

Essential Fish Habitat in
Santa Monica Bay, San Pedro Bay, and San Diego Bay:
A Reference Guide for Managers

By

Erika A. Robbins

Date: _____

Approved:

Scott Eckert, Ph.D., Advisor

Masters project submitted in partial fulfillment of the requirements for the
Master of Environmental Management degree in the
Nicholas School of the Environment and Earth Sciences
of Duke University

2006

Abstract

The Sustainable Fisheries Act established as one of its mandates for regional fishery management councils and the National Marine Fisheries Service a requirement to identify and protect Essential Fish Habitat. The Act defines *Essential Fish Habitat* as “those waters and substrates necessary to fish for spawning, breeding, feeding and growth to maturity.” 16 U.S.C. § 1802(10). To promote the protection of Essential Fish Habitat, the Act establishes interagency consultation between the National Marine Fisheries Service and federal agencies that fund, authorize, or undertake action that may adversely affect Essential Fish Habitat. For their part in the interagency consultation process, the National Marine Fisheries Service is required to provide Essential Fish Habitat Conservation Recommendations, and, if appropriate, in an expedited manner.

The time required to develop proper Essential Fish Habitat Conservation Recommendations can be extensive because managers do not always have access to sufficient information and the scale of Essential Fish Habitat descriptions is larger than the scale of most projects. To facilitate accurate abbreviated assessment of projects and proper Essential Fish Habitat Conservation Recommendations, I have developed an Essential Fish Habitat Reference Guide. This guide is specific to the fish and habitats found in Southern California’s three largest bays: Santa Monica Bay, San Pedro Bay, and San Diego Bay. I synthesized the information contained within this guide from documents traditionally used to support the creation of Essential Fish Habitat Conservation Recommendations. Managers can use the Essential Fish Habitat Reference Guide for interagency consultations when the predicted impact to Essential Fish Habitat is minimal; actions with larger impacts need higher levels of scrutiny. The Reference Guide provides habitat and Essential Fish Habitat descriptions that are on the same, or similar scale, as the projects of federal action agencies. The Habitat Conservation Division of the National Marine Fisheries Service Southwest Regional Office has used draft versions of this guide.

Essential Fish Habitat in
Santa Monica Bay, San Pedro Bay, and San Diego Bay:
A Reference Guide for Managers

Table of Contents

1. Introduction	1
2. Essential Fish Habitat Reference Guide for Southern California’s Large Bays	16
2.1. Santa Monica Bay	18
2.1.1. Estuarine	18
2.1.2. Nearshore Marine	22
2.1.3. Neritic	41
2.1.4. Documentation of Presence in Santa Monica Bay	47
2.2. San Pedro Bay	48
2.2.1. Estuarine	48
2.2.2. Nearshore Marine	51
2.2.3. Neritic	69
2.2.4. Documentation of Presence in San Pedro Bay	70
2.3. San Diego Bay	71
2.3.1. Estuarine	71
2.3.2. Nearshore Marine	73
2.3.3. Neritic	84
2.3.4. Documentation of Presence in San Diego Bay	84
2.4. References	85
3. Appendix 1: Habitat Classification for Southern California’s Large Bays	93
4. Appendix 2: Species Summary Tables	101
5. Appendix 3: Federally Managed Species	121
6. Appendix 4: Important Diet Species	125
7. Acknowledgements	129

Essential Fish Habitat in Santa Monica Bay, San Pedro Bay, and San Diego Bay: A Reference Guide for Managers

Introduction

The Sustainable Fisheries Act established as one of its mandates for regional fishery management councils and the National Marine Fisheries Service a requirement to identify and protect Essential Fish Habitat. The Act defines *Essential Fish Habitat* as “those waters and substrates necessary to fish for spawning, breeding, feeding and growth to maturity.” 16 U.S.C. § 1802(10). To promote the protection of Essential Fish Habitat, the Act establishes interagency consultation between the National Marine Fisheries Service and federal agencies that fund, authorize, or undertake action that may adversely affect Essential Fish Habitat. For their part in the interagency consultation process, the National Marine Fisheries Service is required to provide Essential Fish Habitat Conservation Recommendations, and, if appropriate, in an expedited manner.

The time required to develop proper Essential Fish Habitat Conservation Recommendations can be extensive because managers do not always have access to sufficient information and the scale of Essential Fish Habitat descriptions is larger than the scale of most projects. To facilitate accurate abbreviated assessment of projects and proper Essential Fish Habitat Conservation Recommendations, I have developed an Essential Fish Habitat Reference Guide. This guide is specific to the fish and habitats found in Southern California’s three largest bays: Santa Monica Bay, San Pedro Bay, and San Diego Bay. I synthesized the information contained within this guide from documents traditionally used to support the creation of Essential Fish Habitat Conservation Recommendations. Managers can use the Essential Fish Habitat Reference

Guide for interagency consultations when the predicted impact to Essential Fish Habitat is minimal; actions with larger impacts need higher levels of scrutiny. The Reference Guide provides habitat and Essential Fish Habitat descriptions that are on the same, or similar scale, as the projects of federal action agencies. The Habitat Conservation Division of the National Marine Fisheries Service Southwest Regional Office has used draft versions of this guide.

Background

Sustainable Fisheries Act

Congress passed the Sustainable Fisheries Act (SFA) of 1996 to amend the Magnuson-Stevens Fishery Conservation and Management Act, and by doing so, acknowledged that certain fish stocks have declined to the point that their survival is threatened and that several other stocks are approaching this status. In the SFA, Congress attributes the depletion of fish stocks to increasing fishing pressure; inadequate conservation and management practices and controls; and direct and indirect habitat losses, which have resulted in a diminished capacity to support existing fishing levels. 16 U.S.C. § 1801(a)(2). The SFA has three goals, all aimed at ameliorating these problems: (1) prevent overfishing and rebuild overfished stocks; (2) avoid and minimize bycatch; and (3) identify and protect essential fish habitats (Reiser *et al.* 2005). By addressing the need for habitat conservation, the SFA moves federal fisheries management beyond a single-species maximum sustainable yield approach to an ecosystem-based approach. The ecosystem-based approach represents a new effort to integrate fisheries management and habitat management by stressing ecological relationships between fisheries resources and the environments upon which they depend (Kalo *et al.* 2002).

The Sustainable Fisheries Act creates mandates for the National Marine Fisheries Service (NMFS), the regional fishery management councils (the Councils), and other federal agencies to identify and protect important marine and anadromous fish habitat (NMFS HCD SWRO 1998). These important fish habitats are termed *Essential Fish Habitat* (EFH) and are defined as “those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity.” 16 U.S.C. § 1802(10). The National Marine Fisheries Service clarifies the statute in subsequent regulations:

“Waters” is defined to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate’ “substrate” to include sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” to mean the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding or growth to maturity” to cover a species’ full life cycle.

(NMFS HCD SWRO 1998)

Ultimately, EFH will be a subset of all areas occupied by a species (NMFS HCD SWRO 1998).

The Sustainable Fisheries Act requires that the Councils, with assistance from NMFS, delineate EFH for all federally managed species. This includes species managed by the Councils under Council fishery management plans (FMPs), as well as those managed by NMFS under FMPs developed by the Secretary of Commerce (NMFS HCD SWRO 1998). As required by the SFA, NMFS promulgated regulations to provide

guidance to the Councils for EFH designation and FMP EFH requirements, and published them as an interim final rule in the *Federal Register* on December 19, 1997. 62 FR

66531. The guidelines for EFH designation prescribe the following:

1. An EFH provision in an FMP must include all fish species in the Fishery Management Unit (FMU).
2. The Councils may only designate EFH in the waters of the United States and the U.S. exclusive economic zone (EEZ).
3. FMPs must describe and identify EFH in text that clearly states the habitats or habitat types determined to be EFH for each life stage of the managed species, including the physical, biological, and chemical characteristics of EFH, and if known, how these characteristics influence the use of EFH by the species or life stage.

50 CFR § 600.805 (b)(1-2)

For FMP EFH amendments, NMFS instructed the Councils do the following:

1. Describe and identify EFH.
2. Describe fishing activities that may adversely affect EFH.
3. Describe non-MSA fishing activities that may adversely affect EFH.
4. Describe non-fishing related activities that may adversely affect EFH.
5. Create a cumulative impact analysis.
6. Develop conservation and enhancement suggestions.
7. Describe prey species.
8. Identify habitat areas of particular concern.
9. Identify research and information needs.

10. Perform periodical review and revision of EFH components of FMPs.

The most important component for the EFH amendment to an FMP is the description and identification of EFH.

Interagency Consultation

As a means of protecting Essential Fish Habitat, the SFA establishes an interagency consultation process whereby all federal action agencies must consult with NMFS regarding actions they propose to authorize, fund or undertake that may have adverse effect on EFH. 16 U.S.C. § 1855(b)(2). Essential Fish Habitat regulations define *adverse effect* as “any impact which reduces the quality and/or quantity of EFH...[and] may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction of species’ fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.” FR § 600.910 (a).

The SFA requires that federal action agencies provide NMFS with an EFH Assessment before any project begins. An *Essential Fish Habitat Assessment* is a review of the proposed project and its potential impacts on EFH. Essential Fish Habitat Assessments must include: (1) a description of the proposed action; (2) an analysis of the effects, including cumulative effects, of the action on EFH, the managed species, and associated species by life history stage; (3) the federal agency’s views regarding the effects of the action on EFH; and (4) proposed mitigation, if applicable (NMFS HCD SWRO 1998).

Upon learning about a federal or state project that may have an adverse effect on EFH, NMFS must develop Essential Fish Habitat Conservation Recommendations for the project (NMFS HCD SWRO 1998). These recommendations may include measures to

avoid, minimize, mitigate, or otherwise offset adverse effects on EFH. Although the concept of EFH is similar to Critical Habitat under the Endangered Species Act, the recommendations NMFS or a Council provides to protect EFH are advisory, not compulsory. This means there is no legal ramification for a federal agency that does not follow the EFH Conservation Recommendations provided by NMFS.

The statutes and regulations associated with Essential Fish Habitat have developed methods to streamline the EFH consultation process. First, NMFS uses existing interagency coordination processes to fulfill EFH consultations for federal agency actions. Essential Fish Habitat consultations can be incorporated into interagency procedures developed under the National Environmental Policy Act, the Endangered Species Act, the Clean Water Act, the Fish and Wildlife Coordination Act, or other applicable statutes (NMFS HCD SWRO 1998). Second, NMFS is encouraged to review projects that meet specific criteria with an abbreviated consultation. Abbreviated consultations allow NMFS to determine quickly whether, and to what degree, the action of a federal agency may adversely affect EFH, and NMFS should use them when they do not expect substantial impacts to EFH. FR § 600.920 (a)(2)(ii). For example, the abbreviated consultation procedure is applicable when a federal agency can remedy the adverse effects of a project through minor modifications (NMFS HCD SWRO 1998). Both the use of existing interagency coordination processes and abbreviated consultations are intended to reduce the expenditure of unnecessary time on projects that do not pose major threats to Essential Fish Habitat.

