHA must set forth the permissible methods of taking, other means of effecting the least practicable adverse impacts on the species or stock and its habitat, and monitoring and reporting of such takings. Issuance of an IHA is a major federal action.

The purpose of this EA is to evaluate the potential effects on the human environment of NMFS' proposed action – issuance of an IHA to the Event Authority and the Port – and it is necessary in order to comply with NEPA requirements for the action.

1.2 Scoping Summary

The purpose of scoping is to identify the issues to be addressed and the significant issues related to the proposed action, as well as identify and eliminate from detailed study the issues that are not significant. An additional purpose of the scoping process is to identify the concerns of the affected public and federal, state, and Indian tribes.

The MMPA and its implementing regulations governing issuance of an IHA require that upon receipt of an adequate and complete application for an IHA, NMFS publish a notice of receipt or proposed Incidental Harassment Authorization in the *Federal Register*. The notice summarizes the purpose of the proposed IHA, includes a statement about what type of NEPA analysis is under consideration, and invites interested parties to submit written comments concerning the proposal.

NOAA Administrative Order (NAO) 216-6, established agency procedures for complying with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*) and the implementing regulations issued by the President's Council on Environmental Quality (CEQ). NOA 216-6 specifies that issuance of an IHA under the MMPA is among a category of actions that require further environmental review and the preparation of NEPA documentation. The CEQ regulations implementing NEPA do not require that a draft EA be made available for public comment as part of the scoping process.

1.2.1 Comments on Proposed IHA

On June 1, 2012, NMFS published a notice of a proposed IHA in the *Federal Register* (77 FR 32573), which announced the availability of the proposal for public comment for 30 days.

The public comment period for the proposed IHA covered the same subject matter as this EA, affording public input on similar environmental impacts. NMFS will post the final EA on the following website:

http:/www.nmfs.noaa.gov/pr/permits/incidental

NMFS received comments on the proposed IHA from the Marine Mammal Commission and from Golden Gate Cetacean Research, The Marine Mammal Center, Oceanic Society Expeditions, and from a private citizen. Those comments will be fully addressed in NMFS' Federal Register notice announcing the decision regarding this proposed action. None of the comments require a substantive change to this EA.

1.2.2 Issues within the Scope of this EA

This EA addresses the potential environmental impacts of the NMFS proposal to issue an IHA under section 101(a)(5)(D) of the MMPA and the alternatives to the proposed action. The IHA, if issued, would authorize the harassment of four species of marine mammal incidental to construction and race event activities.

NMFS identified the following issues as relevant to the NMFS proposed action that are appropriate for detailed evaluation in this EA: (1) disturbance of marine mammals from pile driving activities, (2) disturbance of marine mammals from helicopter operations, and (3) disturbance of marine mammals from fireworks.

Disturbance from pile driving activities: Sound associated with vibratory and impact pile driving construction activity may have the potential to disturb marine mammals due to acoustic disturbance.

Disturbance from helicopter operations: The proposed 2012 and 2013 race events include up to three helicopters in operation during the events. Acoustic disturbance within marine mammal's hearing may include noise generated by the helicopter's rotors during helicopter operations.

Disturbance from fireworks: Light flashes and sound associated with fireworks may have the potential to disturb marine mammals.

1.3 Applicable Laws and Necessary Federal Permits, Licenses, and Entitlements

This section summarizes federal, state, and local permits, licenses, approvals, and consultations necessary to implement the proposed action.

1.3.1 National Environmental Policy Act

The NEPA, enacted in 1969, is applicable to all "major" federal actions significantly affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. While NEPA does not dictate substantive requirements for an IHA, it requires consideration of environmental issues in federal agency planning and decision making.

NMFS has, through NAO 216-6, established agency procedures for complying with NEPA and the implementing regulations issued by the CEQ. NOA 216-6 specifies that issuance of an IHA under the

MMPA and Federal Endangered Species Act (ESA) is among a category of actions that require further environmental review. When a proposed action has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon the endangered or threatened species or their habitats, preparation of an EA or EIS is required. NMFS prepared this EA under NAO 216-6 to support its action of approval and regulation of the applicant's activities through issuance of the IHA.

The NPS and USCG are federal co-lead agencies for preparation of a separate EA under NEPA to support the federal permitting actions described below. The USACE and Presidio Trust are cooperating agencies for preparation of the NEPA EA. The scope of the separate EA referred to here encompasses the entirety of the Event Authority and the Port's proposed action. The scope of this EA is limited to NMFS' proposed action, the issuance of an IHA to the Event Authority and the Port.

1.3.2 Endangered Species Act

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or U.S. Fish & Wildlife Service [USFWS]) for federal actions that "may affect" a listed species or critical habitat. NMFS' issuance of an IHA affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these section 7 consultation requirements. Accordingly, NMFS is required to ensure that its action is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species. Because NMFS is not proposing to authorize the incidental take of any ESA-listed species, there is no requirement to consult under Section 7.

1.3.3 Marine Mammal Protection Act

Section 101(a)(5)(D) of the MMPA (16 U.S.C. 1371 (a)(5)(D)) directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking by harassment of small numbers of marine mammals of a species or population stock, for periods of not more than one year, by United States citizens who engage in a specified activity (other than commercial fishing) within a specific geographic region if certain findings are made and, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental taking of marine mammals shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. The authorization must set forth the permissible methods of taking, other means of affecting the least practicable adverse impact on the species or stock and its habitat, and monitoring and reporting of such takings. NMFS has defined "negligible impact" in 50 Code of Federal Regulations (CFR) 216-103 as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the United Sates can apply for an authorization to incidentally take small numbers of marine mammals by

harassment. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as:

> Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild ["Level A harassment"]; or (ii) has the potential to disturb a marine mammal marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering ["Level B harassment"]

Section 101(a)(5)(D) of the MMPA establishes a 45-day time limit for NMFS' review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of small numbers of marine mammals. Not later than 45 days after the close of the public comment period, if the Secretary makes the findings set forth in Section 101(a)(5)(D)(i) of the MMPA, the Secretary shall issue the authorization with appropriate conditions to meet the requirements of clause 101(a)(5)(D)(ii) of the MMPA.

NMFS has promulgated regulations to implement the permit provisions of the MMPA (50 CFR Part 216) and has produced Office of Management and Budget (OMB) approved application instructions (OMB Number 0648-0151) that prescribe the procedures (including the form and manner) necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA. Applications for an IHA must be submitted according to regulations at 50 CFR Section 216.104.

1.3.4 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), Congress defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The EFH provisions of the Magnuson-Stevens Act offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS Office of Protected Resources is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (e.g., incidental take), funds, or undertakes, or proposes to authorize, fund, or undertake that may adversely affect EFH. This includes renewals, review, or substantial revisions of actions. NMFS' proposed action – the issuance of an IHA to the Event Authority and Port – will not result in adverse impacts to EFH and, therefore, does not require separate consultation per Section 305(B)(2) of the MSA as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267).

CHAPTER 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

The NEPA implementing regulations (40 CFR § 1502.14) and NAO 216-6 provide guidance on the consideration of alternatives to a federal proposed action and require rigorous exploration and objective evaluation of all reasonable alternatives. Each alternative must be feasible and reasonable in accordance with the President's Council on Environmental Quality (CEQ) regulations (40 CFR §§ 1500-1508). This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective, as well as alternatives eliminated from detailed study and also summarizes the expected outputs and any related mitigation of each alternative.

This EA evaluates the potential environmental impacts of two alternatives, namely: (1) non-issuance of an IHA if the findings required under the MMPA (i.e., no unmitigable adverse impact and negligible impact) cannot be made; and (2) the issuance of an IHA for the take of marine mammals by Level B behavioral harassment incidental to conducting construction and race-related activities for the proposed project in San Francisco Bay, California..

The Proposed Action (Preferred) alternative analyzed in this EA represents the activities proposed in the application for an IHA submitted on April 27, 2012, with standard monitoring and mitigation measures specified by NMFS.

NMFS is required to issue an IHA if the agency determines that the taking by harassment will have a negligible impact on the species or stocks and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses. Any authorization should include, where applicable, permissible methods of taking and appropriate mitigation and monitoring measures.

2.1 Project Objectives

The project (i.e., proposed action) objective is the authorization of incidental take as appropriate associated with the specified activities proposed by the applicants. Issuance of the IHA is the NMFS proposed action for this EA. The Event Authority and the Port of San Francisco propose to conduct construction activities within San Francisco Bay to repair existing piers and install temporary facilities, and to hold racing events on San Francisco Bay in 2012 and 2013. The project sponsors propose to conduct the majority of the construction activities prior to the 2013 events. Some construction activities associated with the Cruise terminal will take place after 2013. The project sponsors propose to hold 2012 racing events in August and October, 2012 and 2013 racing events between July 4 and September 22, 2013. The project sponsors requested an IHA for the 2012 construction and racing activities. The project sponsors will request an IHA for 2013 construction and racing activities if warranted; those proposed actions would require a separate IHA and possibly a supplemental EA.

2.2 Alternative 1: No Action Alternative – Deny Issuance of an IHA

Evaluation of the No Action Alternative is required by CEQ NEPA regulations to use as a baseline against which the impacts of the Proposed Action are compared.

Under the No Action Alternative, NMFS would not issue the proposed IHA for the activities proposed by the project sponsors. The MMPA prohibits all takings of marine mammals unless authorized by a permit or exemption under the MMPA. If authorization to take, by incidental harassment, harbor seals, California sea lions, harbor porpoises, and elephant seals were denied and the project sponsors chose to perform the construction activities to upgrade existing piers and install temporary race-related facilities and race events on San Francisco Bay these activities may result in unauthorized takes of marine mammals which would be in violation of the MMPA. Under the No Action Alternative marine mammals present within San Francisco Bay may or may not be incidentally harassed depending on whether the project sponsors chose to forgo the AC34 portion of the project. NMFS cannot predict what course of action the applicants may take under this No Action alternative.

NMFS has preliminarily made the required determinations under the MMPA. If NMFS is able to make these required determinations, it must issue the requested authorization. Thus, if no new information is presented to invalidate NMFS' preliminary determinations under the MMPA, this alternative would not meet the MMPA purpose and need for issuance of an IHA.

2.3 Alternative 2: Issuance of an IHA with Mitigation (Preferred Alternative)

The Proposed Action is the Preferred Alternative. Under this alternative, NMFS would issue a 12-month IHA to the project sponsors allowing the incidental take by Level B harassment of small numbers of harbor seal, California sea lions, harbor porpoise, and elephant seals during 2012 construction and racing activities. The project sponsors will request another IHA to cover any 2013 construction and racing activities that do not fall within the original 12 month period.

NMFS will incorporate the mitigation and monitoring measures and reporting requirements described in Sections 2.3.4 and 2.3.5 into the IHA. Accordingly, this Preferred Alternative (Issuance of an IHA with Mitigation) would satisfy the MMPA purpose and need of the action—issuance of an IHA, with mitigation measures and monitoring, would enable the project sponsors to comply with the statutory and regulatory requirements of the MMPA and ESA while conducting facilities construction and repair and race event activities in 2012.

2.3.1 Pile Driving

Pile driving will be required to (1) hold temporary floating docks in place and (2) repair the Pier 19 apron. Piles for floating docks will be installed using a vibratory driver. Impact pile driving will be utilized to install wood piles at Pier 19. **Table 1** provides a summary of the number of piles that will be driven at each location, the purpose of the piles, the type of pile driver used, and piles driven per day.

Piles for Temporary Floating Docks

Temporary floating docks are proposed at eight locations within San Francisco Bay. The temporary floating docks will be held in place with 18-inch diameter steel guide piles (see Table 1). All piles for floating docks will be installed with a vibratory driver and will be removed after the 2013 race events.

Piles for Apron Repair at Pier 19

Apron repair at Pier 19 includes the replacement of up to 224 12-inch wood piles treated with ammoniacal copper zinc arsenate (ACZA) and wrapped with a reinforced plastic or polyethylene coat (see Table 1). The 12-inch wood piles will be installed with an impact hammer.

TABLE 1
SUMMARY OF PILE DRIVING FOR EACH AREA AND
ESTIMATED NUMBER OF ASSOCIATED CONSTRUCTION DAYS

Location and Type of Pile			# of Piles	Piles/day	Construction Days	Type of Pile Driver
		Floating Docks 18" Steel Piles	244	8	31	vibratory
Pier 19	Apron Replaced Piles	12" wood piles	224	8	28	impact
		Totals	**468**		**59**	

2.3.2 Helicopter Operations

Helicopters will be used for AC34 2012 and 2013 races to serve broadcasting and media operations. The project sponsors will be responsible for coordinating with the Federal Aviation Administration (FAA) and helicopter operators to ensure compliance with flight regulations within the San Francisco Bay during race events. America's Cup Event Authority TV will use up to three helicopters for the match racing days. The helicopters following each race will fly between 100 and 400 feet and above 400 feet above sea level (asl) within the race area. Race events could take up to a maximum of five hours in a day; however, most racing days will be much shorter than five hours.

The helicopters will normally require refueling once per day. All helicopter fueling, maintenance and overnight storage will occur at one or more existing regional airports or permitted helipad. During race events, one or two helicopter will stay above 400 feet asl and other helicopters will fly between 100 -400 feet asl to more closely cover the racing.

To protect avian sensitive species, the project sponsors will restrict helicopter operations such that they would avoid the air space within at least 1,000 feet (vertically and horizontally) around Alcatraz Island and Crissy Beach Wildlife Protection Area. During flight operations, helicopters will minimize impacts to pinnipeds by avoiding low flying (below 100 feet) over pinniped haul out areas as safety permits.

An existing helipad on the southeastern corner of Treasure Island is proposed to serve as a temporary staging location for these helicopters, such as between individual races on a race day. Final details of helicopter operations will be provided in the Water and Air Traffic Plan that will be developed and implemented for AC34.

2.3.3 Fireworks

Four 30-45 minute firework displays are proposed for the AC34 race events in 2013. Fireworks would be launched from a barge near Piers 27-29.

It is anticipated that aerial shells would be launched from tubes (called mortars), using black powder charges, to altitudes of 200 to 1,000 feet where they would explode and ignite internal burst charges and incendiary chemicals. Most of the incendiary elements and shell casings burn up in the atmosphere; however, portions of the casings and some internal structural components and chemical residue fall back to the ground or water, depending on prevailing winds.