There are two barriers to the expedition of EFH consultations: (1) improper scale of EFH descriptions in FMPs and (2) lack of information on managed species' habitat

use. When delineating EFH for an FMP, the Councils write descriptions for the entire range of the species. As per EFH regulations, Councils describe Essential Fish Habitat for an FMU, which often includes more than one species. For example, West Coast Groundfish is a Fishery Management Unit that includes 82 species. The West Coast Groundfish FMP, written by the Pacific Fishery Management Council, defines EFH for this FMU as the entire West Coast EEZ (Pacific Fishery Management Council 1998). This is not on a fine scale. EFH descriptions of this size are a problem for managers when they are writing their EFH Conservation Recommendations because most federal actions and their effects occur on a much smaller scale than the West Coast EEZ.

The problem is compounded by the fact that there are varying levels of information available about federally managed fish, both within their individual range and between species. Aside from FMPs, which have already been shown to be limited in their usefulness, a single consolidated source of information on managed species does not exist. The following is an example of how these problems can prevent a manager from executing an abbreviated consultation: The Army Corps of Engineers plans to provide a permit for the dredging of a channel in the Port of Los Angeles. They submit their EFH Assessment to NMFS with a finding that the proposed action will have minimal impact upon EFH. The manager assigned to provide EFH Conservation Recommendations would compare the Army Corps' findings with the FMP EFH descriptions for fish in the area and would then have to provide comments to the Army Corps. The manager needs two important pieces of information that they cannot find within the FMPs: a list of which fish inhabit the Port of Los Angeles, and how the fish use the habitat that is to be

dredged. Without this information, a manager cannot accurately comment on the Army Corps' EFH Assessment.

The solution to this problem exists in Essential Fish Habitat reference guides, which can be tailored to specific locations. EFH reference guides can contain information on the habitats found within regions much smaller than the waters over which the Councils have jurisdiction. For example, a guide might describe the habitats within a large bay, around an island, or surrounding a large peninsula. Included in the guide would also be a description of how the federally managed fish use these habitats in the area—information about where the fish spawn, breed, feed, or mature. The guide could contain descriptions of how prey, more specifically the prey that are important to federally managed fish, use their habitats, increasing the likeliness that managers will take these habitats into consideration during the consultation process. To supplement this information, lists of fish that are not federally managed or important prey, but are present, could also be included. EFH reference guides are on the appropriate scale for managers to assess projects that occur on small scales and assist in the completion of an abbreviated consultation.

EFH Reference Guide for Southern California's Large Bays

To facilitate abbreviated consultations in the Southwest Regional Office of the National Marine Fisheries Service, I developed an Essential Fish Habitat Reference Guide for Southern California's three large bays: Santa Monica, San Pedro, and San Diego. The guide contains information on habitats found in the bays, which fish are present, and how the fish use these habitats. A reference document for these three bays is important because of the large populations that surround them, the large volume of

projects that take place in them, and their important value as nursery and spawning grounds for federally managed species. Most of the County of Los Angeles drains into Santa Monica Bay, which extends from Malibu in the north to Palos Verdes in the south. San Pedro Bay is home to the Los Angeles-Long Beach Harbor Complex, one of the largest ports in the world. The largest naval port on the continental West Coast is located within San Diego Bay. All three bays are located within the Southern California Bight (Cross and Allen 1993).

The Habitats of Southern California's Large Bays

To complete the Essential Fish Habitat Reference Guide, I developed a uniform habitat classification scheme to describe the fish habitats in the three bays. There are multiple classification schemes for benthic habitats, none of which is universally accepted as a standard. In an attempt to solve this problem, the National Oceanic and Atmospheric Administration (NOAA) joined with NatureServe to develop a benthic habitat classification scheme that would be applicable to the waters surrounding the North American continent (Madden *et al.* 2005). As I intend the EFH Reference Guide for use by NMFS, a division within NOAA, I decided to develop the classification scheme for Southern California's large bays based on this standard.

The product of the collaboration between NOAA and NatureServe is the Coastal and Marine Ecological Classification Standard (CMECS). Their classification standard is based on a hierarchy of six levels that correspond to functional ecological relationship and progressively smaller map scale. The highest level is *regime*. There are five coastal and marine regimes—estuarine, freshwater influenced, nearshore marine, neritic and oceanic. Regimes are differentiated by salinity, geomorphology and depth (Madden *et al.*

2005). The next level is *formation*. Formations, or forms, include both geofoms and hydroforms. Examples of geofoms include islands, peninsulas, submarine canyons, and seamounts. Hydroforms include large coastal fronts, great ocean gyres, and upwellings. The third level, *zone*, characterizes the vertical zonation of coastal and marine regions. There are three zones: bottom, water column, and littoral (the land-water interface). The next smallest level is *macrohabitat*. Macrohabitats are spatially large and complex geomorphic, hydromorphic or vegetative structures that support multiple biological associations, and possess homogenous local climate, hydrology, and chemistry (Madden *et al.* 2005). The fifth level is *habitat*, which is the physical unit of the environment employed directly by the biota for food, shelter, spawning, and/or refuge (Madden *et al.* 2005). Descriptive terms of habitat include substrate, energy, composition, and biological association. The smallest level is *biotope*. The biotope is a specific area of the habitat that includes recurring, persistent, and predictable biological associations, such as plants, attached sessile fauna, and unattached but relatively non-motile fauna and bacterial colonies (Madden *et al.* 2005). These levels guided the development of the Habitat Classification for Southern California's Large Bays (Habitat Classification).

While I based the Habitat Classification on the Coastal and Marine Ecological Classification Standard, I did not derive it directly from CMECS. This is because CMECS requires too much information and is not necessarily practical for the geographical scale of the bays. Highly detailed information is required to develop a classification to the biotope level. Given the information I was able to obtain, I could only describe the benthic habitat to the biotope level in two cases: *Macrocystis pyrifera* in kelp beds and *Zostera marina* in eelgrass beds. Additional research in the field would

allow for the development of more biotope descriptions. Furthermore, there is not a uniform description of estuarine environments in the three bays. The San Diego Bay Natural Resources Management Plan describes the estuarine environments in San Diego Bay with a high level of detail, but this level of detail is not available for the other two bays. In order to keep the Habitat Classification uniform across all three bays, I chose not to develop the estuarine habitat description beyond the regime level. To address making the Habitat Classification suitable for practical use, I altered the levels of CMECS slightly. Due to the small scale of the bays and the fact that only one bay has submarine canyons, I chose to place the category *submarine canyon*, a form, at the same level as the zones in the neritic regime. This is the only form included in my scheme because the bays themselves are forms and to include them would be redundant. A diagram of the Habitat Classification for Southern California's Large Bays is in Appendix 1.

The Fish of Southern California's Large Bays

To complete the EFH Reference Guide, I compiled information about the fish that inhabit the three bays and their habitat usage. As per the statutes promulgated by NMFS, the following four levels of information were used to organize the information necessary to describe and identify EFH:

Level 1: Distribution data are available for some or all portions of the geographic range of the species. Distribution data may be derived from systematic sampling and/or may include information collected opportunistically. In the case that the information is available for only portions of the species' range, habitat use can be inferred based on distributions among habitats where the species has been found and on

information about its habitat requirements and behavior. Habitat use may also be inferred, if appropriate, based on information on a similar species or another life stage.

Level 2: Habitat-related densities of the species are available.

Quantitative data (i.e., density or relative abundance) are available for the habitats occupied by a species or life stage. Density data should reflect habitat utilization, and the degree that a habitat is utilized is assumed indicative of habitat value.

Level 3: Growth, reproduction, or survival rates within habitats are available. The habitats contributing most to productivity should be those that support the highest growth, reproduction, and survival of the species (or life stage).

Level 4: Production rates by habitat are available. At this level, data are available that directly relate the production rates of a species of life stage to habitat type, quantity, quality, and location.¹

For the fish known to occupy Santa Monica Bay, San Pedro Bay, and San Diego Bay, information does not often exceed Level 1 and has not reached Level 4. When information is limited, the regulations state that available ecological, environmental, and fisheries information and data relevant to the managed species, the habitat requirements by life stage, species' distribution, and habitat usage should be used to describe Essential Fish Habitat. 50 CFR § 600.815 (a)(1)(iv)(A).

The Essential Fish Habitat Reference Guide contains information on federally managed fish that I collected from various sources. Information on the presence of fish

¹ Summarized from 50 CFR § 600.815 (a)(1)(iii)(A)

comes from biological assessments that involved density sampling. Information about species life stage and habitat use comes from primary literature, technical documents, and reference books. I organized the information according to the levels above and combined it with information about the habitats within the bays to develop EFH designations.

In order to be thorough in my EFH designations, I wanted to include the habitats that are important for sustaining the diets of federally managed fish (i.e., the habitats essential for the survival of their prey). For the EFH Reference Guide, I restricted my research on the habitats of prey species to prey that are fish. There are no references indicating that any single prey species is of more importance than another. To select which prey habitats are essential because of their contribution to the maintenance of populations of managed species, I researched the habitat use of fish that were specifically mentioned as a part of the managed fishes' diets. Habitats that prey fish are restricted to or are dependent upon for spawning, breeding, feeding, or growth to maturity were listed as EFH for those species. Criteria used to create EFH designations for non-managed species were more restrictive than the criteria for managed species.

How to Use the EFH Reference Guide

The information synthesized for the managed species and their important prey is organized within the EFH Reference Guide by bay and habitat. The habitats within the bays are broken down according to the Habitat Classification for Southern California's Large Bays. Each habitat within the bay is described by location and physical appearance. Following the description of the habitat is a list of fish that can be found there.² Bolded names indicate federally managed species. The lists of fish after each habitat include important prey species and other non-managed species. Important prey

² The species lists are not necessarily inclusive of all fish that may be present in the habitat.

species and unmanaged species are formatted identically in the main text of the guide. Numbers following the names of the fish denote references that documented the presence of a species in the bay. If the habitat is designated as EFH for a species, a description of how the species uses the habitat follows the species' name.

The EFH Reference Guide contains an appendix with tables, which summarize the information pertinent to the EFH designations of federally managed fish and important prey fish, as well as references for all of the information. The data is organized into the following categories: bay (Santa Monica, San Pedro, and/or San Diego), life stage (egg, larvae, juvenile, and adult), and diet. Information on the habitat utilized by each life stage is not available for all species. I was not able to find information about the habitats that are essential for all of the important prey species. Consequently, these fish were not included in the Species Summary Tables. As more information is discovered, EFH designations can be expanded to incorporate the new knowledge.

Conclusion

Essential Fish Habitat reference guides represent a new way of developing EFH designations. Instead of starting with the fish and attempting to describe the essential habitat based on the fish's range, an EFH reference guide begins with a specific region and identifies habitats within that region that are essential to federally managed fish. While this method for identifying and designating Essential Fish Habitat requires more information and is more time intensive than the traditional method of EFH determination, it provides a more applicable and practical EFH description for use by federal managers. EFH reference guides enable managers to perform abbreviated assessments and expedite the development of EFH Conservation Recommendations. Managers are able to do this

because an EFH reference guide contains sufficient information to start the process. Currently, managers are using the Essential Fish Habitat Reference Guide for Santa Monica Bay, San Pedro Bay and San Diego Bay in the interagency consultation process in Southern California. If it proves useful and serves its purpose successfully, the concept should be expanded to other regions to assist in accurately developing EFH assessment and EFH Conservation Recommendations throughout the nation.

Essential Fish Habitat in
Santa Monica Bay, San Pedro Bay, and San Diego Bay:
A Reference Guide for Managers

Created by:

Erika A. Robbins

Created for:

Bryant Chesney
Habitat Conservation Division
Southwest Regional Office
National Marine Fishery Service
Long Beach, California

May 2006

Santa Monica Bay

Estuarine

In Santa Monica Bay, there are estuarine environments at Malibu Lagoon, Marina del Rey, Ballona Channel, Ballona wetlands, King Harbor. An estuary is a “small semi-enclosed coastal body of water with a free connection with the open sea within which seawater is measurably diluted by freshwater from land drainage” (Josselyn et al. 1993). This dilution of seawater must occur for at least one month of the year for the water body to “estuarine” (Josselyn et al. 1993).

- Arrow goby (*Clevelandia ios*)^{1, 2, 3, 4, 5, 6, 9, 10}
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 5, 6, 7, 8, 9, 10}
- Bat ray (*Myliobatis californica*)^{1, 4, 5, 6, 8, 9, 10}
- Bay blenny (*Hypsoblennius gentilis*)^{2, 4, 9, 10}
- Bay goby (*Lepidogobius lepidus*)^{4, 7, 9}
- Bay pipefish (*Syngnathus leptorhynchus*)⁴
- Bigmouth sole (*Hippoglossina stomata*)^{4, 7, 9, 10}
- Black croaker (*Cheilotrema saturnum*)^{4, 7, 8, 10}
- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- Blackeye goby (*Coryphopterus nicholsii*)^{3, 4, 7, 8, 10}
- Blacksmith (*Chromis punctipinnis*)^{3, 4, 7, 8, 10}
- Blind goby (*Typhlogobius californiensis*)^{4, 9}
- Bluebanded goby (*Lythrypnus dalli*)^{4, 8, 10}
- Bonefish (*Albula vulpes*)^{4, 9}
- **Brown rockfish (*Sebastes auriculatus*)^{4, 6, 8, 10}** – Brown rockfish reside in shallow waters and bays of estuaries in association with soft bottoms, sand-rock interfaces, and rocky bottoms of artificial reefs at depths less than 54 meters (Ashcraft and Heisdorf 2001; MBC Applied Environmental Sciences 1988).
- Brown smoothhound (*Mustelus henlei*)^{4, 8}
- C-O turbot (*Pleuronichthys coenosus*)^{4, 7, 8, 10}
- **Cabezon (*Scorpaenichthys marmoratus*)^{4, 6, 8, 10}** – Adult cabezon feed in estuaries over sandy bottoms (NMFS Northwest Region 2004). Both demersal and pelagic eggs are in estuaries from winter to spring (McCain 2003).
- California barracuda (*Sphyrna argentea*)^{1, 4, 5, 6, 9, 10}
- California clingfish (*Gobiesox rhessodon*)^{1, 4, 5, 6, 8}

- California corbina (*Menticirrhus undulatus*)^{4, 5, 6, 7, 8, 9, 10}
- California halibut (*Paralichthys californicus*)^{1, 4, 5, 6, 7, 8, 9, 10} – Juvenile California halibut use un-vegetated bays and estuaries as their nursery grounds (Kramer and Sunada 2001).
- California killifish (*Fundulus parvipinis*)^{2, 4, 5, 6, 9}
- California sheephead (*Semicossyphus pulcher*)^{4, 5, 6, 7, 8, 10}
- California tonguefish (*Symphurus atricauda*)^{1, 4, 5, 6, 9} – California tonguefish eggs are located on the benthos of bays (MBC Applied Environmental Sciences 1994).
- Cheekspot goby (*Ilypnus gilberti*)^{1, 4, 9, 10}
- Deepbody anchovy (*Anchoa compressa*)^{4, 9}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 4, 7, 9, 10}
- Dwarf perch (*Micrometrus minimus*)^{4, 8, 10}
- **English sole (*Pleuronectes vetulus*)**^{5, 6, 7} – Juvenile English sole forage at the bottom of intertidal zones in shallow bays and estuaries (NMFS Northwest Region 2004; Pearson and Owen 2001). They reside over sand and mud, in eelgrass and along the open coast at depths less than 250 meters (McCain 2003; Pearson and Owen 2001).
- Fantail sole (*Xysteurys lioleps*)^{4, 6, 7, 9, 10}
- Garibaldi (*Hypsypops rubicundus*)^{4, 7, 10}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 7, 8, 9, 10}
- Grey smoothhound (*Mustelus californicus*)^{4, 7, 9}
- Halfmoon (*Medialuna californiensis*)^{4, 5, 6, 7, 8, 10}
- Horn shark (*Heterodontus francisi*)^{4, 7, 8, 10}
- Hornyhead turbot (*Pleuronichthys verticalis*)^{1, 4, 5, 6, 7, 8, 9, 10}
- Jacksmelt (*Atherinopsis californiensis*)^{4, 5, 6, 7, 9, 10}
- Kelp bass (*Paralabrax clathratus*)^{1, 4, 5, 6, 7, 9, 10}
- Kelp clingfish (*Rimicola muscarum*)^{4, 5, 6, 9}
- **Kelp greenling (*Hexagrammos decagrammus*)**¹⁰ – Juvenile and adult kelp greenling reside on the bottoms of estuaries (NMFS Northwest Region 2004).
- Kelp pipefish (*Syngnathus californiensis*)^{5, 6, 9}
- **Leopard shark (*Triakis semifasciata*)**^{4, 7, 8}
- **Lingcod (*Ophiodon elongatus*)**^{5, 6, 10} – Adult lingcod reside in estuaries and associate with rocky reefs, kelp beds and eelgrass (Abrams and Starr 2001; NMFS Northwest Region 2004). They spawn nearshore and deposit their eggs

on rocky substrate (Abrams and Starr 2001; NMFS Northwest Region 2004). Juvenile lingcod remain in shallow bays over soft bottoms and in eelgrass (Abrams and Starr 2001).

- Longjaw mudsucker (*Gillichthys mirabilis*)^{2, 4, 9}
- Mosquitofish (*Gambusia affinis*)^{2, 4, 5, 6, 9}
- Mussel blenny (*Hypsoblennius jenkinsi*)^{1, 4, 8, 9, 10}
- **Northern anchovy (*Engraulis mordax*)**^{1, 4, 5, 6, 8, 9, 10}
- Northern lampfish (*Stenobranchius leucopsarus*)^{4, 5, 6}
- **Olive rockfish (*Sebastes serranoides*)**^{4, 5, 6, 8, 9, 10}
- Opaleye (*Girella nigricans*)^{2, 3, 4, 5, 6, 7, 8} – Juvenile opaleye reside in Malibu Lagoon from July to September (Ambrose and Meffert 1999).
- Pacific angel shark (*Squatina californica*)¹⁰
- Pacific bonito (*Sarda chiliensis*)^{4, 5, 6, 10}
- **Pacific mackerel (*Scomber japonicus*)**^{5, 10} – Pacific mackerel migrate inshore from July to November (Konno and Wolf 2001; MBC Applied Environmental Sciences 1988). Adults reside mid-water, while juveniles reside along open coast sandy beaches, in kelp beds, and in bays and estuaries (Allen 1985; Konno and Wolf 2001).
- **Pacific sanddab (*Citharichthys sordidus*)**^{3, 6, 7}
- **Pacific sardine (*Sardinops sagax*)**^{1, 4, 5, 6, 9}
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1, 2, 4, 5, 6, 7, 9}
- Painted greenling (*Oxylebius pictus*)^{4, 7, 8}
- Pile perch (*Rhacochilus vacca*)^{4, 5, 6, 7, 8, 9, 10}
- Queenfish (*Seriphus politus*)^{1, 4, 5, 6, 9, 10}
- Reef finspot (*Paraclinus integripinnis*)^{4, 8, 9, 10}
- **Rex sole (*Errex zachirus*)**^{5, 6}
- Rock wrasse (*Halichoeres semicinctus*)^{4, 7, 8, 10}
- Rockpool blenny (*Hypsoblennius gilberti*)^{4, 5, 6, 8, 9, 10}
- Roughback sculpin (*Chitonotus pugetensis*)^{4, 7, 9}
- Round stingray (*Urobatis halleri*)^{1, 4, 7, 9, 10}
- Rubberlip seaperch (*Rhacochilus toxotes*)^{4, 5, 6, 7, 8, 10}
- Sailfin molly (*Poecilia latipinnia*)⁴
- Salema (*Xenistius californiensis*)^{1, 4, 7, 10}

- **Sand sole (*Psettichthys melanostictus*)**⁵ – Juvenile sand sole reside from growth to maturity in estuaries on bottoms of sand, mud, and mixed sand and mud (NMFS Northwest Region 2004).
- Sargo (*Anisotremus davidsonii*)^{4, 7, 8, 10}
- Seniorita (*Oxyjulis californica*)^{4, 5, 6, 7, 8, 10}
- Shadow goby (*Quietula y-cauda*)^{4, 9, 10}
- Shiner perch (*Cymatogaster aggregata*)^{1, 4, 5, 6, 8, 9, 10}
- Shovelnose guitarfish (*Rhinobatos productus*)^{4, 5, 6, 8, 10}
- Slough anchovy (*Anchoa delicatissima*)^{4, 9, 10}
- Speckled sanddab (*Citharichthys stigmaeus*)^{5, 7, 8, 9, 10}
- **Spiny dogfish (*Triakis semifasciatus*)**^{3, 5, 6, 10} – Spiny dogfish are common in estuaries and shallow bays, where adults spawn, and juveniles feed, grow and mature (McCain 2003; NMFS Northwest Region 2004).
- Spotted kelpfish (*Gibbonsia elegans*)^{1, 5, 6, 8, 9, 10}
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{4, 8, 9, 10}
- Spotted turbot (*Pleuronichthys ritteri*)^{1, 4, 7, 10}
- **Starry flounder (*Platichthys stellatus*)**^{4, 5, 6} – Starry flounder spawn in the shallow water of estuaries, where their eggs, larvae, and juveniles remain (Haugen and Thomas 2001; McCain 2003; NMFS Northwest Region 2004).
- Striped mullet (*Mugil cephalus*)^{2, 4, 9, 10}
- Tidewater goby (*Eucyclogobius newberryi*)^{2, 6}
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- Walleye surfperch (*Hyperprosopon argenteum*)^{4, 5, 6, 7, 8, 10}
- White croaker (*Genyonemus lineatus*)^{1, 4, 5, 6, 9, 10}
- White seabass (*Atractoscion nobilis*)^{1, 4, 5, 6, 7, 10}
- White surfperch (*Phanerodon furcatus*)^{4, 5, 6, 7, 8, 10}
- Woolly sculpin (*Clinocottus analis*)^{4, 5, 6, 8, 10}
- Yellowfin croaker (*Umbrina roncadore*)^{4, 7, 9}
- Yellowfin fringehead (*Neoclinus stephensae*)^{4, 10}
- Yellowfin goby (*Acanthogobius flavimanus*)^{1, 4, 9}
- Zebra perch (*Hermosilla azurea*)^{4, 8, 10}