The project sponsors have coordinated and would continue to coordinate with the USCG regarding limitations on the location, frequency and duration of the fireworks to minimize potential environmental impacts. Any proposed fireworks displays would be subject to approval by the USCG, and contained within the Marine Event Permit.

2.3.4 Mitigation Measures

As required under the MMPA, NMFS considered mitigation to affect the least practicable adverse impact on marine mammals and has developed a series of mitigation measures, as well as monitoring and reporting procedures (Section 2.3.7) that would be required under the IHA.

The following measures are designed to eliminate the potential for injury, serious injury, or mortality and to minimize Level B behavioral harassment to marine mammals found in the area of the proposed project. These measures would be required under Alternative 2 (Preferred Alternative).

In the case that NMFS should deem other mitigation measures necessary for future racing event activities, NMFS would consider these and implement them after consultation and agreement with the project sponsors. The additional mitigation measures, if identified, would appear in the IHAs for the 2013 racing events.

Pile Driving Avoidance and Minimization Measures

Avoidance and Minimization Measures that will be implemented for pile driving include the following:

- Vibratory pile drivers will be used for the installation and removal of all steel pilings (18-inch diameter) for floating docks. Vibratory pile driving will be conducted following the USACE "Proposed Procedures for Permitting Projects that will Not Adversely Affect Selected Listed Species in California". USFWS and NOAA completed Section 7 consultation on this document which establishes general procedures for minimizing impacts to natural resources associated with projects in or adjacent to jurisdictional waters.[1] Under this guidance a vibratory hammer may be used year-round to install steel, wood, or concrete piles of any size and in any number.

- 12-inch wood piles will be installed using an impact hammer. Impact pile driving will be conducted following the USACE "Proposed Procedures for Permitting Projects that will Not Adversely Affect Selected Listed Species in California." USFWS and NOAA completed Section 7 consultation on this document which establishes general procedures for minimizing impacts to natural resources associated with projects in or adjacent to jurisdictional waters.[2]

The following is the excerpt from this programmatic guidance for impact hammer usage.

[1] NMFS (National Marine Fisheries Service). 2007. Programmatic Consultation Letter to Brigadier General John R. McMahon, U.S. Army Corps of Engineers, from Robert S. Hoffman, NMFS dated December 21, 2007.

[2] NMFS (National Marine Fisheries Service). 2007. Programmatic Consultation Letter to Brigadier General John R. McMahon, U.S. Army Corps of Engineers, from Robert S. Hoffman, NMFS dated December 21, 2007.

Use of an impact hammer is limited to projects using only one hammer and less than 50 piles installed per day.

i. For wood piles – Any size pile – may occur year-round

ii. For concrete piles – Piles must be 18 inches or less in diameter – may occur year-round

iii. For steel piles – Piles must be 12 inches or less in diameter and hammer must be 3,000 pounds or smaller and must use wood cushion between hammer and pile – may occur year-round.

- The Project Sponsors will develop a NMFS-approved sound monitoring plan prior to the start of pile driving. This plan will provide detail on the methods used to monitor and verify sound levels (air and water) during pile driving activities. The sound monitoring results will be made available to NMFS.
- A NMFS-approved biological monitor will be available to conduct surveys before and during pile driving to inspect the work zone and adjacent Bay waters for marine mammals. The monitor will be present as specified by NMFS during impact pile-driving phases of construction.

  i) Maintain a safety zone established in the sound monitoring plan around sound source, for the protection of marine mammals in association with sound monitoring station distances, as approved by NMFS.

  ii) Halt work activities when a marine mammal enters the safety zone and resume only after the animal has been gone from the area for a minimum of 15-minutes

  iii) Maintain a disturbance zone established in the sound monitoring plan around sound source, in order to monitor animals that may approach the safety zone, observe behavioral reactions, and record incidences of Level B take.

Helicopter Operations Avoidance and Minimization Measures

Approved flight patterns for AC34 contracted and race-affiliated helicopters and aircraft will be detailed in the Water and Air Traffic Plan. The project sponsor will be responsible for coordinating with the FAA and helicopter operators to ensure compliance with flight regulations and to enforce the flight restrictions identified in this document to protect listed species. Helicopters will descend/ascend vertically for landing and take-off at the auxiliary landing barge located at Pier 80 or at a helipad on Treasure Island. Helicopters will not skim the surface of water (<100 feet) during the race events nor during landing and takeoff operations. The project sponsors will ensure that race-related helicopters maintain a buffer of at least 1,000 feet (vertically and horizontally) around Alcatraz Island and Crissy Beach Wildlife Protection Area. Race operations will cease if a whale is observed in the race area and helicopters will immediately maintain a minimum 1,000 feet buffer from any whales observed.

In addition, biological monitors will be positioned at Pier 39 to observe California sea lion behavior. Monitoring activities will be reported to NMFS on a weekly basis.

Fireworks Avoidance and Minimization Measures

This measure applies to the AC34 2013 events. Fireworks displays will be limited in terms of frequency and location as necessary to protect marine mammals. There would be no more than four events, two up to 30 minutes and two up to 45 minutes in duration in 2013. The fireworks barge will be located close

to Pier 27 for the AC34 ceremonies in 2013. These fireworks displays will require a USCG Marine Event Permit.

2.3.5 Monitoring and Reporting

Under the Preferred Alternative (Alternative 2), NMFS would require the project sponsors to undertake the following monitoring activities. The reporting requirements described in Section 2.3.7.3 would also be implemented in Alternative 2.

Monitoring

As described above in Section 2.3.6.1 Pile Driving Avoidance and Minimization Measures the project sponsors will develop a Sound Monitoring Plan for pile driving activities. This plan will provide details on the methods used to monitor and verify sound levels during pile driving activities. The Sound Monitoring Plan will be submitted to NMFS for approval. Sound monitoring results will be provided to NMFS.

In addition to monitoring sound levels from pile driving described above, the project sponsors will have a NMFS-approved biological monitor conduct surveys before and during pile driving to inspect the work zone and adjacent Bay waters for marine mammals. A safety zone established in the monitoring plan and approved by NMFS will be monitored. The monitor will be present as specified by NMFS during impact pile driving phases of construction. The biological monitor will halt pile driving activities if a marine mammal enters the safety zone. Observations of marine mammals by the biological monitor during pile driving activities and any actions taken, such as halting work, will be reported to NMFS. Biological monitoring of all proposed activities will occur as stipulated by NMFS in the IHA.

During race events the USCG will create a managed safety zone on the water. Race management personnel are tasked with scanning the water for debris or other obstructions. In the unlikely event that a large marine mammal, such as a whale, is observed the Course Marshall would postpone or abandon the race. As previously stated, biological monitors will be positioned at Pier 39 to observe California sea lion behavior. Monitoring activities will be reported to NMFS during racing events.

The project sponsors are preparing a Water and Air Traffic Plan for the AC34 events. The Water and Air Traffic Plan will include educational information to the boating public regarding marine mammals. The information will include federal and state regulations prohibiting the harassment of marine mammals and will explain the importance of avoiding any harassment of marine mammals and actions to take if any harassment is observed.

Reporting Requirements

As described above the project sponsors will develop a Sound Monitoring Plan that will be submitted to NMFS for approval. The plan will require sound monitoring during pile driving activities. The results of the sound monitoring will be reported to NMFS.

A biological monitor will be on site during all impact pile driving activities, during racing events/helicopter operations and fireworks displays. Observations of marine mammals by the

biological monitor during these activities and any actions taken will be reported to NMFS. The report will contain the following information: (a) summary of the dates, times, tides and weather during each activity (impact pile driving, helicopter operations, and fireworks); (b) species, number, location, and behavior of any marine mammals, observed throughout monitoring activities; and (c) actions taken if marine mammals are observed. Reporting of all activities and monitoring results will occur as stipulated by NMFS in the IHA.

2.3.6 Estimated Take by Incidental Harassment

Provided that mitigation and monitoring measures are implemented, NMFS conservatively estimates the approximate number of individuals that could be potentially affected by Level B harassment per day is as shown in **Table 2**.

Section 4.2 describes the basis of NMFS' determination on the impacts associated with construction and race event activities on marine mammals present within the race area.

Pinnipeds present near the race area on San Francisco Bay that could be disturbed or affected by pile driving activities, helicopter activities, and fireworks per event have been estimated and these numbers are provided in Table 2. These estimates are based on local reporting on various projects for the presence of marine mammals.

NMFS does not expect the activity to impact rates of recruitment or survival of the pinnipeds since no mortality (which would remove individuals from the population) or injury is anticipated to occur, nor authorized. Only a temporary modification in behavior and/or low-level physiological effects is anticipated to occur over a short period of time, occurring at limited times of the day.

2.4 Alternatives Considered but Eliminated From Detailed Study

The following alternatives were considered but eliminated from detailed study in this EA.

Issuance of IHA with Additional Mitigation Measures

Under Alternative 2, the Port and ACEA would conduct their action with authorization for incidental take under the MMPA, including the mitigation measures described previously. This alternative would include all of the same mitigation measures required as described for the Preferred Alternative, but would include additional mitigation measures derived from a variety of sources including: (1) comments submitted from the public on similar actions; (2) discussions within NMFS as a part of the proposed IHA process; and (3) a literature review of past and current research into potential mitigation measures.

Evaluations of new mitigation measures include assessments of their effectiveness in reducing risk to marine mammals, but any such measures must also pass safety and practicability considerations, meet project objectives, and be consistent with the purpose and need for NMFS' proposed action (Chapter 1). Three additional mitigation measures were identified for inclusion in this alternative: a requirement for the applicants to conduct an expanded monitoring program rather than monitoring only a subsample of certain activities, a requirement to implement soft-start for every pile, and limitations on the number and location of vibratory pile drivers that may be in use at a given time.

The effects on the human environment resulting from Alternative 3 would be substantially the same as those resulting from Alternative 2, with the exception that the applicant would be required to spend additional money to implement monitoring beyond that which NMFS has determined is necessary. In addition, the project would require additional time for completion in order to implement soft start for every pile or to implement restrictions on the number of vibratory pile drivers that may be used, thus lengthening the period of time during which animals may be exposed to sound as described above.

This alternative was rejected because the additional mitigation measures do not satisfy NMFS' criteria for inclusion, as described above. The additional mitigation measures considered would likely not be effective in further reducing risk to marine mammals and are not considered practicable by the action proponent.

Preferred Project without Mitigation Alternative

NMFS considered an alternative where NMFS issues an IHA without the mitigation measures described in Alternative 2–Issuance of an IHA with Mitigation (the Preferred Alternative). However, this alternative failed to meet the statutory and regulatory requirements of the MMPA for an IHA (e.g., negligible impact, effecting the least practicable adverse impact, and monitoring and reporting of such takings). Accordingly, NMFS did not consider this alternative further.

Greater Intensity Alternative

A greater intensity project was originally considered by the Project Sponsor. The greater intensity project included event programming at several additional on land locations, additional floating docks at several locations, major seismic improvements to Pier 30-32, which included installation of new 72-inch steel piles with impact hammers, and four fireworks displays in 2012.

The greater intensity project would result in increased harassment of marine mammals as a result of increased impact pile driving and increased fireworks displays. The Project Sponsor modified the

original project proposal, reducing potential harassment of marine mammals. The modified project is Alternative 2, the Preferred Alternative.

Open Ocean Alternative

NMFS also considered an alternative where NMFS issues an IHA as described in Alternative 2 – Issuance of an IHA with Mitigation (Preferred Alternative) with the requirement that the racing events take place in the open ocean. Under this alternative pile driving activities and fireworks would be the same as for Alternative 2 but helicopter operations would take place over the open ocean instead of the bay. This alternative was eliminated from detailed study because the AC34 racing boats are not designed for the open ocean and the alternative would therefore result in an unacceptable safety risk.

TABLE 2
NUMBER OF INDIVIDUALS REQUESTED FOR LEVEL B HARASSMENT
TAKE OVER THE ENTIRE PROJECT TIMELINE

Activity	Number of individuals requested for Level B Harassment take over the entire Project Timeline											
	Harbor Seals			California Sea Lion			Harbor Porpoise			Elephant Seal		
	Individual per day or event	TOTAL Event and Days in 2012-2013	Total Take Requested	Individual per day or event	TOTAL Event and Days in 2012-2013	Total Take Requested	Individual per day or event	TOTAL Event and Days in 2012-2013	Total Take Requested	Individual per project	Total Take Request	
Pile Driving	2	63	126	1	63	63	1	63	63	2	2	
Helicopter Operations	10	52	520	250	52	13,000	NTR	NTR	NTR			
Fireworks Displays	10	4	40	250	4	1,000	NTR	NTR	NTR			
U.S. or California Stock population estimate		***30,196***			***296,750***			***9,189***			***124,000***	

NOTES: NTR – no take requested

CHAPTER 3. AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives, and describes the resources that would be affected by the alternatives, as well as environmental components that would affect the alternatives if they were to be implemented. The effects of the Alternatives on the environment are discussed in Section 4.

3.1 Physical Environment

3.1.1 Water Quality

San Francisco Bay is a large, complex, and highly dynamic estuary. Circulation within the Bay is dependent upon, tides, river flow, winds and bathymetry. It also receives inputs from stormwater runoff, and wastewater from municipal and industrial sources that vary in proportion depending on the location and seasonal weather patterns. Project activities are located within what is described as the Central Bay and is influenced by these hydrodynamic conditions. Figure 1 provides a vicinity map and shows the locations where construction activities will occur along the San Francisco waterfront and the designated race area where racing events will occur within the Central Bay. Current and wave patterns exhibited along the San Francisco waterfront and within the Central Bay are largely generated by the tides interacting with bottom and shoreline configurations.

Water quality in the Project Area where construction and races will occur is saline and predominated by ocean influences. However, during periods of significant runoff, especially from the Sacramento-San Joaquin River system, substantial freshwater migrates through San Pablo Bay and into San Francisco Bay. This inundation of freshwater can temporarily reduce the salinity of waters in the project vicinity to substantially less than ocean water (Bay Institute 2003). Additionally, when tidal current is impaired by a barrier or constricted, such as through the Golden Gate, the behavior of the current can influence the sedimentation and water quality characteristics within the Bay, thereby affecting circulation, flushing action, and water exchange. Various contaminants are transported into San Francisco Bay by an assortment of sources: urban uses, industrial outfalls, municipal wastewater outfalls, municipal stormwater, upstream farming, upstream historic and current mining discharges, legacy pollutants,[3] and various other pollutant sources.

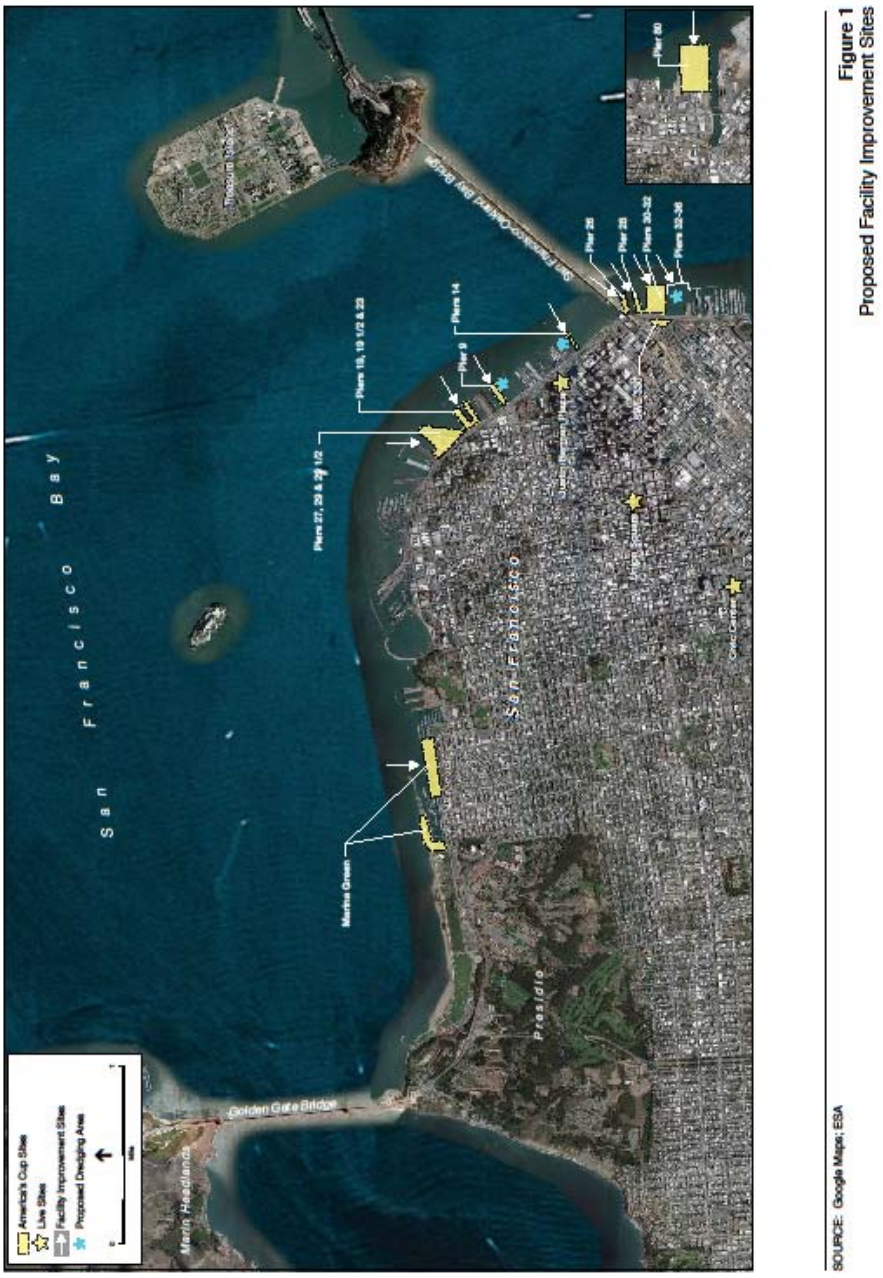
Suspended sediments are a key component of the estuarine system. The terms turbidity and suspended sediments are often used interchangeably. Turbidity refers to a number of different suspended particulates including plankton and sediments. Suspended sediments refer to the actual sediment component in the water column. Most near shore environments, and estuaries in particular, tend to have higher levels of turbidity or suspended sediment loads due to discharges from rivers, drainages and the relative shallow nature of the environment. Suspended sediment concentrations in San Francisco

[3] Legacy pollutants are water quality constituents that are considered harmful to human health or the environment, that were historically emitted by industry or other human activities, and that are in general banned or significantly restricted from current usage. Examples include mercury, lead, PCBs, and DDT.

Bay tend to be extremely variable and strongly correlated to season and water depth (Buchanan and Ganju 2006, 2006, McKee et al., 2005). Several groups, including the San Francisco Estuary Institute (SFEI) and the U.S. Geological Survey (USGS), have monitored suspended sediment loads throughout the

FIGURE 1

Vicinity Map



San Francisco Bay for many years. Suspended sediment concentrations can range from well over 1,000 milligrams per liter (mg/L) near the bottom, to as little as 10 mg/L in near surface measurements (Buchanan and Ganju 2006). The Action Area footprint for in-water construction sites along the San Francisco waterfront and piers is in relatively shallow water with water depths ranging between -10 and -40 feet MLLW. These locations are strongly influenced by nearshore discharges and wind- and wave-generated sediment disruption. Suspended sediment loads within the Action Area where facility improvements will occur are characterized by the higher sediment load concentrations typically found near the bottom of the Bay or in shallow environments.

Contaminants are introduced into Central San Francisco Bay primarily through runoff, combined sewer overflow, stormwater, spills and leaks, and remobilization from sediment into the overlying water column. SFRWQCB listed the Central Bay, which includes the Action Area, as an impaired water body. Under Section 303(d) of the Clean Water Act, impaired waters are defined as those that do not meet water quality standards, even after point and non-point sources of pollution have had pollution control technologies implemented. The pollutants listed for the Central Bay include chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, dioxin compounds, exotic species, furan compounds, mercury, PCBs, and selenium (Bay Institute 2003). Pollutant concentrations vary seasonally and annually, dependent upon their specific source and degradation characteristics. Contaminants, such as ammonia, copper, and legacy pesticides, have decreased over recent years due to cleanup efforts and natural attenuation (SFEI 2010, Bay Institute 2003).

Since 1993, the Regional Monitoring Program (RMP) for Water Quality in the San Francisco Estuary associated with SFEI, collects water quality data and provides reports annually. The annual monitoring consists of conventional water quality parameters (ammonia, conductivity, dissolved oxygen, dissolved organic carbon, silicates, hardness, nitrate, nitrite, pH, phosphate, salinity, temperature, suspended solids, phaeophytin, and chlorophyll); trace elements (aluminum, arsenic, cadmium, cobalt, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc); trace organics (including polycyclic aromatic hydrocarbons [PAHs], polychlorinated biphenyls [PCBs], phthalates, polybrominated diphenyl ethers, and pesticides); and toxicity. Water quality pollutants contained in the Bay at detectable levels include trace metals, pesticides, PCBs, PAHs, algae blooms/low dissolved oxygen, and sediment contamination. The most recent annual RMP report with data collected in 2009 (SFEI, 2010) indicates that, with the exception of PCBs, water quality conditions remain within water quality objectives established by the SFRWQCB for the parameters monitored (SFEI 2010).

Waters in San Francisco Bay are generally well oxygenated with typical concentrations of dissolved oxygen (DO) ranging from 9 to 10 mg/L during high periods of river flow, 7 to 9 mg/L during moderate river flow, and 6 to 9 mg/L during the late summer months when flows are lowest (SFEI 2008)· DO levels in the San Francisco Bay are typically high and well oxygenated. Concerns about sediment disruption causing problems related to reductions in DO occur in areas with anoxic sediment conditions and water bodies with low DO.

Approximately 800 million gallons of wastewater carrying 60 tons of nitrogen enters the San Francisco Bay annually (USGS 2011). Until the 1980s, nutrient enrichment was a major problem to the San

Francisco Bay estuary. Prior to the 1980's, concentrations of ammonia and nitrogen in Bay waters were in excess of 15 mg/L. This level of enrichment led to algal blooms and anoxic conditions in portions of the Bay with poor water circulation including large portions of the South Bay. Improvements in wastewater treatment caused a large decrease in nutrient loads entering the estuary. Concentrations today are less than 3 mg/L and no anoxic conditions are being recorded (USGS 2011).

3.1.2 Intertidal Habitats within Action Area

Intertidal habitats, or the regions of the Bay that lie between low and high tides, in Central Bay include sandy beaches, natural and artificial rock (quarried rip rap), concrete bulkheads, concrete, composite and wood pier pilings and mud flats. These intertidal habitats provide highly diverse and varied locations for marine flora and fauna. The Central Bay's proximity to the Golden Gate and Pacific Ocean has resulted in an intertidal zone inhabited by many coastal as well as estuarine species. The natural bluff and exposed rocky shorelines interspersed with sandy pocket beaches occur at various locations on Yerba Buena, Alcatraz, and Angel Islands, and portions of San Francisco's north shoreline and area within the Golden Gate National Recreation Areas. In developed areas along the San Francisco waterfront quarried riprap rock areas found as well as along Treasure, Alcatraz, and Angel Islands.

The angular and piled rip-rap rocks that have been placed to protect numerous shoreline locations in Central Bay have been observed to provide additional habitat for a more diverse invertebrate community than observed in natural hard substrate intertidal locations because of the increased and protected surface area created by the piled rocks. These protected pockets provide numerous havens in which assorted marine species are able to survive and flourish (AMS 2009).

3.1.3 Subtidal Habitats within the Action Area

Central San Francisco Bay contains both soft sediment and hard substrate subtidal (below the low tide) habitat. Soft bottom substrate ranges between soft mud with high silt and clay content and areas of coarser sand. These latter tend to occur in locations subjected to high tidal or current flow. Soft mud locations are typically located in areas of reduced energy that enable deposition of sediments that have been suspended in the water column, such as in protected slips, under wharfs, and behind breakwalls and groins.

The Central Bay region has the largest accumulation of natural hard substrate in the Bay-Delta. The hard substrate benthos in San Francisco Bay consists of both natural and artificial surfaces. Natural substrates include boulders, rock face outcrops, and low relief rock. Artificial hard substrate includes submerged concrete breakwalls, bulkheads, vessel structures, pilings, riprap, and pipelines. Pilings, riprap, and pipelines can be found in every San Francisco Bay region and are a dominant feature along the Port's waterfront. The western portion of Central Bay, between Alcatraz Island and the Golden Gate are four submerged rocks or pinnacles, including Arch Rock, Harding Rock, Shag Rock, and Blossom Rock. Several of these rise to within 40 feet of the sea surface. Most of these rock features were flattened to minimize navigation hazards when transiting the Bay. As a result, each of these natural features is surrounded by rubble and boulder fields.

These hard substrate areas provide habitat for an assemblage of marine algae, invertebrates and fishes, similar to the hard substrate in the intertidal zone of Central Bay.

The predominant seafloor habitat in the project area is unconsolidated soft sediment composed of combinations of mud/silt/clay (particles 0.001 to 0.062 mm in diameter), sand (particles 0.062 to 2.0 mm in diameter), and pebble/cobble (particles 2 to 256 mm in diameter), with varying amounts of intermixed shell fragments. Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms within these soft sediments (NOAA 2007a). Based on many geologic and marine biological studies conducted within the Bay-Delta, unconsolidated sediments are present throughout the Bay-Delta and are the predominant substrate type.

The unconsolidated gravel, sand and silt sediments of Central Bay can be subdivided into deepwater channels, slough channels, harbor, and shallow subtidal topographies, each exhibiting different sediment and ecological compositions and associated biological communities (NOAA 2007a). Subtidal habitats in the western portion of Central Bay, where the AC34 races would be held, are characterized as coarse sand and gravel with shifting sands, muddy-sand and sandy-mud in the lee of the islands, and sand and sandy mud in the shallows and Port areas (NOAA 2007a).

3.1.4 Essential Fish Habitat

The Central San Francisco Bay is included in the listing of essential fish habitat for a variety of pelagic, groundfish, and salmon species covered by the Coastal Pelagic Fish Management Plan (FMP), the Pacific Groundfish FMP, and the Pacific Coast Salmon FMP developed by the Pacific Fishery Management Council under the requirements of the Magnuson-Stevens Act. **Table 3** lists those fish species covered by these plans identified as utilizing the Action Area, along with the life stage and relative occurrence within the Action Area.

3.2 Social and Economic Environment

Socioeconomics comprise the basic attributes and resources associated with the human environment, particularly population and economic activity. This section identifies the socioeconomic environment within the proposed action area related to tourism/recreation, commercial and recreational fishing, and subsistence use.

3.2.1 Tourism and Recreation

Tourism is one of the prominent industries in San Francisco and generates $6.73 billion in tourist spending each year and is the largest industry in the region. There are numerous tours that focus on the waterfront, fishing, or transit to the Alcatraz or Angel Islands or to other cities such as Sausalito, Tiburon, Oakland, and Alameda. Tourists and residents alike are drawn to the San Francisco waterfront to partake of the incredible views of the bay, restaurants, ferry transportation, and general recreational activities such as biking, walking, or going to a baseball game at AT&T Park located south of Piers 30-32.