Nearshore Marine

Littoral

Intertidal

Sandy Beach

The soft-bottom intertidal of Santa Monica Bay consists of sandy beaches, which extend almost uninterrupted from Point Dume to Palos Verdes (MBC Applied Environmental Sciences 1988). Several fish, such as California halibut, **English sole**, and **leopard shark**, forage in the intertidal (MBC Applied environmental 1988; McCain 2003).

- Barred surfperch (*Amphistichus argenteus*)^{5, 6}
- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- California corbina (*Menticirrhus undulatus*)^{4, 5, 6, 7, 8, 9, 10}
- California grunion (*Leuresthes tenuis*)^{4, 5, 6, 9, 10}
- California halibut (*Paralichthys californicus*)^{1, 4, 5, 6, 7, 8, 9, 10} – California halibut enter the intertidal during grunion runs to feed (Martin 2003).
- Cheekspot goby (*Ilypnus gilberti*)^{1, 4, 9, 10}
- Dwarf perch (*Micrometrus minimus*)^{4, 8, 10}
- **English sole (*Pleuronectes vetulus*)**^{5, 6, 7} – Juvenile English sole forage at the bottom of intertidal zones in shallow bays and estuaries (NMFS Northwest Region 2004; Pearson and Owen 2001). They reside over sand and mud, in eelgrass and along the open coast at depths less than 250 meters (McCain 2003; Pearson and Owen 2001).
- **Leopard shark (*Triakis semifasciata*)**^{4, 7, 8} – Leopard sharks are most common from the surfzone to 5 meters (Smith 2001). They enter the intertidal zone during high tides (McCain 2003). Leopard sharks pup and mate in the shallow waters near the surfzone in Southern California (Smith 2001; Smith 2005). Pups reside seasonally along protected beaches and in bays like Santa Monica (Smith 2005).
- Pile perch (*Rhacochilus vacca*)^{4, 5, 6, 7, 8, 9, 10}
- Rainbow seaperch (*Hypsurus caryi*)^{4, 7, 8, 10}
- Rubberlip seaperch (*Rhacochilus toxotes*)^{4, 5, 6, 7, 8, 10}
- Shiner perch (*Cymatogaster aggregata*)^{1, 4, 5, 6, 8, 9, 10}
- Shovelnose guitarfish (*Rhinobatos prodcutus*)^{4, 5, 6, 8, 10}

- **Spiny dogfish (*Triakis semifasciatus*)**^{3, 5, 6, 10}
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- Walleye surfperch (*Hyperprosopon argenteum*)^{4, 5, 6, 7, 8, 10}
- White surfperch (*Phanerodon furcatus*)^{4, 5, 6, 7, 8, 10}

Rocky Intertidal

In Santa Monica Bay, rocky intertidal habitats are intermittent from Point Dume in Malibu to Pacific Palisades and along the Palos Verdes Peninsula (MBC Applied Environmental Sciences 1988). Exposed bedrock forms the rocky intertidal from the Ventura County line to Pulga Canyon in Malibu and from Malaga Cove to Point Fermin on the Palos Verdes shelf (MBC Applied Environmental Sciences 1993). Artificial rocky intertidal—jetties, breakwater, rip rap—exist in Marina del Rey; the mouth of Ballona Creek; and King Harbor (MBC Applied Environmental Sciences 1988).

- Barred surfperch (*Amphistichus argenteus*)^{5, 6}
- Bat ray (*Myliobatis californica*)^{1, 4, 5, 6, 8, 9, 10}
- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- Blackeye goby (*Coryphopterus nicholsii*)^{3, 4, 7, 8, 10}
- **Cabazon (*Scorpaenichthys marmoratus*)**^{4, 6, 7, 8, 10} – Juvenile and adult cabazon migrate with the tide, in and out of tidepools, to forage (Wilson-Vandenberg and Hardy 2001).
- California barracuda (*Sphyraena argentea*)^{1, 4, 5, 6, 9, 10}
- California clingfish (*Gobiesox rhesodon*)^{1, 4, 5, 6, 8}
- **California scorpionfish (*Scorpaena guttata*)**^{4, 5, 6, 7, 8, 10} – Adult California scorpionfish forage in the rocky intertidal and are in tidepools (Love 2001a; NMFS Northwest Region 2004).
- California sheephead (*Semicossyphus pulcher*)^{4, 5, 6, 7, 8, 10}
- Dwarf perch (*Micrometrus minimus*)^{4, 8, 10}
- Giant kelpfish (*Heterostichus rostratus*)²
- **Gopher rockfish (*Sebastes carnatus*)**^{8, 10} – Adult and juvenile gopher rockfish feed in the intertidal kelp bed (NMFS Northwest Region 2004).
- **Grass rockfish (*Sebastes rastrelliger*)**⁸ – Grass rockfish occupy the rocky intertidal (Love 2002i). Juveniles recruit to low-growing algae and hard bottoms, and reside in tidepools (Love *et al* 1991; McCain 2003).
- Jacksmelt (*Atherinopsis californiensis*)^{4, 5, 6, 7, 9, 10}

- **Kelp greenling (*Hexagrammos decagrammus*)¹⁰** – Kelp greenling occupy nearshore rocky habitats, often near or in kelp beds (Howard 2001). Kelp greenling attach their eggs to the sea floor and encrusting biota (Howard 2001).
- Kelp perch (*Brachyistius frenatus*)^{5, 6, 7, 8, 10}
- **Kelp rockfish (*Sebastes atrovirens*)^{4, 5, 6, 7, 8}** – Juvenile kelp rockfish reside in the rocky intertidal and the holdfast region of the kelp from growth to maturity (Larson 2002a; NMFS Northwest Region 2004).
- **Leopard shark (*Triakis semifasciata*)^{4, 7, 8}**
- **Olive rockfish (*Sebastes serranoides*)^{4, 5, 6, 8, 10}** – Juvenile and adult olive rockfish forage in the rocky intertidal (NMFS Northwest Region 2004).
- Opaleye (*Girella nigricans*)^{2, 4, 5, 6, 7, 8}
- Pile perch (*Rhacochilus vacca*)^{4, 5, 6, 7, 8, 9, 10}
- Rainbow seaperch (*Hypsurus caryi*)^{4, 7, 8, 10}
- Reef finspot (*Paraclinus integripinnis*)^{4, 8, 9, 10}
- Rockpool blenny (*Hypsoblennius gilberti*)^{4, 5, 6, 8, 9, 10}
- Rubberlip seaperch (*Rhacochilus toxotes*)^{4, 5, 6, 7, 8, 10}
- Shiner perch (*Cymatogaster aggregata*)^{1, 4, 5, 6, 8, 9, 10}
- Spotted kelpfish (*Gibbonsia elegans*)^{1, 5, 6, 8, 9, 10}
- Striped kelpfish (*Gibbonsia metzi*)⁸
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- Walleye surfperch (*Hyperprosopon argenteum*)^{4, 5, 6, 7, 8, 10}
- White surfperch (*Phanerodon furcatus*)^{4, 5, 6, 7, 8, 10}
- Woolly sculpin (*Clinocottus analis*)^{4, 5, 6, 8, 10}

Water Column

The water column encompasses all waters beyond the littoral zone and deeper than one meter. It extends from the sea surface to the ocean bottom (Madden *et al.* 2005). For the water column to be considered EFH, the fish must either (1) spend the majority of their time in the water column; (2) spend and entire life stage in the water column (i.e., egg, larvae, juvenile, adult); or (3) perform an activity in the water column that is required to promote the welfare of the population (i.e., feeding).

- Basking shark (*Cetorhinus maximus*)^{5, 6}

- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- **Blue rockfish (*Sebastes mystinus*)**^{8, 10} – Blue rockfish release their pelagic larvae between October and March (Hobson 2002).
- Blue shark (*Prionace glauca*)^{5, 6}
- **Bocaccio (*Sebastes paucipinis*)**^{3, 5, 6, 10} – Juvenile bocaccio reside in shallow waters over soft-bottom near piers and adult bocaccio reside in the water column over hard-bottom and soft-bottom (Allen 1985; McCain 2003; Thomas 2001). Bocaccio feed in the offshore pelagic realm (MBC Applied Environmental Sciences 1988). Bocaccio release their larvae between October and July (Love 2002h). The larvae remain in bays within 100 feet of the surface (Love 2002h; McCain 2003; Moser and Boehlert 1991).
- **Brown rockfish (*Sebastes auriculatus*)**^{4, 6, 8, 10} – Brown rockfish release their pelagic larvae between January and August (Love 2002a).
- **Calico rockfish (*Sebastes dalli*)**^{3, 8, 10} – Calico rockfish release their pelagic larvae between January and May (Butler and Love 2002).
- California barracuda (*Sphyraena argentea*)^{1, 4, 5, 6, 9, 10}
- California clingfish (*Gobiesox rhesodon*)^{1, 4, 5, 6, 8}
- California grunion (*Leuresthes tenuis*)^{4, 5, 6, 9, 10}
- **California scorpionfish (*Scorpaena guttata*)**^{4, 5, 6, 7, 8, 10} – Californai scorpionfihs eggs are pelagic and float in masses near the surface (McCain 2003).
- California smoothtongue (*Leuroglossus stilbius*)^{5, 6}
- **Chilipepper (*Sebastes goodei*)**^{5, 6} – Chilipepper release their pelagic larvae between August and April (Love 2002d).
- Common thresher shark (*Alopias vulpinus*)^{5, 6}
- **Curlfin sole (*Pleuronichthys decurrens*)**^{5, 6, 7, 8, 10} – Curlfin sole spawn from April to August and release pelagic eggs (McCain 2003).
- **Dover sole (*Microstomus pacificus*)**^{3, 5, 6, 7} – Dover sole eggs are in the upper 50 meters of the water column (McCain 2003).
- **Greenblotched rockfish (*Sebastes rosenblatti*)**^{5, 6} – Greenblotched rockfish release pelagic larvae December thru July (Love 2002j).
- **Greenspotted rockfish (*Sebastes chlorosticus*)**³ – Greenspotted rockfish release pelagic larvae between February and July (Love 2002c).
- **Halfbanded rockfish (*Sebastes semicinctus*)**³ – Halfbanded rockfish release their pelagic larvae from December to April (Love 2002i).