TABLE 3
MANAGED FISH SPECIES IN CENTRAL SAN FRANCISCO BAY
UNDER THE MAGNUSON STEVENS ACT

Fisheries Management Plan	Species, Common Name	Species, Scientific Name	Life Stage*	Abundance
Coastal Pelagic	Northern anchovy	*Engraulis mordax*	J, A	Abundant
	Jack mackerel	*Trachurus symmetricus*	E,L	Present
	Pacific sardine	*Sardinops sagax*	J, A	Present
Pacific Groundfish	English sole	*Parophrys vetulus*	J, A	Abundant
	Sand sole	*Psettichthys melanostictus*	L, J, A	Present
	Curlfin sole	*Pleuronichthys decurrens*	J	Rare
	Pacific sanddab	*Citharichthys sordidus*	E, L, J, A	Present
	Starry flounder	*Platichthys stellatus*	J, A	Present
	Lingcod	*Ophiodon elongatus*	J, A	Present
	Brown rockfish	*Sebastes auriculatus*	J	Present
	Pacific whiting (hake)	*Merluccius productus*	E,L	Present
	Kelp greenling	*Hexagrammos decagrammus*	J, A	Present
	Leopard shark	*Triakis semifasciata*	J, A	Present
	Spiny dogfish	*Squalus acanthias*	J, A	Present
	Skates	*Raja* ssp.	J, A	Present
	Soupfin shark	*Galeorhinus galeus*	J, A	Rare
	Bocaccio	*Sebastes paucispinis*	J	Rare
	Cabezon	*Scorpaenichthys marmoratus*	J	Present
Pacific Coast Salmon	Chinook salmon	*Oncorhynchus tshawytscha*	J, A	Seasonally Present
	Coho salmon	*Oncorhynchus kisutch*	J, A	Historically Present, Current Occurrence unknown

Table Information Sources: Pacific Fishery Management Council. 2011. Groundfish - http://www.pcouncil.org/groundfish/background/; Salmon- http://www.pcouncil.org/salmon/background/; Coastal Pelagic- http://www.pcouncil.org/coastal-pelagic-species/background-information/. Accessed April 20, 2011. CDFG IEP unpublished midwater trawl data 2005-2009 (Appendix A).

NOTES: A = Adult; J = Juvenile; L = Larvae; E = Egg

There are several waterfront piers that allow public access to walk along each pier over the San Francisco Bay. Pier 39 is the third most popular tourist destination in the U.S. It is a former commercial pier that was converted to accommodate numerous shops, restaurants, and the San Francisco Aquarium, but its main attraction is the sea lions that took over "K" dock in 1990, becoming an immediate tourist favorite. Tourists flock to Pier 39 or Pier 41 to watch the sea lions.

General recreation activities along the waterfront include kayaking, boating, and swimming. Each activity is fairly frequent along the waterfront and marine mammals can be seen foraging or transiting along the waterfront while the general public performs such activities.

3.2.2 Commercial Fishing

At present, only three species of fish and macroinvertebrates are harvested commercially in the San Francisco Bay-Delta: Bay shrimp (*Crangon franciscorum),* Pacific herring (*Clupea pallasi*), and Northern anchovy (*Engraulis mordax*).

Pacific herring and their roe are harvested in several areas around the Bay. The herring season lasts from the beginning of December to mid-March and would therefore not overlap with construction activities or the AC-34 race events. San Francisco Bay has the largest spawning population of herring and produces more than 90 percent of the herring catch. This fishery is managed through a limited entry system that began with 17 permits in 1973 – 1974, peaked with over 450 permits in the 1990s, and declined to 185 permits issued for the 2010-2011 season (CDFG 2011). None of the landings reported for Pacific herring (whole fish, sac roe, or herring eggs on kelp) in San Francisco Bay were within the months of August and September.

Bay shrimp are commercially harvested primarily to provide live bait for sturgeon and striped bass, but a small percentage of the catch is reserved for human consumption. Fishing is permitted year round and the primary method is beam trawling in waters less than 20 feet deep in channels of the estuary's shallow reaches (CDFG 2011). Peak catch per unit effort and total catch typically occurs in the months of June through November. Bay shrimp is the only commercial species regularly harvested in recent years during the months of August and September.

The northern anchovy is the most abundant fish in the Central Bay and an important prey species for many fishes and seabirds. Northern anchovy are harvested in San Francisco Bay, primarily using purse seine type nets, for use as both live and frozen bait for sport fishermen. Northern anchovy landings in San Francisco Bay were virtually nonexistent between 2005 and 2009; the one exception was in 2006, when more than 150,000 pounds were landed. During the months of August and September only 15 pounds of northern anchovy were harvested between 2005 and 2009, with the harvest occurring in 2005.

In addition to fishing within San Francisco Bay, numerous fishing boats depart from San Francisco for ocean fishing. The Port of San Francisco's Fisherman's Wharf is the center of Northern California's commercial and sport fishing fleets. Additionally, the Wharf's Pier 45 houses the West Coast's largest concentration of commercial fish processors and distributors. In 2010, approximately 8 million pounds of seafood worth $13.8 million dollars was brought in at Fisherman's Wharf. This represents 90.6 percent by weight and 89.1 percent by value of all the commercial seafood brought into ports within the Bay (CDFG 2011). While commercial fishing occurs year round, the peak season is November and December when typically nearly 70 percent of the year's total catch (by value) is landed. August is typically the third busiest year for commercial fishing although catches are generally only a third to quarter of peak season totals (by value).

Charter Fishing / Party Boats. Charter fishing vessels (also known as "sport fishing" or "party" boats) typically carry small groups of paying customers to sport fishing grounds outside the Golden Gate - although occasionally they may fish for migratory species within the bay. Charter fishing boat operations

operate from the harbors of Oakland, Emeryville, Berkeley, Richmond, Point San Pablo, San Rafael and Sausalito. Ten charter operators offer daily fishing excursion from the Port of San Francisco. The charter fishing trips generally leave port in the early morning (six to seven am) and return in the early afternoon (two to three pm). The major activity period for charter fishing operators is the salmon season (April through October) during which time up to 40 to 50 charter fishing boats typically operate per day (PAWSA, 2008). Many commercial sport fishing vessels also offer San Francisco Bay tours and wildlife viewing trips for whale and shark observation mostly in the Gulf of the Farallones outside the Golden Gate.

3.2.3 Subsistence Use

MMPA provisions require that the take authorized by an IHA not have an unmitigable adverse impact on the availability of the affected species or stock for subsistence uses. There are no subsistence activities directed at marine mammals within the action area.

3.3 Biological Environment

As previously stated construction activities and race events for this project will occur along the San Francisco Waterfront within the Central Bay of San Francisco Bay. San Francisco Bay is a large, complex, and highly dynamic estuary with an abundant and diverse array of marine species. The following sections provide a summary of the species that are found within the project area.

3.3.1 Marine Habitats

3.3.1.1 Open Water (Pelagic) Habitat

The construction activities for the Project will all occur along the San Francisco waterfront within the Central Bay and race activities will occur within the westernmost portion of the Central Bay. Because of its close proximity to the Pacific Ocean, the open water (pelagic zone) environment of the Central Bay is very similar to the open water coastal environment. Pelagic habitat is the predominant marine habitat in Central San Francisco Bay and includes the area between the water surface and the seafloor. The water column can be further subdivided into shallow-water/shoal and deepwater/channel areas (NOAA 2007a). AC34 race activities in 2012 and 2013 would occur in the deepwater/channels of Central Bay with docking/mooring occurring adjacent to existing Port wharfs in shallow water areas. No activities are expected to occur in regions of the Bay characterized as shoals or mud flats. The pelagic water column habitat is predominantly inhabited by planktonic organisms that either float or swim in the water, fish, marine birds, and marine mammals.

Plankton

Because of the high water flow rates typically present in Central Bay due to high tidal flow, plankton blooms do not regularly occur (NOAA 2007a). The zooplankton community consists of small invertebrate organisms that spend all or a portion of their life cycle in the water column and will change seasonally, with a few species being present year-round. These include microzooplankton (tintinnids, rotifers, and copepod nauplii), larger copepods (small crustaceans), cladocerans (small crustaceans or water fleas), and the larvae of benthic and pelagic invertebrate animals and fish (meroplankton). Other components of the zooplankton community include larvaceans, such as *Oikopleura dioica*, barnacle nauplii, polychaete worm larvae, ghost shrimp larvae and krill, which are important forage for planktivorous fish

species (CDFG 1987). The opossum shrimp (*Neomysis mercedis*) is an especially important zooplankton species found in Central Bay waters because of its dominant role as a preferred food for young fishes, including several protected species or species of concern like American shad, Striped bass, and green sturgeon (Adams et al. 2002, Sigfried 1980). Bay meroplankton is dominated by the northern anchovy (*Engraulis mordax*), longfin smelt (*Spirinchus thaleichtys*), Pacific herring (*Clupea pallasi*), plainfin midshipman (*Porichthys notatus*), the shrimps *Palaemon macrodactylus*, *Crangon franciscorum* and *C. nigricauda*, and the mysid *Neomysis kadiakensis*. All of these species are common fish forage either in their larval or adult stages.

Pelagic Fish

Thirty-three species of fish have been documented inhabiting Central Bay pelagic waters (Appendix A) in the years 2005 through 2009. Of these 33 taxa, three species account for 99% of the total abundance of fish regularly sampled in both the deep water and shallow areas of Central Bay. Northern anchovy (*Engraulis mordax*) is the overwhelming dominant species, accounting for up to 94% of those fish inhabiting the water column. Pacific herring (*Clupea pallasii*) and jacksmelt (*Atherinopsis californiensis*), are the second and third most common fish taxa in Central Bay waters, which together account for an additional 5% of the fish sampled on an annual basis.

In general, the presence of marine mammals in San Francisco Bay is related to distribution and presence of prey species and foraging habitat. Additionally, harbor seals and sea lions use various intertidal substrates that are exposed at low to medium tide levels for resting and breeding (NOAA 2007a). California sea lions are noted for using anthropogenic structures such as floating docks, piers, and buoys to haul out of the water to rest.

3.3.1.2 Intertidal Habitat

Little scientific documentation is available that describes the intertidal communities within the San Francisco Bay-Delta. However, in support of the Treasure Island Redevelopment Project (CCSF 2011), an intertidal community characterization study was performed along the artificial rocky rip-rap shoreline of Treasure Island and along the natural western shoreline of Yerba Buena Island (AMS 2009b). This study reported that the hard substrate intertidal regions of the project area support numerous marine and estuarine species of red and green algae, bryozoa, sponges, ectoprocts, barnacles, mussels, chitons, crabs, and anemones. As stated previously, because of its proximity to and influence by coastal ocean water flowing through the Golden Gate, Central Bay intertidal invertebrate and algae communities contain many coastal hard substrate taxa (AMS 2009b) interspersed with typical estuarine taxa, as illustrated by the presence of both the hybridized bay mussel (*Mytilus trossulus/galloprovencialis*) and the coastal mussel (*M. californianus)* (AMS 2011). The intertidal biological communities in Central Bay also include both native and non-native species (AMS 2009b).

The concrete, wood, and composite pier and wharf pilings in Central San Francisco Bay also provide both intertidal and subtidal habitat for marine biota. A March 2011 reconnaissance survey of marine biota attached to Port pilings at locations to be used for the project observed multiple species of barnacles, chitons, limpets, mussels, bryozoans, and tunicates, along with the native oyster (*Ostrea lurida*) and the

sea star *Pisaster ochraceous*. Observed algae included the green algae *Ulva spp*., the brown algae (*Egregia menziesii*), and the red algae (*Polyneura latissima*). Additional species of algae are expected to be present but were difficult to identify to the season of the survey. Both the hybridized bay mussel (*Mytilus trossulus/ galloprovencialis*) and the coastal mussel (M*. californianus)* were observed (AMS 2011).

3.3.1.3 Subtidal Habitats

Submerged hard bottom substrate is typically covered with a mixture of turf organisms that is dominated by hydroids, bryozoans, tunicates, encrusting sponges, encrusting diatoms, and anemones. In the intertidal and near subtidal zones, the barnacles *Balanus glandula*, *Amphibalanus amphitrite* and *A. improvisus* are commonly present along with the Bay mussel, *Mytilus trossulus/galloprovincialis*, the invasive Asian mussel *Musculista senhousia*, and the native or Olympia oyster *Ostrea lurida*. Barnacles can also be found subtidally on pier pilings, exposed rock outcropping and debris (NOAA 2007a). At least six species of sponges, seven species of bryozoans, and the hydrozoans *Ectopleura crocea* and *G. franciscana* are found inhabiting both natural and man-made hard substrate (NOAA 2007a). Commonly observed isopods and amphipods include the surface deposit feeders Gnorimosphaeroma, sp., and *Synidotea laevidorsalis*, the algae grazers *Ampithoe valida*, *Sphaeroma quoianum*, and *Eogammarus confervicolus*, the carnivore *Hopkinsia plana*, and *Incisocalliope derzhavini*, *Jassa marmorata* and *Stenothoe* (NOAA 2007a).

In addition, three species of caprellids (i.e., detritivores, carnivores, and deposit feeders) are commonly observed only in Central Bay (NOAA 2007a). Pacific rock crab (*Cancer antennarius*) and the red rock crab (*C. productus*) inhabit rocky, intertidal and subtidal areas in the Pacific Ocean, and likely use San Francisco Bay as an extension of their coastal habitats (Hieb 1999). Adult (age 1+) Pacific rock crabs are most commonly found in Central Bay in both the fall and spring months. Juveniles are most common in Central Bay from January to May and in South Bay from July to December (Hieb 1999). Pacific rock crabs move seasonally from channels (January to April) to shoals (June to December) (Hieb 1999). The Pacific and red rock crabs are frequent targets of sport anglers from piers and jetties.

The muddy-sand benthic community of Central Bay consists of a diverse polychaete community represented by several subsurface deposit feeding capitellid species, a tube dwelling filter feeding species (*Euchone limnicola*), a carnivorous species (*Exogone lourei*), and the maldanid polychaete *Sabaco elongatus*. There are also several surface deposit feeding *Ameana* spp. persisting throughout the year (NOAA 2007a).

The harbor and main channel areas of Central Bay are characterized as a mix of the benthic communities from surrounding areas (deep and shallow-water and slough marine communities) and include the obligate amphipod filter-feeder *Ampelisca abdita* and the tube dwelling polychaete *Euchone limnicola*. As a result of increased water flow and sedimentation in the harbor areas of Central Bay, the majority of the species reported inhabiting seafloor sediments in this region of the Bay-Delta are deposit and filter feeders, including the amphipods *Grandidierella japonica*, *Monocophium acherusicum*, and *Monocorophium alienense*, and the polychaetes *Streblospio benedicti* and *Psuedopolydora diopatra.* There is also a relatively high number of subsurface deposit feeding polychaetes and oligochaetes in

these areas including *Tubificidae* spp., *Mediomastus* spp., *Heteromastus filiformis*, and *Sabaco elongatus*. There is also sufficient community complexity and abundance to support relatively high abundances of three carnivorous polychaete species: *Exogone lourei*, *Harmothoe imbricata*, and *Glycinde armigera*.

A recent assessment of benthic infauna inhabiting Central Bay sand mining leases (FESA 2010), reported a low diversity, low abundance community composed of 107 taxa that appeared to be heavily influenced by natural and anthropogenic sediment disturbance and instability (AMS 2009a). This sediment instability appeared to be the result of high currents in the area that characterize the portion of Central Bay near the Golden Gate. The study reported observing a region-wide community where the benthic infauna community was dominated by nematodes, polychaetes, oligochaetes and nemerteans, all which are worms, and amphipods. Other dominant taxa reported included several native and introduced bivalves (clams) and the holothurian (sea cucumber) *Leptosynapta* spp. Total animal density was estimated at about 2,000 individuals per m^2.

The most common large mobile benthic invertebrate organisms in the Central Bay include blackspotted shrimp (*Crangon nigromaculata*), the bay shrimp (*Crangon franciscorum*), Dungeness crab (*Metacarcinus magister*), and the slender rock crab (*Cancer g*racilis). Although other species of shrimp are present in the Central Bay, their numbers are substantially lower when compared to the number of bay and blackspotted shrimps present (NOAA 2007a). All of these mobile invertebrates are present throughout the Central Bay and provide an important food source for carnivorous fishes, marine mammals, and birds in San Francisco Bay's food web. Dungeness crabs use most of the Bay as an area for juvenile growth and development prior to returning to the ocean as sexually mature adults (Tasto 1979).

Subtidal Plants and Submerged Aquatic Vegetation (SAV)

Aquatic vegetation occurs throughout Central Bay on both soft and hard substrate. On the shallow unconsolidated subtidal habitat within the Central Bay, such as in Clipper Cove and along the intertidal mudflats in Richardson Bay, the green algae, *Ulva/Enteromorpha*, *Gracillaria verrucosa*, *Ruppia maritime, Potamogeton pectinatus* and *Zostera marina* (eelgrass) frequently occur (NOAA 2007). *Zostera*, is a shallow subtidal as well as intertidal flowering plant found inhabiting bays, estuaries, and the leeside of islands, such as Treasure, Angel, Yerba Buena, and Alcatraz Islands (Merkel & Associates 2010). Bed locations and size are determined by water depth and turbidity. Eelgrass can only become established in those areas of the Bay-Delta where water depth and turbidity allow light to penetrate to the seafloor (Merkel & Associates 2010). In addition to the eelgrass beds present along the major islands in Central Bay, extensive eelgrass beds are also located throughout Richardson Bay , in Clipper cove between Yerba Buena and Treasure Islands, along the southern shoreline of the Tiburon peninsula, such as in Kiel cove, within Horseshoe Cove, and along the East Bay shorelines of Richmond, San Leandro, Oakland, and Alameda (Merkel & Associates 2010). The eelgrass beds located throughout Richardson Bay are the largest in Central Bay and the second largest in the entire Bay-Delta (Merkel & Associates 2010). The Richardson Bay bed covers approximately 675 acres (Merkel & Associates 2010). SAV beds

and plants are also primary spawning habitat for many invertebrate and vertebrate species in San Francisco Bay, most notably, Pacific herring (NOAA 2007a).

In addition to eelgrass beds discussed above, because of the strong ocean influence in Central Bay, additional species of red and brown algae are found attached to submerged and intertidal hard substrate, including pier pilings. These include *Cladophora serice, Codium fragile, Fucus gardneri, Laminaria sinclairii, Egregia, Halkymenia schizymenioides menziesii, Sargassum muticum, Polyneura latissima, Cryptopleura violacea, and Gelidium coulteri* (NOAA 2007a). In addition, the species *Codium fragile* subspecies *tomentosoidess, Bryopsis hypnoides*, *Chondracanthus* (formerly *Gigartina*) *exaspertata, Ahnfeltiopsis* (formerly *Gymnogongrus*) *leptophyllus* can be found inhabiting either hard or soft substrate (NOAA 2007a). Oceanic species decline in numbers and presence the further east you go in the bay where the salinities can typically be much higher than oceanic species can tolerate (NOAA 2007a). The only flowering plant found in the Bay is surfgrass (*Phyllospadix*), found only at the entrance to the Bay no further than Fort Baker and Fort Point on either side of the Golden Gate Bridge (NOAA 2007a). All submerged aquatic vegetation in the Central Bay is considered critical essential fish spawning habitat for Pacific herring.[4]

Demersal Fish

Many different fish species spend all or part of their life cycle in association with the demersal or (bottom) zone including flatfish, gobies, poachers, eelpouts, and sculpins, which all live in close association with the benthos during their sub-adult and adult life. Others, such as salmon, steelhead, longfin smelt, and other fish species will use the benthos for foraging.

In total, fifty-three demersal fish species have been collected from CDFG IEP monthly bottom trawl fish collections between 2005 and 2009 (Appendix A) (IEP 2005-2009). Of these species, 12 constitute 98% of the species commonly inhabit the seafloor and immediately adjacent waters in both the deep and shallow water regions of Central Bay. The remaining forty-one taxa account for less than 0.1% each. Bay goby (*Lepidogobius lepidus*), English sole (*Parophrys vetulus*), speckled sanddab (*C. stigmaeus*), plainfin midshipmen (P. notatus), Pacific staghorn sculpin (*Leptocottus armatus*), shiner perch (C. aggregata), cheekspot goby (*llypnus gilberti*), Longfin smelt (*S. thaleichthys*), white croaker (*G. lineatus*), bonyhead sculpin (*Artedius notospilotus*), Pacific sandab (*Citharichthys sordidus*), and bay pipefish (*Syngnathus leptorhynchus*) account for 98% of the species present over the past five years and dominate the community structure (IEP 2005-2009).

Managed, protected, or other fish species of concern or special significance observed inhabiting Central Bay seafloor areas include Pacific sardine (*S. sagax*), English sole (*P. vetulus*), Pacific sanddab (*C. sordidus)*, lingcod (*Ophiodon elongates*), Brown rockfish (*S. auriculatus*), Kelp greenling *Hexagrammos decagrammus*), Leopard shark *Triakas semifaciata*), spiny dogfish shark (*Squalus acantias*), skates (*Raja* spp.), cabezon (*Scopaenichthys marmaoratus*), Pacific herring (*C. pallasii*), and longfin smelt (*Spirinchus thaleichthys).* Anadromous species use San Francisco Bay estuary on their way up rivers to spawn and as

[4] The Magnuson-Stevens Act defines "essential fish habitat" as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

a rearing area for juveniles on their way down from their birthplace in the river to the open ocean (NOAA 2007). Native anadromous species include Chinook salmon (O*. tshawytscha*), steelhead trout (*Oncorhynchus mykiss gairdneri*) and both green and white sturgeon (*Acipenser medirostris* and *A. transmontanus*).

3.3.2 ESA Listed Fish Species

3.3.2.1 Green Sturgeon-Southern DPS (Acipenser medirostris)

Distribution: Green sturgeons, after outmigration from freshwater, disperse widely in nearshore coastal waters from Mexico to the Bering Sea and are common occupants of bays and estuaries along the western coast of the United States (Moyle et al. 1995). Sturgeons that have been tagged in the Sacramento River have been reported captured in coastal and estuarine waters to the north of San Francisco Bay (Miller and Kaplan 2001). Adults are found throughout the San Francisco Bay and Delta during periods of migration, while juveniles are present in the southern San Francisco Bay year-round, mostly south of the Dumbarton Bridge.

***Critical Habitat*:** Critical habitat for the green sturgeon includes the Sacramento River, the Sacramento-San Joaquin Delta, and Suisun, San Pablo and all of San Francisco Bay below the higher high water (NOAA 2009).

***Occurrence in Action Area*:** Green sturgeon have the potential to be present throughout all marine portions of the Action Area at any time of the year.

3.3.2.2 Steelhead (Oncorhynchus mykiss), Central California Coast ESU

Distribution: Includes coastal river basins from the Russian River south to Soquel and Aptos Creek, California (inclusive), and the drainages of San Francisco and San Pablo Bays, including the Napa River. They are also known to migrate to the South Bay, where they spawn in the Guadalupe River, Coyote Creek, and San Francisquito Creek. Also included are adjacent riparian zones, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay from San Pablo Bay to the Golden Gate Bridge. Major river basins containing habitat comprise approximately 6,516 square miles. These basins are located within Alameda, Contra Costa, Marin, Mendocino, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma counties (NOAA 2007a). Historically, most streams with suitable habitat within the San Francisco Bay Estuary supported steelhead populations (Leidy 2000). Current runs are estimated less than 10,000 fish, exist in the San Francisco Bay tributaries (Leidy 2000).

Critical Habitat: Critical habitat includes all natal spawning and rearing waters, migration corridors, and estuarine areas that serve as rearing areas accessible to listed steelhead in coastal river basins, from the Russian River to Aptos Creek (inclusive), and the drainages of San Francisco and San Pablo Bays. Also included are adjacent riparian zones, all waters of San Pablo Bay west of the Carquinez Bridge, and all waters of San Francisco Bay to the Golden Gate (USFWS 2000). Specific to estuarine areas, NMFS requires that all estuarine areas be free of obstruction and excessive predation, maintain water quality, and salinity conditions supportive of juvenile and adult physiological transitions between fresh water and saltwater; that natural cover such as submerged and overhanging large wood, aquatic vegetation,

large rocks and boulders, and side channels be maintained; and maintenance of juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (NOAA 2005).

Occurrence in Action Area: Primarily present during in-migration and out-migration periods. Suspected to forage in Central Bay shallow water areas (<30 feet) during in-migration and out-migration transits.

3.3.2.3 Steelhead (Oncorhynchus mykiss), California Central Valley ESU

Distribution: Historically occurred throughout the Sacramento and San Joaquin river systems: from the upper Sacramento/Pit river systems south to the Kings and possibly Kern river systems in wet years (Yoshiyama et al. 1996). Currently, the Central Valley steelhead ESU includes steelhead in all river reaches accessible to the Sacramento and San Joaquin Rivers and their tributaries in California (NOAA 2000). Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas of the San Joaquin River upstream of the Merced River confluence and areas above specific dams identified or above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years) (NOAA 2000). Presently, the Central Valley contains only winter steelhead. Based on Red Bluff Diversion Dam counts, hatchery counts, and prior natural spawning escapement estimates from the early 1990s (McEwan and Jackson 1996), roughly estimated the total annual run size (hatchery and wild) for the entire system at no greater than 10,000 adult fish.

Critical Habitat: Critical habitat for the Central Valley steelhead was designated throughout the Central Valley on 16 September 2, 2005 (NOAA 2005). Critical habitat for the species is divided into 22 hydrologic units by watersheds. None of these hydrologic units occur within San Francisco Bay. However, the primary migration corridor to these hydrologic units spawning areas is through Central Bay, North Bay, and San Pablo and Suisun Bays in the Delta. The primary migration corridor is similar to that used by migrating salmon in the Bay and occurs through Raccoon Straight north of Angel Island.

Occurrence in Action Area: Primarily present during in-migration and out-migration periods. Suspected to forage in Central Bay shallow water areas (<30 feet) during in-migration and out-migration transits.

3.3.2.4 Chinook Salmon, Sacramento winter-run (Oncorhynchus tshawytscha)

Distribution: Adults utilize the coastal waters of California, migrating through the golden Gate, Central Bay, North Bay, San Pablo Bay, Suisun Bay and into the Sacramento River. Outmigrating juveniles follow the same path in reverse. Studies conducted by NMFS (2001) and CDFG (Baxter et al. 1999) indicate that the primary migration corridor is through the northern reaches of Central San Francisco Bay (Raccoon Straight and north of Yerba Buena Island).

Critical Habitat: The Sacramento River from Keswick Dam, Shasta County (River mile 302) to Chipps Island (River mile 0) at the westward margin of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and

Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (NOAA 1993).

Occurrence in Action Area: Primarily present during in-migration and out-migration periods. Suspected to forage in Central Bay shallow water areas (<30 feet) during in-migration and out-migration transits.

3.3.2.5 Chinook Salmon, Central Valley (Sacramento) spring-run (Oncorhynchus tshawytscha)

Distribution: Adults utilize the coastal waters of California, migrating through the golden Gate, Central Bay, North Bay, San Pablo Bay, Suisun Bay and into the Sacramento River. Outmigrating juveniles follow the same path in reverse. Studies conducted by NMFS (2001) and CDFG (Baxter et al. 1999) indicate that the primary migration corridor is through the northern reaches of Central San Francisco Bay (Raccoon Straight and north of Yerba Buena Island).

Critical Habitat: All river reaches accessible in the Sacramento River and its tributaries in California, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (NMFS 2005).

Occurrence in Action Area: Primarily present during in-migration and outmigration periods. Known to forage in Central Bay shallow water areas.

3.3.3 ESA Listed Marine Bird Species

3.3.3.1 Western Snowy Plover[5]

Distribution. The Pacific coast population of the western snowy plover breeds primarily on coastal beaches from southern Washington to southern Baja California, Mexico. Sand spits, dune-backed beaches, beaches at creek and river mouths, and salt pans at lagoons and estuaries are the main coastal habitats for nesting. Less common nesting habitats include bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and river bars. Roosting plovers usually sit in small depressions in the sand, or in the lee of kelp, other debris, or small dunes. Sitting behind debris or in depressions provides some shelter from the wind and probably makes the birds more difficult for predators to detect. When roosting snowy plovers are disturbed, they frequently run a few feet to a new spot where they sometimes displace other individuals. Alternatively, the whole flock may fly to a new location. Near to the Action Area, the Golden Gate National Recreation Area has created the Ocean Beach Snowy Plover Protection Area (Stairwell #21, just south of the Beach Chalet, to Sloat Boulevard—including all tidelands). This area is at the southern end of the Beach, just north of the San Francisco Zoo.

[5] For the most part, this information was obtained from the U.S. Fish and Wildlife *Recovery Plan for the Pacific Coast Population of the Western Snowy Plover,* 2007.

Occurrence within the Action Area. In the Action Area, non-nesting birds may be present at Crissy Beach from July through early May. Most, if not all, of the western snowy plovers within the Action Area would be found within the Crissy Beach Wildlife Protection Area (Crissy Beach WPA) (west end of Crissy Beach)[6]. See Figure 1 for a vicinity map, which identifies the Crissy Beach WPA. There are no breeding sites in or adjacent to the Action Area. Within both the Crissy and the Ocean Beach protection area, specific prohibitions are in place to protect against dogs off leash (36 CFR 1.5(a)(2)); disturbing wildlife (36 CFR 2.2); and disturbing threatened species (16 USC 1538). As described above, the winter season, from November through February, is the critical time period for the western snowy plover, (both because of energy demands and the presence of greater numbers of birds), which the AC34 events will avoid.