- **Jack mackerel (*Trachurus symmetricus*)**^{5, 6, 7, 8} – Juvenile jack mackerel school over shallow and deep rocky reefs, in kelp beds, and along rocky shorelines (Allen 1985; Mason 2001). Adults remain offshore (Mason 2001).
- Jacksmelt (*Atherinopsis californiensis*)^{4, 5, 6, 7, 9, 10}
- Kelp bass (*Paralabrax clathratus*)^{1, 4, 5, 6, 7, 9, 10} – Kelp bass form breeding assemblages over shallow rocky reefs and forage mid-water (Allen and Hovey 2001b).
- Longjaw mudsucker (*Gillichthys mirabilis*)^{2, 4, 9}
- **Market squid (*Loligo opalescens*)**^{5, 6} – In southern California waters, market squid spawn from October to early May (Yaremko 2001). While spawning, market squid congregate in bays over sandy bottoms with rocky outcrops (Yaremko 2001).
- Mexican lampfish (*Triphiturus mexicanus*)^{4, 5}
- **Northern anchovy (*Engraulis mordax*)**^{1, 4, 5, 6, 8, 9, 10} – Northern anchovy school near the surface, over soft bottoms, along open coast sandy beaches, over shallow rocky reefs, and in bays and estuaries (Allen 1985; Bergen and Jacobson 2001).
- Northern lampfish (*Stenobranchius leucopsarus*)^{4, 5, 6}
- **Olive rockfish (*Sebastes serranoides*)**^{4, 5, 6, 8, 9, 10} – Olive rockfish release their pelagic larvae between December and March (Love 2002m).
- Pacific bonito (*Sarda chiliensis*)^{4, 5, 6, 10}
- Pacific butterfish (pompano) (*Peprilus similimus*)⁴
- **Pacific mackerel (*Scomber japonicus*)**^{5, 10} – Pacific mackerel migrate inshore from July to November (Konno and Wolf 2001; MBC Applied Environmental Sciences 1988). Adults reside mid-water, while juveniles reside along open coast sandy beaches, in kelp beds, and in bays and estuaries (Allen 1985; Konno and Wolf 2001).
- **Pacific sardine (*Sardinops sagax*)**^{1, 4, 5, 6, 9} – Pacific sardines school mid-water (Allen 1985; MBC Applied Environmental Sciences 1988).
- **Pacific whiting (hake) (*Meluccius productus*)**^{5, 6} – Pacific whiting reside in the pelagic realm over nearshore and neritic soft-bottom (Allen 1985; MBC Applied Environmental Sciences 1988; Quirollo and Wespestad 2001).
- Queenfish (*Seriphus politus*)^{1, 4, 5, 6, 9, 10}
- **Sablefish (*Anoplopoma fimbria*)**^{3, 5, 6} – Sablefish reside in the pelagic realm or over soft-bottom at depths between 90 and 1460 meters; they are most common between 365 and 550 meters (Henry 2001; MBC Applied Environmental Sciences 1988). Between the months of October and

February, sablefish spawn at depths greater than 823 meters (Henry 2001). Larvae initially inhabit offshore surface waters but move to inshore nursery areas as they get older (Henry 2001).

- Shiner perch (*Cymatogaster aggregata*)^{1, 4, 5, 6, 8, 9, 10}
- Speckled sanddab (*Citharichthys stigmaeus*)^{5, 7, 8, 9, 10} – Speckled sanddab larvae are pelagic and remain near the surface (Allen and Leos 2001).
- **Stripetail rockfish (*Sebastes saxicola*)**^{3, 5, 6} – Stripetail rockfish release their pelagic larvae between November and March (Sakuma 2002).
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- **Vermilion rockfish (*Sebastes miniatus*)**^{3, 5, 6, 8, 10} – Vermilion rockfish occupy the pelagic habitat over nearshore and neritic soft-bottom and hard-bottom (Allen 1985; VanTresca 2001). They are most common from 50-150 meters (Love 2002g). Vermilion rockfish feed in the pelagic realm (MBC Applied Environmental Sciences 1988). Vermilion rockfish release their pelagic larvae between July and March (Love 2002g).
- Yellowtail (*Seriola lalandi*)^{5, 6}

Bottom

Soft Bottom

Vegetated

Eelgrass

In Santa Monica Bay, eelgrass grows in Malibu and at Mother's Beach in Marina del Rey (Chesney 2005; Stephens et al. ca. 1990). Several fish species use eelgrass as a food source and shelter (Allen 1999).

- Arrow goby (*Clevelandia ios*)^{1, 2, 4, 5, 6, 9, 10}
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 5, 6, 7, 8, 9, 10}
- Bat ray (*Myliobatis californica*)^{1, 4, 5, 6, 8, 9, 10}
- Bay blenny (*Hypsoblennius gentilis*)^{2, 4, 9, 10}
- Bay goby (*Lepidogobius lepidus*)^{4, 7, 9}
- Bay pipefish (*Syngnathus leptorhynchus*)⁴
- Black croaker (*Cheilotrema saturnum*)^{4, 7, 8, 10}
- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- Blacksmith (*Chromis punctipinnis*)^{3, 4, 7, 8, 10}
- **Brown rockfish (*Sebastes auriculatus*)**^{4, 6, 8, 10} – Adult brown rockfish forage in eelgrass (Love 2002a; NMFS Northwest Region 2004).

- **Cabezon (*Scorpaenichthys marmoratus*)**^{4, 6, 7, 8, 10} – Adult cabezon feed in estuaries over soft and hard bottoms, and among seagrass (NMFS Northwest Region 2004).
- California corbina (*Menticirrhus undulatus*)^{4, 5, 6, 7, 8, 9, 10}
- California grunion (*Leuresthes tenuis*)^{4, 5, 6, 9, 10}
- California halibut (*Paralichthys californicus*)^{1, 4, 5, 6, 7, 8, 9, 10}
- California killifish (*Fundulus parvipinnis*)^{2, 4, 5, 6, 9}
- California needlefish (*Strongylura exilis*)^{1, 4, 9}
- Cheekspot goby (*Ilypnus gilberti*)^{1, 4, 9, 10}
- Deepbody anchovy (*Anchoa compressa*)^{4, 9}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 4, 7, 9, 10}
- **English sole (*Pleuronectes vetulus*)**^{5, 6, 7} – English sole move inshore during the summer months (Pearson and Owen 2001). They reside over sand and mud, in eelgrass and along the open coast at depths less than 250 meters (McCain 2003; Pearson and Owen 2001).
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 7, 8, 9, 10}
- Grey smoothhound (*Mustelus californicus*)^{4, 7, 9}
- Jacksmelt (*Atherinopsis californiensis*)^{4, 5, 6, 7, 9, 10}
- Kelp bass (*Paralabrax clathratus*)^{1, 4, 5, 6, 7, 9, 10}
- Kelp clingfish (*Rimicola muscarum*)^{4, 5, 6, 9} – Kelp clingfish reside in the kelp canopy and among eelgrass (Eschemeyer *et al.* 1983).
- Kelp perch (*Brachyistius frenatus*)^{5, 6, 7, 8, 10}
- Kelp pipefish (*Syngnathus californiensis*)^{5, 6, 9}
- **Leopard shark (*Triakis semifasciata*)**^{4, 7, 8}
- **Northern anchovy (*Engraulis mordax*)**^{1, 4, 5, 6, 8, 9, 10}
- **Olive rockfish (*Sebastes serranoides*)**^{4, 5, 6, 8, 10} – Young-of-year olive rockfish settle out in kelp beds, surfgrass, kelp mats, and other forms of physical relief (Love 2002m).
- **Pacific mackerel (*Scomber japonicus*)**^{5, 10}
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1, 2, 4, 5, 6, 7, 9}
- Queenfish (*Seriphus politus*)^{1, 4, 5, 6, 9, 10}
- Rock wrasse (*Halichoeres semicinctus*)^{4, 7, 8, 10}

- Rockpool blenny (*Hypsoblennius gilberti*)^{4, 5, 6, 8, 9, 10}
- Round stingray (*Urobatis halleri*)^{1, 4, 7, 9, 10}
- Rubberlip seaperch (*Rhacochilus toxotes*)^{4, 5, 6, 7, 8, 10}
- Salema (*Xenistius californiensis*)^{1, 4, 7, 10}
- Sargo (*Anisotremus davidsonii*)^{4, 7, 8, 10}
- Shadow goby (*Quietula y-cauda*)^{4, 9, 10}
- Shiner perch (*Cymatogaster aggregata*)^{1, 4, 5, 6, 8, 9, 10}
- Shovelnose guitarfish (*Rhinobatos productus*)^{4, 5, 6, 8, 10}
- Slough anchovy (*Anchoa delicatissima*)^{4, 9, 10}
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{4, 8, 9, 10}
- Spotted turbot (*Pleuronichthys ritteri*)^{1, 4, 7, 10}
- Striped mullet (*Mugil cephalus*)^{2, 4, 9, 10}
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- Walleye surfperch (*Hyperprosopon argenteum*)^{4, 5, 6, 7, 8, 10}
- White croaker (*Genyonemus lineatus*)^{1, 4, 5, 6, 9, 10}
- White seabass (*Atractoscion nobilis*)^{1, 4, 5, 6, 7, 10}
- White surfperch (*Phanerodon furcatus*)^{4, 5, 6, 7, 8, 10}
- Yellowfin croaker (*Umbrina roncador*)^{4, 7, 9}

Un-Vegetated

Most of the subtidal benthos of Santa Monica Bay is soft-bottom comprised of sand and silt, with sand found closest to shore (MBC Applied Environmental Sciences 1988). Silty sand is found over the central plateau and the Palos Verdes Shelf (MBC Applied Environmental Sciences 1993). The soft-bottom in Santa Monica Bay ranges in depth from MLLW to 500+ meters in the outer portions of the bay and the submarine canyons. Fish use this habitat for all life stages.