3.3.3.2 California Least Tern[7]

Distribution. The California least tern once nested widely along the central and southern California coast and the Pacific coast of Mexico. Nesting today is limited to the Alameda Point on Alameda Island in the South San Francisco Bay (two miles outside of the Action Area), the Sacramento River delta, and areas along the coast from San Luis Obispo County to San Diego County.

Occurrence in the Action Area. Least terns have been seen in the portion of the Central Bay where the races will take place; however, the least tern forages more frequently in shallower water and therefore would not be especially common in the deeper areas where the race will take place. Atwood and Minski indicate that approximately 90-95% of foraging takes place in water less than 60 feet deep (Atwood and Minski, 1983). BA Conservation Measures are intended to minimize disturbance to foraging birds.

3.3.4 Marine Mammals

3.3.4.1 Species not Considered in this Environmental Assessment

Gray (*Eschrichtius robustus*) and humpback whales (*Megaptera noveangliae*) were excluded from the consultation as they would not be adversely affected by construction or race related activities due to their migration timing and the preventive measures that will be taken during the races.

The gray whale is typically observed migrating southward along the Central California coast between December and February and then again heading northward between February and July. Observations in San Francisco Bay are typically made from December through May, during the whales' coastal migration (USACE 2011). Pile driving activities could overlap with the southbound migrating whales; however, typically southbound migrating whales travel farther offshore and are less likely to enter into the Bay.

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6 Snowy plovers have also been observed on rare occasions and for short periods of time (over a few days) at Rodeo Beach, north of the Action Area (NPS, 2009).

7 Information in this species description was obtained from the following source or references cited therein: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B03X (USFWS, 2011a)

Humpback whales migrate in the summer and fall from Central America and Mexico to areas ranging from California to southern British Columbia this species would be more likely than the gray whale to enter the bay and encounter pile driving activities between June through November of 2012. However, given the timing of pile driving activities, it is unlikely that any gray whales or humpback whales would be impacted. Marine mammal monitoring for the SFOBB Projected reported that sightings of humpback whales were extremely rare and stated that the species was unlikely to be present in the project vicinity during construction (SRS 2004). During Caltrans monitoring for the Bay Bridge project no gray or humpback whales were reported (Caltrans 2006). Project pile driving activities are of a smaller scale and shorter duration than the SFOBB project and therefore it would be even more unlikely that a grey or humpback whale would be present in the project area during pile driving construction activities or during race events and thus unlikely that incidental harassment would occur. In addition, all race management personnel will be trained in marine mammal identification and will be tasked with scanning for debris or other obstructions that could possibly damage or impede fair play. Although unlikely, in the event that a large marine mammal, such as a whale is observed, the Course Marshal would postpone or abandon the race depending on the direction the whale is moving or its presence within or near the race course. These actions would be taken to ensure the safety of the marine mammals as well as the racing boats and crews.

Accordingly, this EA will not consider gray or humpback whales in greater detail.

3.3.4.2 Species Considered in this Environmental Assessment

The species that are analyzed in the IHA permit application are those that are expected to be in the project area defined as the pier area where construction activities occur or the race area, and include harbor seals, California sea lions, harbor porpoises, and elephant seals. Additional information on these species is relevant to the analysis of impacts.

Marine mammal species likely to be found in the activity area include the harbor Seal (*Phoca vitulina*), California Sea-lion (*Zalophus californianus*), and the harbor porpoise (*Phocoena phocoena*). Harbor seals and California Sea-lion are found within the Bay at multiple sites either resting or foraging. Marine mammal monitoring results during the San Francisco/ Oakland Bay Bridge (SFOBB) project indicated that occasional sightings of harbor porpoises in the Bay, including near the Yerba Buena Island (YBI) harbor seal haul-out site were reported (SRS 2004). As per NMFS Southwest Regional office staff, harbor porpoises have been observed below the Golden Gate Bridge and were observed in some instances displaying mating behavior. Individual juvenile elephant seals (*Mirounga angustirostris*) have been reported entering the Bay in the past few years between March and August, with an occasional report in October and November. These juveniles have been observed on occasion to haul out on the beach at Crissy Field to rest. A few have been collected and taken to the Marine Mammal Center for treatment of malnutrition prior to being released. Thus for this EA, harbor seals and sea lions are the only marine mammal species that have the potential to be consistently present anywhere near proposed construction activities for the AC34 Project.

Typically there is minimal marine mammal activity in the waters immediately adjacent to waterfront facilities where floating docks and associated vibratory pile driving are proposed. A lack of marine

mammal activities in these areas may be due to the level of human disturbance along the San Francisco waterfront. The primary route for shipping traffic into and out of the Port of San Francisco and Port of Oakland is located between the San Francisco waterfront (project sites) and Angel Island. Tugboat activities occur at Piers 15 and 17, Ferry Traffic around Pier 1 and along the waterfront to Piers 39 and 45, marine shipping and cargo transport to Piers 80 A-D and Piers 92, 94-96 and cruise vessel traffic at Piers 27 and 35 and other water dependant maritime uses frequently occur along the San Francisco waterfront. Ambient underwater noise for a major harbor like San Francisco is estimated at approximately 150 dB based on sound monitoring conducted for the SFOBB Project (Caltrans 2009). These levels of noise exceed the NMFS threshold for continuous sound levels of 120 dB) for marine mammal disturbance under ambient conditions. Furthermore, during Fleet Week (October 6-11, 2011) which consisted of four hour air shows each day and increased vessel traffic, there were no strandings nor collisions of marine mammals reported to or recorded by NOAA (Pers comm. 2011a).

As shown in **Figure 2,** the primary race area will be a small area within the overall race course limits. Racing Yachts, spectator boats, and helicopter operations will occur primarily between the Golden Gate and extend a short distance beyond Pier 27/29. Disturbance related to boating activities would be similar to noise levels seen on an active day in the bay. Ambient conditions already exceed NMFS criterion for Level B harassment resulting from non-pulsed sound (i.e., 120 dB). Fireworks displays will be launched from a barge in proximity to Pier 27 in 2013.

Construction activities will take place along the San Francisco waterfront. Vibratory pile driving for installation of floating docks will occur June through August 2012 and March through July of 2013, installation of 12-inch wood piles at Pier 19 will occur sometime between July and December 2012. Race events are scheduled for eight days in August and October of 2012 and between July and September of 2013. Based on recent projects with similar vibratory pile driving equipment and pile size (Exploratorium and Pier 36/Brannan Street Wharf) along the San Francisco waterfront; it has been generally shown that Level A harassment thresholds are not reached during vibratory pile driving. The applicant has submitted examples of anticipated Level A and Level B harassment zones for vibratory pile driving from recent monitoring projects as well as calculations of anticipated Level A and Level B harassment zones for impact pile driving at Pier 19 within the IHA application.

The following sections describe each species that are expected to be present within either the project site where construction will take place or the race area in general.

Harbor seal (*Phoca vitulina*)

Status: California Harbor Seals are not listed under the ESA or considered strategic under the MMPA (NOAA 2011).

Distribution: There are up to 500 haul out sites for the harbor seal distributed along their Pacific coast range. The harbor seal is a permanent resident in San Francisco Bay. Harbor seals have established haul out sites at Castro Rocks in San Pablo Bay, YBI in the Central Bay, and Mowry Slough in the South Bay

FIGURE 2

Primary Race Area

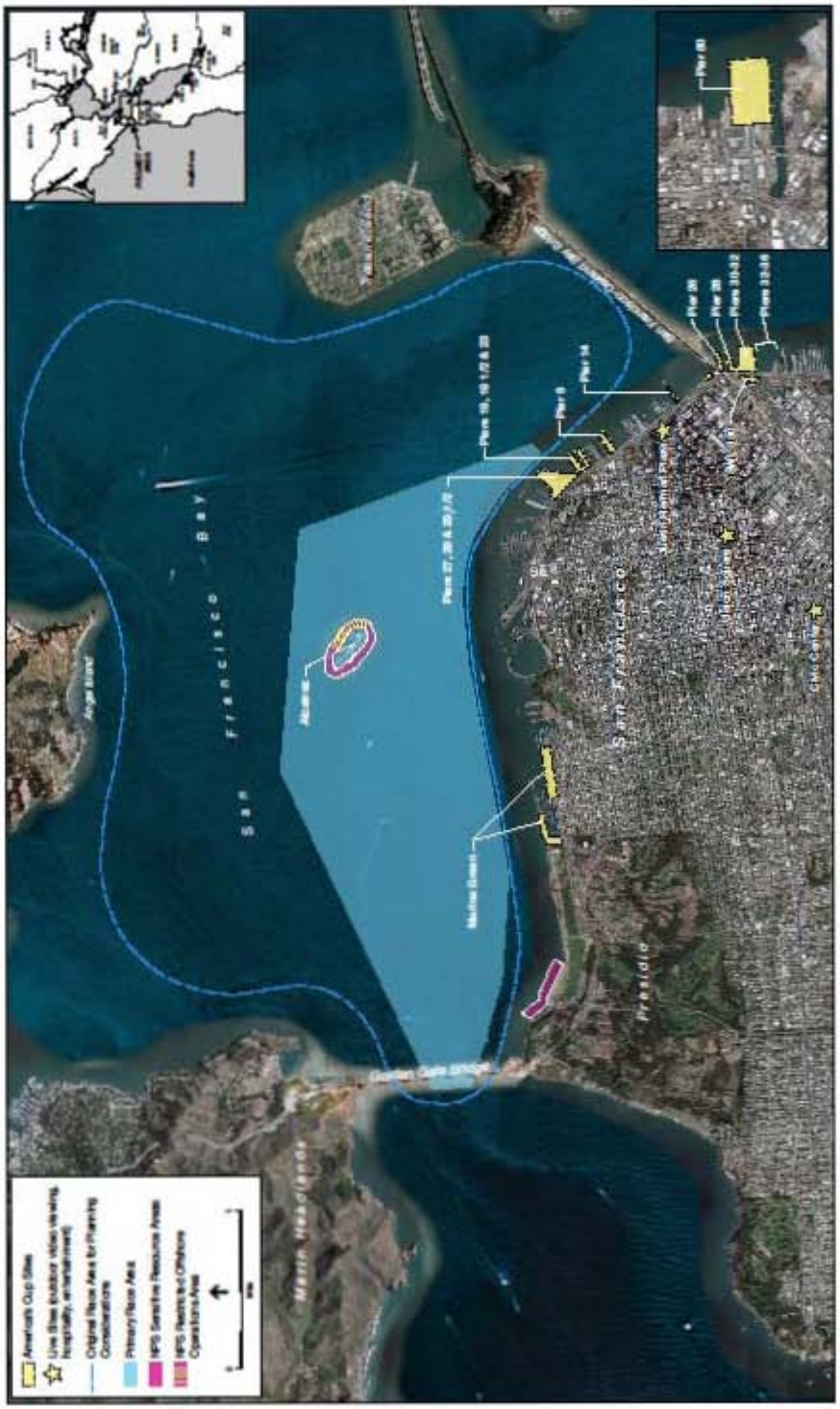

Figure 2
Primary Race Area

SOURCE: Google Maps; ESA

(NOAA 2007a). The south side of YBI is the nearest haul out area to the Project Site.

The year-round seal haul-out on the south side of YBI is part of the U.S. Coast Guard lands on the island and is not identified as a site for use by the project. Although not historically identified as a pupping site for harbor seals, recent observations suggest that occasional pupping does occur at this location (Green et al. 2006). Pupping season for harbor seals in San Francisco Bay spans approximately March 15th through May 31st, with pup numbers generally peaking in late April or May.

As noted above, the YBI haul-out site is on the south side of the island, on U.S. Coast Guard property. Individual seals may occasionally haul out farther to the west and southwest of the main haul-out site, depending on space availability and conditions at the main haul-out area. San Francisco Bay Pacific Harbor Seal counts ranged from 524 to 641 seals from 1987 to 1999 (Goals Project 2000). The current Bay-Delta harbor seal population is estimated at between 500 and 700 individuals (NOAA 2007b). The haul-out area on YBI is within the region of influence but not within the boundaries of the Proposed Project. The YBI haul out site is approximately two miles from Pier 19 where impact pile driving will be conducted.

Stock Assessment: California's population is estimated at 34,233 individuals (http://www.nmfs.noaa.gov/pr/sars/ NOAA 2011).

California sea lion (*Zalophus californianus*)

Status: California sea lions in the U.S. are not listed under the ESA or considered depleted under the MMPA (NOAA 2011). They are also not considered a strategic stock under the MMPA (NOAA 2011).

Distribution: California sea lions reside in the Eastern North Pacific Ocean in shallow coastal and estuarine waters. A common, abundant marine mammal, they are found throughout the west coast, generally within 10-miles of shore. California sea lions occur within the Bay-Delta in their highest numbers while migrating to and from their primary breeding areas on the Farallon and California Channel Islands, and when Pacific herring and salmon inhabit Bay-Delta waters to spawn or migrate to upriver spawning areas. They haul out on offshore rocks, sandy beaches, and onto floating docks, wharfs, vessels, and other man-made structures in the Bay and coastal waters of the state. Winter numbers of California Sea-lion in the Bay are generally over 500 animals (Goals Project 2000). In San Francisco Bay, California sea lion have been observed at Angel Island and occupying the docks near Pier 39 which is the largest California sea lion haul-out in San Francisco Bay. Up to 800 sea lions have been historically counted at Pier 39. This group of sea lions has decreased in size in recent years, coincident with a fluctuating decrease in the herring population in the Bay. There are no known breeding sites within San Francisco Bay. Their primary breeding site is in the Channel Islands (USACE 2011). The sea lions appear at Pier 39 after returning from the Channel Islands at the beginning of August (Bauer 1999). No other sea lion haul-out sites have been identified in the Bay and no pupping has been observed at the Pier 39 site or any other site in San Francisco Bay under normal conditions (USACE 2011). Although there has been documentation of pupping on docks in the Bay, this event was during a domoic acid event. It is not anticipated that any domoic events will occur during the AC34 event

or construction activities. California sea lions may forage in the waters of and adjacent to the sites where construction is proposed and where the race events will occur.