- Arrow goby (*Clevelandia ios*)^{1, 2, 4, 5, 6, 9, 10}
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 5, 6, 7, 8, 9, 10}
- Barred surfperch (*Amphistichus argenteus*)^{5, 6}
- Basketweave cusk-eel (*Ophiodion scrippsae*)⁷
- Bat ray (*Myliobatis californica*)^{1, 4, 5, 6, 8, 9, 10}
- Bay blenny (*Hypsoblennius gentilis*)^{2, 4, 9, 10}

- Bay goby (*Lepidogobius lepidus*)^{4, 7, 9}
- Bay pipefish (*Syngnathus leptorhynchys*)⁴
- Bigmouth sole (*Hippoglossina stomata*)^{4, 7, 9, 10}
- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- Blackeye goby (*Coryphopterus nicholsii*)^{3, 4, 7, 8, 10}
- **Bocaccio (*Sebastes paucipinis*)**^{3, 5, 6, 10} – Juvenile bocaccio are in shallow waters over soft-bottom near piers (MBC Applied Environmental Sciences 1988; McCain 2003; Thomas 2001). Juveniles over soft bottoms often associate with drift algae (McCain 2003).
- **Brown rockfish (*Sebastes auriculatus*)**^{4, 6, 8, 10}
- Brown smoothhound (*Mustelus henlei*)^{4, 8}
- C-O turbot (*Pleuronichthys coenosus*)^{4, 7, 8, 10}
- **Calico rockfish (*Sebastes dalli*)**^{3, 8, 10}
- California barracuda (*Sphyraena argentea*)^{1, 4, 5, 6, 9, 10}
- California corbina (*Menticirrhus undulatus*)^{4, 5, 6, 7, 8, 9, 10}
- California grunion (*Leuresthes tenuis*)^{4, 5, 6, 9, 10}
- California halibut (*Paralichthys californicus*)^{1, 4, 5, 6, 7, 8, 9, 10} – Adult and older juvenile California halibut reside along the open coast on soft-bottom and deeper rocky reefs from 0 to 90 meters, but they are most common at depths less than 30 meters (Allen 1985; Kramer and Sunada 2001).
- California killifish (*Fundulus parvipinis*)^{2, 4, 5, 6, 9}
- California lizardfish (*Synodus lucioceps*)^{1, 2, 3, 4, 6}
- California needlefish (*Strongylura exilis*)^{1, 4, 9}
- **California scorpionfish (*Scorpaena guttata*)**^{4, 5, 6, 7, 8, 10} – California scorpionfish can be found over soft-bottom from the surfzone to 180 meters, but are most common from 6 to 137 meters (Love 2001a).
- California tonguefish (*Symphurus atricauda*)^{1, 4, 5, 6, 9} – California tonguefish eggs are located on the benthos of bays (MBC Applied Environmental Sciences 1994).
- Cheekspot goby (*Ilypnus gilberti*)^{1, 4, 9, 10}
- **Chilipepper (*Sebastes goodei*)**^{5, 6}
- Common thresher shark (*Alopias vulpinus*)^{5, 6}

- **Curlfin sole (*Pleuronichthys decurrens*)**^{5, 6, 7, 8, 10} – Curlfin turbot reside over soft-bottom (Allen 1985; Anchor Environmental, L.L.C. 2001). They are most common at depths less than 90 meters (McCain 2003).
- Deepbody anchovy (*Anchoa compressa*)^{4, 9}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 4, 7, 9, 10}
- Dwarf perch (*Micrometrus minimus*)^{4, 8, 10}
- **English sole (*Pleuronectes vetulus*)**^{5, 6, 7} – English sole move inshore during the summer months and can be found in eelgrass, along the open coast, and over sand and mud (McCain 2003; Pearson and Owen 2001).
- Fantail sole (*Xysteurys lioleps*)^{4, 6, 7, 9, 10}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 7, 8, 9, 10}
- Grey smoothhound (*Mustelus californicus*)^{4, 7, 9}
- Hornyhead turbot (*Pleuronichthys verticalis*)^{1, 4, 5, 6, 7, 8, 9, 10}
- Jacksmelt (*Atherinopsis californiensis*)^{4, 5, 6, 7, 9, 10}
- Kelp bass (*Paralabrax clathratus*)^{1, 4, 5, 6, 7, 9, 10}
- Kelp pipefish (*Syngnathus californiensis*)^{5, 6, 9}
- **Leopard shark (*Triakis semifasciata*)**^{4, 7, 8} – In Southern California, leopard sharks reside along open coasts over sandy bottoms (NMFS Northwest Region 2004; Smith 2001). They are most common from the surfzone to 5 meters (Smith 2001). Seasonally, pups are along protected beaches and in bays like Santa Monica (Smith 2005).
- **Lingcod (*Ophiondon elongatus*)**^{5, 6, 10} – Adult lingcod reside near the bottom in estuaries (NMFS Northwest Region 2004). Juvenile lingcod remain in shallow bays over soft bottoms and in eelgrass (Abrams and Starr 2001).
- **Market squid (*Loligo opalescens*)**^{5, 6} – Market squid spawn from October to May, congregating in bays over sandy bottoms with rocky outcrops (Yaremko 2001). Market squid attach their egg masses to the sea floor (Yaremko 2001).
- **Northern anchovy (*Engraulis mordax*)**^{1, 4, 5, 6, 8, 9, 10}
- Pacific hagfish (*Eptatretus stouti*)³
- Pacific electric ray (*Torpedo californica*)^{5, 6, 8, 10}
- **Pacific mackerel (*Scomber japonicus*)**^{5, 10}

- **Pacific sanddab (*Citharichthys sordidus*)**^{3, 6, 7} – Pacific sanddabs reside on nearshore soft-bottom at depths between 9 and 550 meters, but are most common in water shallower than 183 meters (Allen 1985; Allen and Leos 2001; Cross and Allen 1993).
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1, 2, 4, 5, 6, 7, 9}
- Plainfin midshipman (*Porichthys notatus*)^{5, 7}
- Queenfish (*Seriphus politus*)^{1, 4, 5, 6, 9, 10}
- Rainbow seaperch (*Hypsurus caryi*)^{4, 7, 8, 10}
- **Ratfish (*Hydrolagus colliei*)**³ – Ratfish attach their eggs to rocks or place them upright in the sand (McCain 2003).
- **Rex sole (*Errex zachirus*)**^{5, 6} – Rex sole reside over muddy and sandy bottoms (Anchor Environmental, L.L.C. 2001; McCain 2003; Quirollo 2001).
- Round stingray (*Urobatis halleri*)^{1, 4, 7, 9, 10}
- Rubberlip seaperch (*Rhacochilus toxotes*)^{4, 5, 6, 7, 8, 10}
- **Sand sole (*Psettichthys melanosticus*)**⁵
- Shadow goby (*Quietula y-cauda*)^{4, 9, 10}
- Shiner perch (*Cymatogaster aggregata*)^{1, 4, 5, 6, 8, 9, 10}
- Shovelnose guitarfish (*Rhinobatos productus*)^{4, 5, 6, 8, 10}
- Slough anchovy (*Anchoa delicatissima*)^{4, 9, 10}
- Speckled sanddab (*Citharichthys stigmaeus*)^{5, 7, 8, 9, 10}
- Specklefin midshipman (*Porichthys myriaster*)^{4, 10}
- **Spiny dogfish (*Squalus acanthias*)**^{3, 5, 6, 10} – Adult spiny dogfish spawn in shallow bays, the same place where juveniles forage and mature (McCain 2003; NMFS Northwest Region 2004).
- Spotted cusk-eel (*Chilara taylori*)⁷
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{4, 8, 9, 10}
- Spotted turbot (*Pleuronichthys ritteri*)^{1, 4, 7, 10}
- **Starry flounder (*Platichthys stellatus*)**^{4, 5, 6}
- **Stripetail rockfish (*Sebastes saxicola*)**^{3, 5, 6} – Juvenile settlement of stripetail rockfish occurs between February and May; they recruit to soft-bottom and kelp beds (Love *et al.* 1991; Sakuma 2002).
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}

- **Vermilion rockfish (*Sebastes miniatus*)**^{3, 5, 6, 8, 10} – Vermilion rockfish occupy the pelagic habitat over nearshore and deeper soft-bottom and hard-bottom (Allen 1985; VanTresca 2001). They are most common from 50-150 meters (Love 2002g). Juveniles recruit to low relief soft and hard-bottom, moving into deeper water as they get older (Love *et al.* 1991; McCain 2003).
- Walleye surfperch (*Hyperprosopon argenteum*)^{4, 5, 6, 7, 8, 10}
- White croaker (*Genyonemus lineatus*)^{1, 4, 5, 6, 9, 10}
- White seabass (*Atractoscion nobilis*)^{1, 4, 5, 6, 7, 10}
- White surfperch (*Phanerodon furcatus*)^{4, 5, 6, 8, 10}
- Yellowchin sculpin (*Icelinus quadriseriatus*)^{3, 6, 7}
- Yellowfin croaker (*Umbrina roncadore*)^{4, 7, 9}
- Yellowfin goby (*Acanthogobius flavimanus*)^{1, 4, 9}

Hard Bottom

Kelp Bed

Giant Kelp

Kelp beds are located at the northern and southern ends of Santa Monica Bay. There is a kelp bed off Point Dume in Malibu and another fringes the Palos Verdes Peninsula (MBC Applied Environmental Sciences 1993). Kelp beds grow on hard bottoms at depths ranging from 8 to 18 meters (Allen 1985). Fish may inhabit one or more of the following region of the kelp bed: holdfast, stipe, or canopy (MBC Applied Environmental Sciences).

- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 5, 6, 7, 8, 9, 10}
- Bat ray (*Myliobatis californica*)^{1, 4, 5, 6, 8, 9, 10}
- Black croaker (*Cheilotrema saturnum*)^{4, 7, 8, 10}
- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- Blacksmith (*Chromis punctipinnis*)^{3, 4, 7, 8, 10}
- **Blue rockfish (*Sebastes mystinus*)**^{8, 10} – Between April and June in the Southern California Bight, juvenile blue rockfish recruit to shallow rocky reefs and kelp beds where they remain throughout adulthood (Allen 1985; Love *et al.* 1991; Hobson 2002; NMFS Northwest Region 2004).
- **Bocaccio (*Sebastes paucipinis*)**^{3, 5, 6, 10} – Juvenile bocaccio recruit to kelp beds and low-growing algae (Love *et al.* 1991). Juveniles forage in the kelp canopy, and adults are there for all activities (NMFS Northwest Region 2004).