Stock Assessment: The most current NMFS stock assessment report estimates the U.S. stock population size at approximately 296,750 individuals (NOAA 2012).

Harbor porpoise (*Phocoena phocoena*)

Status: Harbor porpoise in California are not listed under the ESA or considered depleted under the MMPA (NOAA 2011).

Distribution: Harbor porpoise is a near-shore species that inhabits northern temperate and subarctic coastal and offshore waters. In the North Pacific, they are found from Japan (34°N) north to the Chukchi Sea and from Monterey Bay, CA to the Beaufort Sea. They are most often observed in bays, estuaries, harbors, and fjords less than 650 feet (200 m) deep, like San Francisco Bay-Delta. The San Francisco-Russian River Stock, identified as a unique genetic group, ranges from Point Arena to Monterey Bay. Harbor porpoises are non-social animals usually seen in groups of 2 to 5 individuals near the Golden Gate Bridge and open water areas of Central Bay. Unlike some of their cousins, harbor porpoises typically avoid boats and humans. Little information is known about their social behavior. Harbor porpoises feed on schooling fish such as herring and anchovies and invertebrates, including squid.

Occasional sightings of harbor porpoises (*Phocoena phocoena*) in the Bay, including near the Yerba Buena Island harbor seal haul-out site, were reported by the revised Caltrans marine mammal monitoring program (SRS 2004 as cited in WRA 2010) and the Golden Gate Cetacean Research (GGCR) Organization suggests that the species is returning to San Francisco Bay after an absence of approximately 65 years (GGCR 2010). This re-emergence is not unique to San Francisco Bay, but rather indicative of the harbor porpoise in general along the west coast. GGCR has begun a NMFS authorized, multi-year assessment to document the population abundance and distribution in the Bay. Recent observations of harbor porpoises have been reported by GGCR researchers off Cavallo Point, outside Raccoon Strait between Tiburon and Angel Island, off Fort Point and as far into the Bay as Carquinez Strait (Perlman 2010). Based on the Caltrans marine mammal monitoring and GGCR observations, the furthest site within the Bay at which harbor porpoises have been observed is Yerba Buena Island where in 2000 a single harbor porpoise was observed (CalTrans 2006). Harbor porpoises have been observed in the central and north bay and could potentially occur within the race course area.

Stock Assessment: NMFS's most current final stock assessment report for the San Francisco/Russian River stock estimates this population at approximately 9,189 individuals (NOAA 2010).

***Elephant Seals (Mirounga angustirostris*)**

Status: Elephant seals in California are not listed under the ESA or considered depleted under the MMPA (NOAA 2010).

Distribution: Northern elephant seals spend approximately 9 months out of the year in the ocean. They usually dive underwater to depths ranging between 1,000-2,500 ft for 20-30 minute intervals with only

short breaks at the surface. Due to this behavior, they are rarely seen out at sea. Northern elephant seals are found in the eastern and central North Pacific Ocean and range as far north as Alaska and as far south as Mexico, they typically breed in the Channel Islands of California or Baja California in Mexico. Breeding occurs between December and March. While on land they prefer sandy beaches. Elephant Seals do not have any established haul out sites in the San Francisco Bay, but occasional sightings have occurred at Crissy Field.

Stock Assessment: NOAA estimates the California breeding stock at 124,000 individuals (NOAA 2010).

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytical basis for comparison of direct, indirect, and cumulative effects of the alternatives. Regulations for implementing the provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508).

4.1 Effects of Alternative 1: Deny Issuance of an IHA (No Action)

Under the No Action Alternative, NMFS would not issue the proposed IHA for the activities proposed by the project sponsors. Accordingly, any takes of marine mammals resulting from the proposed construction or race event activities would not be authorized and any incidental take of marine mammals would be a violation of the MMPA. As a result, the project sponsors may decide that they are not able to hold AC34 races or install temporary floating docks, and the Port of San Francisco may not be able to conduct the repairs at Pier 19.

4.2 Effects of Alternative 2: Issuance of an IHA with Mitigation (Preferred)

4.2.1 Impacts of the Physical Environment

Geology and Oceanography: Based on a review of the data, no direct impacts to geologic or oceanographic resources are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals to construction and race event activities.

Based on a review of the data, no significant indirect impacts are expected from the project sponsors construction and race event activities. The activities that may affect marine mammals covered under the IHA are not expected to disturb the geology nor the water quality surrounding the project area. The proposed project includes dredging in three locations that may result in some non-significant environmental impacts (i.e., minimal increase in turbidity in the immediate dredge area).

Intertidal and Subtidal Habitat: Based on a review of available information, no direct impacts to intertidal or subtidal habitat are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals for construction and race event activities. That action is unlikely to affect such habitat.

Indirect effects would likely include localized and temporary turbidity impacts caused by dredging and the installation and removal of piles and vessel moorings, disturbance of benthic foraging habitat during dredging and the installation and removal of piles and vessel moorings, potential temporary exclusion from habitat associated with the avoidance of high noise levels generated during pile driving, temporary loss of soft sediment from dredging and pile replacement, and potential temporary increased predation of pelagic schooling fish as a result of temporary night-time lighting on temporary floating docks.

These indirect impacts would be localized and temporary. No significant indirect impacts to these habitats are expected from construction and race event activities. Considering the location of these activities and the temporary nature of the activities, significant indirect impacts on intertidal and subtidal habitat are unlikely.

Essential Fish Habitat: The proposed project is located within Essential Fish Habitat (EFH), as defined in Magnuson-Stevens Act, for 20 species of commercially important fish and sharks managed under three federal fisheries management plans (FMPs); the Pacific Groundfish FMP, the Coastal pelagic FMP, and the Pacific Coast salmon FMP. The proposed project is located near eelgrass beds which are Habitat Areas of Particular Concern (HAPC). Although not considered a HAPC, native oyster beds that have the potential to occur within the action area have been recognized as important components of hard bottom (rock) HAPC that is utilized by groundfish and reflect the quality of the habitat. No significant direct impacts are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals for construction and race event activities. The action of issuing an IHA to conduct construction and race event activities is not likely to affect, destroy, or adversely modify designated EFH or HAPC.

Indirect impacts to EFH include localized and temporary turbidity impacts caused by dredging and the installation and removal of piles and vessel moorings, disturbance of benthic foraging habitat during dredging and the installation and removal of piles and vessel moorings, potential temporary exclusion from habitat associated with the avoidance of high noise levels generated during pile driving, temporary loss of soft sediment from dredging and pile replacement, and potential temporary increased predation of pelagic schooling fish as a result of temporary night-time lighting on temporary floating docks.

The indirect impacts to EFH are localized and temporary. No significant indirect impacts to EFH are expected from construction and race event activities. Considering the location of these activities and the temporary nature of the activities, significant indirect impacts on EFH are unlikely and are not likely to affect, destroy, or adversely modify designated EFH or HAPC.

Designated Critical Habitat: The proposed project is located within critical habitat identified for Green Sturgeon, Steelhead (California Coast ESU and Central Valley ESU), and Chinook Salmon (Central Valley spring-run and Sacramento River winter-run). No significant direct impacts are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals from construction and race event activities.

No significant indirect impacts to critical habitat are expected from construction and race event activities. The proposed activities are not likely to affect, destroy, or adversely modify designated critical habitat.

4.2.2 Impacts on the Social and Economic Environment

Commercial Fishing: None of the activities would be directed at commercial fishing or would likely have any impact on commercial fishing in the action area. No significant direct impacts are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals for construction and race event activities. No significant indirect impacts are expected from construction and race event activities.

Recreational Fishing: None of the activities are directed at recreational fishing. No significant direct impacts are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals. No significant indirect impacts are expected from construction and race event activities.

Tourism and Recreation: No significant direct impacts are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals for construction and race event activities.

Subsistence Use: Subsistence hunts of marine mammals do not occur in the area. No significant direct impacts are expected from the action of issuing an IHA for the incidental take, by Level B harassment only, of small numbers of marine mammals for construction and race event activities. No significant indirect impacts are expected from construction and race event activities.

4.2.3 Impacts on the Biological Environment

Issuance of the proposed IHA for the proposed construction and race event activities would be likely to cause three primary stressors to marine mammals in the area: (1) disturbance to marine mammals from pile driving activities; (2) disturbance to marine mammals from helicopter operations; and (3) disturbance to marine mammals related to fireworks. Issuance of the IHA would not impact other facets of the biological environment (e.g., fish, birds, vegetation).

Pinnipeds within the proposed project area may be exposed to sounds from pile driving activities, helicopter operations, and fireworks. Project construction and race event activities may impact marine mammal species through temporary avoidance and disruption of foraging behavior as a result of construction and race activities, but no long term impacts to the species or stocks are expected to occur as a result of the project.

4.2.3.1 Pile Driving

Pile driving for installation of floating docks and structural improvements may impact marine mammal species through temporary avoidance and disruption of foraging behavior as a result of pile driving, but no long term impacts to the species or stock are expected to occur as a result of the project. NMFS-established thresholds for acoustic impacts to marine mammals are set for behavioral harassment ("Level B" criteria) of marine mammals at 120 dB root mean square (RMS) for "continuous" source vibrations, and 160dB RMS for impact sources. Standards for physical injury ("Level A" criteria) are set at 190 dB RMS for pinnipeds and 180 dB for cetaceans.

4.2.3.2 Noise Effects from Pile Driving

Steel pilings for temporary race infrastructure (18-inch), such as floating docks will be installed using a vibratory pile driver. An impact hammer will be deployed to install 12-inch wood piles at Pier 19.

Concrete, wood, and steel piles that are driven within the water column can produce high intensity noise resulting in damage to soft tissues, and/or result in harassment of fish and marine mammals such that they alter swimming, sleeping, or foraging behavior or abandon temporarily forage habitat. It is not anticipated that fish will be killed or injured from pile driving activities. Generally, underwater noise

generated by driving concrete piles is less intensive than for comparable steel piles. The striking of a pile by a pile-driving hammer creates a pulse of sound that propagates through the pile, radiating out through the water column, seafloor, and air. Sound pressure pulses, as a function of time are referred to as a waveform. Peak waveform pressure underwater is typically expressed in decibels (dB) referenced to 1 micro Pascal (µPa). Sound levels are generally reported as peak levels (peak) and sound exposure levels (SEL). In addition to the pressure pulse of the waveform, the frequency of the sound, expressed in Hertz (Hz) is also important to evaluating the potential for sound impacts. Low frequency sounds are typically capable of traveling over greater distances with less reduction in the pressure waveform than high frequency sounds. Pile driving hammers driving concrete and steel piles in water typically generate sound waves ranging between 185-220 dB (peak) and 160-195 dB (SEL) and impact pile driving of wood piles generates sound levels lower than for concrete or steel but all are dependent on the environment in which they are used (Caltrans 2009).

Vibratory pile drivers work on a different principal than pile-driving hammers and produce a different sound profile. A vibratory driver works by inducting particle motion to the substrate immediately below and around the pile causing liquefaction of the immediately adjacent sediment, allowing the pile to sink downward or to be removed. Vibratory pile driving is only suitable where soft substrate is present. The noise produced by vibratory drivers driving concrete and steel piles in water range between 165 -195 dB (Peak) and 150-180 dB (SEL). These sound levels are typically 10-20 dB lower in intensity relative to the higher, pulse-type noise produced by an impact hammer (Caltrans 2009).

A sound monitoring plan will be developed for the AC34 pile driving activities to ensure thresholds are not exceeded.

4.2.3.3 Noise Effects to Marine Mammals

Currently, the National Marine Fisheries Service (NMFS) thresholds for acoustic impacts from impulse sounds to marine mammals are set at the following levels:

- 120 dB RMS for behavioral harassment of marine mammals from continuous source vibrations (“Level B” harassment);
- 160 dB RMS for behavioral harassment of marine mammals from impact source vibrations ("Level B" harassment);
- 180 dB RMS for physical injury of cetaceans (harbor porpoises) ("Level A" criteria); and
- 190 dB RMS for physical injury of pinnipeds, such as Pacific harbor seal and California sea lion ("Level A" criteria).

As previously stated, all piles for installation of floating docks will be driven with vibratory hammer. Wood piles will be driven with an impact hammer. Only one pile type is expected to be driven on any given day. All impact pile driving will employ a “soft start” technique.

Marine mammal monitors will be present during pile driving activities. The monitors will record observations of marine mammals within the Level B buffer zones before, during, and after pile driving activities. Should a marine mammal come within or approach the Level A MMSZ prior to the start of pile

driving, pile driving activities will be delayed until the mammal is seen exiting the Level A MMSZ or if the marine mammal has not been observed within the Level A zone for a period of 15 minutes or more.

4.2.3.4 Helicopters

A paucity of data exists that quantitatively provide sound levels related to marine mammal responses to aircraft. Some studies have reported that aircraft flying at low altitudes and close lateral distances and above shallow water elicit stronger responses than aircraft flying higher, at greater lateral distances and over deep water (Luksenburg and Parsons 2008). Sensitivity to aircraft noise may also differ among species. Luksenburg and Parsons (2008) noted that in the Alaskan Beaufort Sea, beluga whales reacted more frequently to noise than bowhead whales.

A recent Environmental Assessment (EA) conducted by the Navy for its Naval Base in Coronado, CA monitored sound exposure levels from helicopter operations (U.S. Navy 2011). Helicopter operations for the Naval Air Station North Island (NASNI) Environmental Assessment reported SELs ranging from 65 dB to 98 dB for helicopters at lateral distances from the monitoring locations between 0 feet and 5,000 feet at altitudes between 100 feet to 800 feet asl. The maximum SEL of 98 dB was recorded for a lateral distance of 0 feet and a height of 100 feet asl. The EA concluded that marine mammals such as the California sea lion and Pacific harbor seal would not be impacted and helicopter flight operations associated with the Proposed Action would not appreciably change the noise contours. The Navy did not request "take" for this project based on the recorded SELs.

Currently, the National Marine Fisheries Service (NMFS) Level B harassment thresholds for acoustic impacts to marine mammals are set at the following levels (primarily determined by altitude).

- In air (re: 20 µPa) RL > 90 dB RMS for harbor seals
- In air (re: 20 µPa) RL > 100 dB RMS for all other pinniped species

The Integrated Noise Model, Version 7.0b, was used to quantify maximum noise levels generated by race-sponsored helicopters at Pier 39 platforms where sea lions are known to regularly gather. The helicopter types assumed included two Bell 206L Long Rangers and one Robinson R-44 for each year. The modeling effort assumed that all helicopter operations would occur during daytime hours. Flight tracks for helicopter operations follow the race course and include a 1,000-foot buffer from the Crissy Field Wildlife Protection Area and Alcatraz Island. In order to cover the race, the modeling assumed the helicopters would be flying at relatively low altitudes. The Long Rangers were modeled at 100 feet above sea level (ASL) and the Robinson-44 at 300 feet ASL at an average speed of 30 knots while in flight and including 15 minutes of hovering time per race. Maximum noise levels estimated by the model at the Pier 39 platforms were 58.8 and 67.6 dBA generated by the long rangers and Robinson helicopters, respectfully. Based on this model, Level B harassment due to noise from helicopters should not exceed NMFS levels. However, it is anticipated that some disturbance may occur to the California sea lion and Pacific harbor seal in the area of operations either due to shadow or presence of helicopters.

4.2.3.5 Fireworks

Marine mammals can be impacted by fireworks displays by light and sound. The primary causes of disturbance are light flashes and sound effects from exploding fireworks. Direct impacts include, but are not limited to, immediate physical and physiological impacts such as abrupt changes in behavior, flight response, diving, evading, flushing, cessation of feeding, and physical impairment or mortality.

Marine mammals and other wildlife may avoid or temporarily depart the impact area during the hours immediately prior to the beginning of the fireworks display due to increased human recreational activities associated with the overall celebration event (noise, boating, kayaking, fishing, picnicking, etc.), and as a fireworks presentation progresses, most marine mammals generally evacuate the impact area. In particular, a flotilla of recreational and commercial boats usually gathers in a semi circle within the impact area to view the fireworks display from the water. As per the Special Local Regulations proposed by the U.S. Coast Guard for this project, USCG and/or other government agencies will patrol the waters of the impact area to keep vessels a safe distance from the fireworks launch site.

NOAA recently assessed the potential impact of aerial fireworks displays in the Monterey Bay National Marine Sanctuary (MBNMS) on marine mammals in preparation for issuance of an Incidental Harassment Authorization permit under the MMPA. This assessment of the potential effects of firework noise on marine mammals included all of the species observed in Central San Francisco Bay (NOAA 2011). In its assessment NOAA determined that for injury to occur to marine mammals from fireworks, they would need to generate in-air sounds in excess of 128 db at a reference (re) 20 µPa. Noise studies done at Vandenberg Air Force Base (VAFB) following missile launches reported that behavioral changes in marine mammals were observed at sound levels of 90-100 db re 20 µPa. Sound monitoring conducted between 1993 and 2001 offshore of Monterey, California during annual 4th of July events, reported firework displays generating peak sound levels of 82 dB re 20 µPa at a 0.5-mile distance and average sound levels of 78 dB re 20 µPa, which is below the noise level determined to cause either injury or behavioral responses in marine mammals. Ambient noise levels were recorded at 58 dB re 20 µPa. Both the VAFB and MBNMS monitoring studies reported that when marine mammals left their haul out and entered the water because of noises exceeding 90-100 dB, they would return within 4-15 hours (NOAA 2011). In conclusion, NOAA determined that any impact to marine mammals from firework displays would be negligible.

Past monitoring by the MBNMS has shown that fireworks displays result in only short-term behavioral harassment of animals, at most (NOAA 2001). Most animals depart affected haul-out areas at the beginning of the display and return to previous levels of abundance within 4-15 hours following the event. For past projects, NMFS determined that fireworks displays would result in no more than Level B harassment of small numbers of California sea lions and harbor seals. In a 2001 consultation with the National Marine Sanctuary Program (NMSP), NMFS, the Southwest Region, concluded that a fireworks display was not likely to adversely affect federally listed species under its jurisdiction. NMFS determined that any take would have a negligible impact on the affected species and stocks. Furthermore, the potential for AC34 2013 firework displays to result in impact to marine mammals is extremely small or negligible since the closest established haul-outs range between 0.5 and 3.5 miles from Piers 27-29. No

take by injury and/or death is anticipated from the AC34 fireworks, and harassment take will be at the lowest level practicable due to incorporation of the mitigation measures mentioned in this document. The effects of the fireworks displays will be limited to short term and localized changes in behavior, including temporarily vacating haul outs to avoid the sight and sound of fireworks.

4.2.3.6 Potential for Injury or Mortality

It is not anticipated that the construction or race event activities will impact rates of recruitment or survival of marine mammals since no mortality (which would remove individuals from the population) or injury is anticipated to occur, nor will be authorized. A flushing event can include an active departure of a haul-out site, slow displacement into the water, or a stampede which occurs when a large proportion of the pinnipeds in a group enter the water defensively (Bowles, 2000). Rapid and direct helicopter approaches have the potential to initiate stampedes or subgroups temporarily departing into the water. An initial helicopter approach at Pier 39 may have the potential to cause a significant portion of the sea lions hauled out on "K" dock at Pier 39 to depart into the water. In order to mitigate for the potential of sea lions temporarily vacating the dock, the IHA would require the helicopter to implement approach and timing techniques that are least disturbing to marine mammals. For example, the project sponsor will be responsible for coordinating with the FAA and helicopter operators to ensure compliance with flight regulations and to enforce the flight restrictions identified in the AC34 Water and Air Traffic Plan. Helicopters will descend/ascend vertically for landing and take-off at a helipad on Treasure Island. Helicopters will not skim the surface of the water (<100 feet) during the race events nor during landing and takeoff operations.

The project sponsors will ensure that race-related helicopters maintain a buffer of at least 1,000 feet (vertically and horizontally) around Alcatraz Island and Crissy Beach Wildlife Protection Area. A low fly over zone will be restricted in the vicinity of Pier 39 where sea lions are known to haul out.

4.3 Compliance with Applicable Laws/Necessary Federal Permits

NMFS has determined that its proposed IHA is consistent with the applicable requirements of the MMPA, ESA, and NMFS' regulations. The applicant has secured or applied for necessary permits from the NMFS, the USCG and other federal agencies.

4.3.1 Endangered Species Act

The proposed action would not result in effects to ESA-listed marine mammals, therefore, no consultation is required for this proposed action under section 7 of the ESA.

4.3.2 Marine Mammal Protection Act

The applicant submitted an application which included responses to all applicable questions in the regulations. The requested activities are consistent with applicable issuance criteria in the MMPA and NMFS' implementing regulations. NMFS considered the views and opinions of the scientists, or other persons or organizations knowledgeable about the marine mammals that were the subject of the application. These views, and other matters germane to the application, supported NMFS' initial determinations of the action having a negligible impact on the species or stocks for issuance of the IHA. The IHA would contain standard terms and conditions stipulated in the MMPA and NMFS' regulations.

As required by the MMPA, the IHA would specify: (1) the effective date of the permit; (2) the number and kinds (species and stock) of marine mammals that may be taken; (3) the location and manner in which they may be taken; and (4) other terms and conditions deemed appropriate.

4.4 Unavoidable Adverse Effects

NMFS does not expect the AC34 construction activities or AC34 race event activities to have adverse consequences on the viability of the subpopulations of the marine mammals within the San Francisco Bay area. Given this and the likely response by pinnipeds hauled out on Yerba Buena Island, Pier 39 or various locations along the San Francisco waterfront to the proposed project activities, individual animals are likely to be adversely affected by pile driving, helicopters, and fireworks during proposed project activities, but as mentioned throughout this EA, the project is expected to have a negligible impact on the affected species or stocks of marine mammals.

4.5 Cumulative Effects

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions" (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

The proposed project will take place on and along the developed San Francisco (SF) Waterfront and in the Central Bay. In particular, pile driving construction activities will take place at Piers 80, 30-32, 14, 9, 19, 23, 27-29 and offshore of the Marina Green.

Although human activities elsewhere have been shown to have detrimental impacts to the marine environment within the area, NMFS has determined that the proposed project would not have a significant cumulative effect on the marine environment, in particular, California sea lions, harbor seals, harbor porpoises and elephant seals.

Activities that are likely to affect the marine environment or marine mammals near the proposed project area include ongoing and anticipated construction projects, commercial and recreational fishing, marine pollution, and disease.

4.5.1 ONGOING AND ANTICIPATED CONSTRUCTION PROJECTS

This EA analyzes the potential cumulative effects of past, present and reasonably foreseeable projects with the proposed project area. NMFS reviewed the ongoing and anticipated projects that may occur within the same geographical area as the proposed project, within a similar time frame and which may cause a potential impact to marine mammals. All of the anticipated and ongoing constructions projects will take place along the industrialized SF waterfront and do not extend past existing piers into the marine environment. Accordingly, none of these projects are anticipated to pose short-term effects greater than temporary disturbance or a long-term cumulative effect on the marine environment or marine mammals.

The proposed project could cause a temporary effect on marine mammals associated with helicopter operations, fireworks and pile driving. During pile driving sound levels will be monitored as detailed in the sound monitoring plan approved by NMFS. The helicopter operations would take place only on race days between 1-5 hours during the day (up to 8 days in 2012 and up to 44 days in 2013). The racing activities will be less than 5 hours on most days. The fireworks would take place at four night events in 2013. Each of these three components of the project will take place at different times and be short in duration.

4.5.2 COMMERCIAL AND RECREATIONAL FISHING

Entrapment and entanglement in commercial fishing gear is one of the most frequently documented sources of human-caused mortality in marine mammals (Read, 2008). The incidental mortality due to fisheries is especially high for harbor seals and California sea lions. However, the populations for both species are growing and fishing mortality is declining (Angliss & Allen, 2008; Carretta, et al., 2008). The exact impact of mortality from entanglement in fishing gear is difficult to accurately determine, however, as many marine mammals that die from entanglement in commercial fishing gear tend to sink rather than strand ashore.

At present, only three species of fish and macroinvertebrates are harvested commercially in the San Francisco Bay-Delta: Bay shrimp (Crangon franciscorum), Pacific herring (Clupea pallasi), and Northern anchovy (Engraulis mordax). The areas in which proposed in-water construction will take place do not currently provide a large food source or spawning habitat for these three species. However, herring fisherman sometimes will work between Piers 29 to 80. In addition, shrimp fisherman occasionally will work the Central Bay offshore of Fort Mason, Crissy Field and Aquatic Park.

All of the accessible docks and sea walls along the SF Waterfront are available for recreational fishing; however, the amount of recreational fishing is not extensive along the SF Waterfront and is not anticipated to cause a significant impact to marine mammals in the proposed project area.

The proposed project could temporarily limit fishing in the project areas during construction. In addition, commercial fishing will be temporarily diverted outside the racecourse area in the Central Bay during America's Cup race events. Transit lanes will be established during race times to allow commercial/recreational fishing boats transit through the regulated area. Accordingly, commercial/recreational fishing and the proposed project considered together will not contribute cumulatively to significant impacts to marine mammals.

4.5.3 PREY SPECIES

As stated above, the project area does not currently provide a large food source or spawning habitat for the three species that are commercially fished in the Bay. Any commercial fishing that does take place within the project area will be temporarily diverted during race events. Accordingly, commercial fishing and the proposed project will not contribute cumulatively to the decline in prey species for marine mammals in the project area.

4.5.4 MARINE POLLUTION

Marine mammals are exposed to contaminants via the food they consume, the water in which they swim, and the air they breathe. Point and non-point source pollutants from coastal runoff, offshore mineral and gravel mining, at-sea disposal of dredged materials and sewage effluent, marine debris, and organic compounds from aquaculture are all lasting threats to marine mammals in the project area. The impacts of these pollutants are difficult to measure.

The persistent organic pollutants (POPs) tend to bioaccumulate through the food chain; therefore, the chronic exposure of POPs in the environment is perhaps of the most concern to high trophic level predators such as California sea lions, harbor seals and northern elephant seals.

The proposed project activities analyzed in this EA (pile driving, helicopter operations, and fireworks) are not expected to cause increased exposure of POPs to marine mammals in the project area due to the activities themselves; their small scale and localized nature.

4.5.5 DISEASE

Disease is common in all pinniped populations and has been responsible for major die-offs worldwide, but such events are usually relatively short-lived. NMFS notes two unexplained harbor seal mortality events occurred in Point Reyes National Park, located north of the proposed project, involving at least 90 harbor seals in 1997 and 16 animals in 2000. Necropsies of three seals from the 2000 event diagnosed cases of severe pneumonia and tests for morbillivirus were negative. Subsequently, NMFS found that all west-coast harbor seals tested for morbilliviruses were seronegative, indicating that this disease was not endemic in the population (Carretta, et al., 2008).

The proposed project is not anticipated to contribute to disease in marine mammals.

4.5.6 SUMMARY OF CUMULATIVE EFFECTS

All of the issues noted above are likely to have some level of impact on marine mammal populations in the area. Anticipated and ongoing construction projects, commercial and recreational fishing, overfishing and decline of prey species, marine pollution, and disease continue to result in some level of impact to marine mammal populations in the area.

The proposed action includes detailed avoidance and minimization measures to reduce impacts to the biological and physical environment, in particular, measures to reduce effects on marine mammals associated with pile driving, fireworks and helicopter operations. Therefore, NMFS has determined that the proposed project activities would not have a significant cumulative effect on marine mammals or the human environment, provided that the mitigation and monitoring measures described in Section 2 are implemented.

4.6 Conclusions

The inclusion of the mitigation and monitoring requirements in the IHA, as described in the Preferred Alternative, will ensure that the proposed activities and the proposed mitigation measures under

Alternative 2 (Preferred Alternative) are sufficient to minimize any potential adverse impacts to the human environment, particularly marine mammal species or stocks and their habitat. With the inclusion of the required mitigation and monitoring requirements, NMFS has determined that the proposed activities, and NMFS' proposed issuance of an IHA, will result at worst in a temporary modification of behavior (Level B harassment) of some individuals of up to four species of marine mammals in San Francisco Bay. In addition, no take by injury, death and/or serious injury is anticipated, and the potential for temporary or permanent hearing impairment will be avoided through the incorporation of the mitigation and monitoring measures described earlier in this document.

CHAPTER 5. LIST OF AGENCIES AND PERSONS CONSULTED

America's Cup Event Authority

Port of San Francisco

CHAPTER 6. LITERATURE CITED

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