- **Brown rockfish (*Sebastes auriculatus*)**^{4, 6, 8, 10} – Pelagic juvenile brown rockfish settle out over rocks and other hard bottom, and among drift algae and kelp beds at depths near 36 meters (Love 2002a; Love et al. 1991; NMFS Northwest Region).
- **Cabezon (*Scorpaenichthys marmoratus*)**^{4, 6, 7, 8, 10} – Cabezon reside at depths between 0 and 76 meters over rocky reefs and in kelp beds (Wilson-Vandenberg and Hardy 2001). Juveniles are in the kelp canopy, and adults remain near the holdfasts (Wilson-Vandenberg and Hardy 2001).
- California barracuda (*Sphyraena argentea*)^{1, 4, 5, 6, 9, 10}
- **California scorpionfish (*Scorpaena guttata*)**^{4, 5, 6, 7, 8, 10} – Juvenile California scorpionfish reside among dense algae located in shallow water (Love 2001a). Adults reside at the bottoms of kelp beds (NMFS Northwest Region 2004).
- California sheephead (*Semicossyphus pulcher*)^{4, 5, 6, 7, 8, 10}
- **Chilipepper (*Sebastes goodei*)**^{5, 6} – Juvenile chilipepper school in nearshore shallow waters, kelp beds, and over bedrock (NMFS Northwest Region 2004; Ralston and Oda 2001). Larvae and juveniles feed in the kelp canopy (NMFS Northwest Region 2004). Young-of-year recruit to kelp beds in June (Love 2002d).
- Garibaldi (*Hypsypops rubicundus*)^{4, 7, 10}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 7, 8, 9, 10}
- **Gopher rockfish (*Sebastes carnatus*)**^{8, 10} – Gopher rockfish reside shallow rocky reefs and kelp beds (Allen 1985). Juveniles recruit to kelp beds and high relief hard-bottom, where they remain as adults (Love et al. 1991; NMFS Northwest Region 2004). Larvae and juveniles feed in the kelp canopy (NMFS Northwest Region 2004).
- **Grass rockfish (*Sebastes rastrelliger*)**⁸ – Juvenile and adult grass rockfish forage in the holdfast region of kelp beds (NMFS Northwest Region 2004).
- Halfblind goby (*Lethops connectens*)^{5, 6} – Halfblind gobies reside among the kelp stipe (MBC Applied Environmental Sciences 1988).
- Halfmoon (*Medialuna californiensis*)^{4, 5, 6, 7, 8, 10}
- Horn shark (*Heterodontus francisi*)^{4, 7, 8, 10}
- **Jack mackerel (*Trachurus symmetricus*)**^{5, 6, 7, 8}

- Jacksmelt (*Atherinopsis californiensis*)^{4, 5, 6, 7, 9, 10}
- Kelp bass (*Paralabrax chlathratus*)^{1, 4, 5, 6, 7, 9, 10}
- Kelp clingfish (*Rimicola muscarum*)^{4, 5, 6, 9} – Kelp clingfish reside in the kelp canopy and among eelgrass (Eschemeyer *et al.* 1983).
- **Kelp greenling (*Hexagrammos decagrammus*)¹⁰** – Kelp greenling occupy nearshore rocky habitats, often near or in kelp beds (Howard 2001). Kelp greenling attach their eggs to the sea floor and encrusting biota (Howard 2001).
- Kelp gunnel (*Apodichthys sanctarosae*)⁵ – Kelp gunnel reside in the kelp canopy (MBC Applied Environmental Sciences 1988).
- Kelp perch (*Brachyistius frenatus*)^{5, 6, 7, 8, 10}
- Kelp pipefish (*Syngnathus californiensis*)^{5, 6, 9}
- **Kelp rockfish (*Sebastes atrovirens*)^{4, 5, 6, 7, 8}** – Kelp rockfish reside in kelp beds and over shallow rocky reefs at depths of 18 to 24 meters (Allen 1985; Larson 2002a; MBC Applied Environmental Sciences 1988). In July and August, young-of-year settle out into the kelp canopy (Larson 2002a; Love *et al.* 1991). Adults reside among the holdfasts and juveniles are there from growth to maturity (Larson 2002a; NMFS Northwest Region 2004). Larval, juvenile and adult kelp rockfish forage in the kelp canopy (NMFS Northwest Region 2004).
- **Leopard shark (*Triakis semifasciata*)^{4, 7, 8}**
- **Lingcod (*Ophiodon elongatus*)^{5, 6, 10}** – Adult lingcod may be near the bottom in Santa Monica Bay’s estuaries (NMFS Northwest Region 2004). They are found in association with rocky reefs, kelp beds and eelgrass (Abrams and Starr 2001; NMFS Northwest Region 2004). They spawn nearshore and deposit their eggs on rocky substrate (Abrams and Starr 2001; NMFS Northwest Region 2004). Juvenile lingcod remain in shallow bays over soft bottoms and in eelgrass (Abrams and Starr 2001).
- **Olive rockfish (*Sebastes serranoides*)^{4, 5, 6, 8, 10}** – In the Southern California Bight, juvenile olive rockfish settle out into kelp beds and shallow rocky reefs (Love 2001b; Love 2002l; Love *et al.* 1991).
- Opaleye (*Girella nigricans*)^{2, 4, 5, 6, 7, 8}
- Pacific bonito (*Sarda chiliensis*)^{4, 5, 6, 10}

- Pacific electric ray (*Torpedo californica*)^{5, 6, 8, 10}
- **Pacific mackerel** (*Scomber japonicus*)^{5, 10}
- **Pacific sanddab** (*Citharichthys sordidus*)^{6, 7} – Adult Pacific sanddab forage in kelp beds (NMFS Northwest Region 2004).
- Painted greenling (*Oxylebius pictus*)^{4, 7, 8}
- Rock wrasse (*Halichoeres semicinctus*)^{4, 7, 8, 10}
- Rubberlip seaperch (*Rhacochilus toxotes*)^{4, 5, 6, 7, 8, 10}
- Salema (*Xenistius californiensis*)^{1, 4, 7, 10}
- Sargo (*Anisotremis davidsonii*)^{4, 7, 8, 10}
- Seniorita (*Oxyjulis californica*)^{4, 5, 6, 7, 8, 10}
- Spotted kelpfish (*Gibbonsia elegans*)^{1, 5, 6, 8, 9, 10}
- **Stripetail rockfish** (*Sebastes saxicola*)^{3, 5, 6} – Juvenile stripetail rockfish recruit to soft-bottom and kelp beds between February and May in Southern California (Love et al. 1991; Sakuma 2002). They remain in these habitats from growth to maturity (NMFS Northwest Region 2004; Sakuma 2002).
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- **Treefish** (*Sebastes serriceps*)^{7, 8, 10} – Young-of-year treefish hide under kelp mats in the spring and summer (Love 2002n).
- **Vermilion rockfish** (*Sebastes miniatus*)^{3, 5, 6, 8, 10} – Vermilion rockfish release their larvae between July and March (Love 2002g). The larvae feed in the kelp canopy (NMFS Northwest Region 2004). Juveniles and adults forage in the holdfast region of kelp beds (NMFS Northwest Region 2004). Adults occupy the holdfast region for all activities (NMFS Northwest Region 2004).
- Walleye surfperch (*Hyperprosopon argenteum*)^{4, 5, 6, 7, 8, 10}
- White seabass (*Atractoscion nobilis*)^{1, 4, 5, 6, 7, 10}
- White surfperch (*Phanerodon furcatus*)^{4, 5, 6, 7, 8, 10}
- Yellowtail (*Seriola lalandi*)^{5, 6}

Rocky Reef

Allen (1985) defines shallow rocky reef as the rocky reef that lies between 2 and 12 meters. In Santa Monica Bay, shallow rock reef is located from Point Dume in Malibu to the Pacific Palisades; in Marina del Rey and King Harbor; and from Malaga Cove to Point Fermin off the Palos Verdes Peninsula (Allen 1985; MBC Applied Environmental Sciences 1988). Exposed bedrock occurs from the Ventura County line

to Pulga Canyon in Malibu, and from Malaga Cove to Point Fermin on the Palos Verdes shelf (MBC Applied Environmental Sciences 1993). Artificial hard-bottom exists in the form of municipal wastewater outfall pipes, jetties, breakwaters, groins and artificial reefs (MBC Applied Environmental Sciences 1993).

- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 5, 6, 7, 8, 9, 10}
- Bat ray (*Myliobatis californica*)^{1, 4, 5, 6, 8, 9, 10}
- Black croaker (*Cheilotrema saturnum*)^{4, 7, 8, 10}
- Black surfperch (*Embiotoca jacksoni*)^{4, 5, 7, 8, 9, 10}
- Blackeye goby (*Coryphopterus nicholsii*)^{3, 4, 7, 8, 10}
- Blacksmith (*Chromis punctipinnis*)^{3, 4, 7, 8, 10}
- **Blue rockfish (*Sebastes mystinus*)^{8, 10}** – Juvenile blue rockfish recruit to shallow rocky reefs and kelp beds, remaining there through adulthood between April and June in the Southern California Bight (Allen 1985; Love *et al.* 1991; Hobson 2002; NMFS Northwest Region 2004).
- Bluebanded goby (*Lythrypnus dalli*)^{4, 8, 10}
- **Bocaccio (*Sebastes paucipinis*)^{5, 6, 10}** – Juvenile bocaccio recruit to hard-bottom, kelp beds, low growing algae, and shallow soft-bottom near piers, where they remain as they mature (Love *et al.* 1991; Love 2002h; Thomas 2001).
- **Brown rockfish (*Sebastes auriculatus*)^{4, 6, 8, 10}** – Brown rockfish associate with the sand-rock interfaces and rocky bottoms of artificial reefs at depths less than 54 meters (Ashcraft and Heisdorf 2001). Pelagic juveniles settle out over rocks, other hard bottoms, among drift algae, and in kelp beds at depths near 36 meters (Love 2002a; Love *et al.* 1991; NMFS Northwest Region).
- **Cabazon (*Scorpaenichthys marmoratus*)^{4, 6, 7, 8, 10}** – Cabazon reside over rocky reefs and in kelp beds at depths between 0 and 76 meters (Wilson-Vandenberg and Hardy 2001).
- **Calico rockfish (*Sebastes dalli*)^{8, 10}** – Juvenile and adult calico rockfish reside over soft-bottom, rocky reef, and artificial reef (Allen 1985; Ono 2001). Young-of-year enter San Pedro Bay in July, settling out over soft-bottom, hard-bottom and mixed bottom (Butler and Love 2002; Love *et al.* 1991; McCain 2003).
- California barracuda (*Sphyraena argentea*)^{1, 4, 5, 6, 9, 10}
- California corbina (*Menticirrhus undulatus*)^{4, 5, 6, 7, 8, 9, 10}
- **California scorpionfish (*Scorpaena guttata*)^{4, 5, 6, 7, 8, 10}** – California scorpionfish spawn near the bottom at depths between 3

and 120 meters (Love 2001a). They reside over hard-bottom and soft-bottom (Love 2001a; NMFS Northwest Region 2004).

- California sheephead (*Semicossyphus pulcher*)^{4, 5, 6, 7, 8, 10}
- **Chilipepper (*Sebastes goodei*)**^{5, 6} – Juvenile chilipepper school in nearshore shallow waters, kelp beds, and over bedrock (NMFS Northwest Region 2004; Ralston and Oda 2001).
- Dwarf perch (*Micrometrus minimus*)^{4, 8, 10}
- Garibaldi (*Hypsypops rubicundus*)^{4, 7, 10}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 7, 8, 9, 10}
- **Gopher rockfish (*Sebastes carnatus*)**^{8, 10} – Gopher rockfish reside over shallow rocky reefs and in kelp beds (Allen 1985). Juveniles recruit to kelp beds and high relief hard-bottom, where they remain as adults (Love *et al.* 1991; NMFS Northwest Region 2004).
- **Grass rockfish (*Sebastes rosenblatti*)**⁸ – Juvenile grass rockfish recruit to low growing algae and hard-bottom, including tidepools (Love *et al.* 1991; McCain 2003).
- **Greenblotched rockfish (*Sebastes rosenblatti*)**^{5, 6} – Greenblotched rockfish are found over cobble and high relief rocks (Love 2002j). Young-of-year settle out on bottoms of cobble, boulder, and shell (Love 2002j).
- Grey smoothhound (*Mustelus californicus*)^{4, 7, 9}
- Halfmoon (*Medialuna californiensis*)^{4, 5, 6, 7, 8, 10}
- Horn shark (*Heterodontus francisi*)^{4, 7, 8, 10}
- **Jack mackerel (*Trachurus symmetricus*)**^{5, 6, 7, 8}
- Jacksmelt (*Atherinopsis californiensis*)^{4, 5, 6, 7, 9, 10}
- Kelp bass (*Paralabrax chlathratus*)^{1, 4, 5, 6, 7, 9, 10} – Kelp bass form breeding assemblages over shallow rocky reefs (Allen and Hovey 2001b).
- **Kelp greenling (*Hexagrammos decagrammus*)**¹⁰ – Kelp greenling deposit their eggs on the sea floor and encrusting biota (Howard 2001).
- Kelp perch (*Brachyistius frenatus*)^{5, 6, 7, 8, 10}
- **Kelp rockfish (*Sebastes atrovirens*)**^{4, 5, 6, 7, 8} – Kelp rockfish reside in kelp beds and over shallow rocky reef at depths of 18 to 24 meters (Allen 1985; Larson 2002a; NMFS Northwest Region 2004).
- **Leopard shark (*Triakis semifasciata*)**^{4, 7, 8}

- **Lingcod (*Ophionodon elongatus*)**^{5, 6, 10} – Adult lingcod associate with rocky reefs, kelp beds, and eelgrass (Abrams and Starr 2001; NMFS Northwest Region 2004). They spawn nearshore and deposit their eggs on rocky substrate (Abrams and Starr 2001; NMFS Northwest Region 2004).
- Mussel blenny (*Hypsoblennius jenkinsi*)^{1, 4, 8, 9, 10}
- **Northern anchovy (*Engraulis mordax*)**^{1, 4, 5, 6, 8, 9, 10}
- Ocean whitefish (*Caulolatilus princeps*)^{5, 6, 7, 8, 10}
- **Olive rockfish (*Sebastes serranoides*)**^{4, 5, 6, 8, 10} – Olive rockfish inhabit rocky reefs (Allen 1985; Love 2001b; NMFS Northwest Region 2004). In the Southern California Bight, juveniles settle out into kelp beds and shallow rocky reefs (Love 2001b; Love 2002i; Love *et al.* 1991).
- Onespot fringehead (*Neoclinus uninotatus*)^{8, 10}
- Opaleye (*Girella nigricans*)^{2, 4, 5, 6, 7, 8}
- Pacific angel shark (*Squatina californica*)¹⁰
- Pacific bonito (*Sarda chiliensis*)^{4, 5, 6, 10}
- Pacific electric ray (*Torpedo californica*)^{5, 6, 8, 10}
- **Pacific mackerel (*Scomber japonicus*)**^{5, 10}
- Painted greenling (*Oxylebius pictus*)^{4, 7, 8}
- Pile perch (*Rhacochilus vacca*)^{4, 5, 6, 7, 8, 9, 10}
- Queenfish (*Seriphus politus*)^{1, 4, 5, 6, 9, 10}
- Rainbow seaperch (*Hypsurus caryi*)^{4, 7, 8, 10}
- **Ratfish (*Hydrolagus colliei*)**³ – Juvenile ratfish reside over shelf gravel, cobble and bedrock from growth to maturity (McCain 2003; NMFS Northwest Region 2004). Adults occupy the same habitat for spawning and other activities (McCain 2003; NMFS Northwest Region 2004). They attach their eggs to rocks or place them upright in the sand (McCain 2003).
- Reef finspot (*Paraclinus integripinnis*)^{4, 8, 9, 10}
- Rock wrasse (*Halichoeres semicinctus*)^{4, 7, 8, 10}
- Rockpool blenny (*Hypsoblennius gilberti*)^{4, 5, 6, 8, 9, 10}
- Roughcheek sculpin (*Artedius creaseri*)^{8, 10}
- Rubberlip seaperch (*Rhacochilus toxotes*)^{4, 5, 6, 7, 8, 10}
- Salema (*Xenistius californiensis*)^{1, 4, 7, 10}

- Sarcastic fringehead (*Neoclinus blanchardi*)¹⁰
- Sargo (*Anisotremis davidsonii*)^{4, 7, 8, 10}
- Senorita (*Oxyjulis californica*)^{4, 5, 6, 7, 8, 10}
- Shadow goby (*Quietula y-cauda*)^{4, 9, 10}
- Shiner perch (*Cymatogaster aggregata*)^{1, 4, 5, 6, 8, 9, 10}
- Snubnose sculpin (*Orthonopias triacis*)^{8, 10}
- Specklefin midshipman (*Porichthys myriaster*)^{4, 10}
- **Spiny dogfish (*Squalus acanthias*)**^{3, 5, 6, 10}
- Spotted kelpfish (*Gibbonsia elegans*)^{1, 5, 6, 8, 9, 10}
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{4, 8, 9, 10}
- Striped kelpfish (*Gibbonsia metzi*)⁸
- Stripedfin ronquil (*Rathbunella hypoplecta*)¹⁰
- **Stripetail rockfish (*Sebastes saxicola*)**^{3, 5, 6}
- Thornback guitarfish (*Platyrrhinoidis triseriata*)^{7, 8, 10}
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- **Treefish (*Sebastes serriceps*)**^{7, 8, 10} – Juvenile treefish recruit to hard-bottom and remain as adults (Love *et al.* 1991; NMFS Northwest Region 2004). Treefish can be at depths ranging from MLLW to 97 meters (Love 2002n).
- **Vermilion rockfish (*Sebastes miniatus*)**^{3, 5, 6, 8, 10} – Vermilion rockfish are most common from 50-150 meters (Love 2002g). Juveniles recruit to low relief soft and hard-bottom, moving to deeper water as they get older (Love *et al.* 1991; McCain 2003).
- Walleye surfperch (*Hyperprosopon argenteum*)^{4, 5, 6, 7, 8, 10}
- White croaker (*Genyonemus lineatus*)^{1, 4, 5, 6, 9, 10}
- White seabass (*Atractoscion nobilis*)^{1, 4, 5, 6, 7, 10}
- White surfperch (*Phanerodon furcatus*)^{4, 5, 6, 7, 8, 10}
- Woolly sculpin (*Clinocottus analis*)^{4, 5, 6, 8, 10}
- Yellowfin fringehead (*Neoclinus stephensae*)^{4, 10}
- Zebra goby (*Lythrypnus zebra*)^{8, 10}
- Zebra perch (*Hermosilla azurea*)^{4, 8, 10}

Neritic

Water Column

The water column encompasses all waters beyond the littoral zone and deeper than one meter. It extends from the sea surface to the ocean bottom (Madden *et al.* 2005). For the water column to be considered EFH, the fish must either (1) spend the majority of their time in the water column; (2) spend and entire life stage in the water column (i.e., egg, larvae, juvenile, adult); or (3) perform an activity in the water column that is required to promote the welfare of the population (i.e., feeding).

- Basking shark (*Cetorhinus maximus*)^{5,6}
- **Blue rockfish (*Sebastes mystinus*)**^{8,10} – Blue rockfish release their pelagic larvae between October and March (Hobson 2002).
- Blue shark (*Prionace glauca*)^{5,6}
- **Bocaccio (*Sebastes paucipinis*)**^{3,5,6,10} – Juvenile bocaccio reside in shallow waters over soft-bottom near piers and adult bocaccio reside in the water column over hard-bottom and soft-bottom (Allen 1985; MBC Applied Environmental Sciences 1988; McCain 2003; Thomas 2001). Bocaccio feed in the offshore pelagic realm (MBC Applied Environmental Sciences 1988). Bocaccio release their larvae between October and July (Love 2002h). The larvae remain in Santa Monica Bay and, along small juveniles, remain within 100 feet of the surface (Love 2002h; McCain 2003; Moser and Boehlert 1991).
- **Brown rockfish (*Sebastes auriculatus*)**^{4,6,8,10} – Brown rockfish release their pelagic larvae between January and August (Love 2002a).
- **Calico rockfish (*Sebastes dalli*)**^{3,8,10} – Calico rockfish release their pelagic larvae between January and May (Butler and Love 2002).
- California barracuda (*Sphyraena argentea*)^{1,4,5,6,9,10}
- **California scorpionfish (*Scorpaena guttata*)**^{4,5,6,7,8,10} – California scorpionfish eggs are pelagic and float in masses near the surface (McCain 2003).
- California smoothtongue (*Leuroglossus stilbius*)^{5,6}
- **Chilipepper (*Sebastes goodei*)**^{5,6} – Chilipepper release their pelagic larvae between August and April (Love 2002d).
- Common thresher shark (*Alopias vulpinus*)^{5,6}
- **Curlfin sole (*Pleuronichthys decurrens*)**^{5,6,7,8,10} – Curlfin sole spawn from April to August and release pelagic eggs (McCain 2003).
- **Dover sole (*Microstomus pacificus*)**^{3,5,6,7} – Dover sole eggs are in the upper 50 meters of the water column (McCain 2003).

- **Greenblotched rockfish (*Sebastes rosenblatti*)**^{5,6} – Greenblotched rockfish release pelagic larvae December thru July (Love 2002j).
- **Greenspotted rockfish (*Sebastes chlorosticus*)**³ – Greenspotted rockfish release pelagic larvae between February and July (Love 2002c).
- **Halfbanded rockfish (*Sebastes semicinctus*)**³ – Halfbanded rockfish release their pelagic larvae from December to April (Love 2002i).
- **Jack mackerel (*Trachurus symmetricus*)**^{5,6,7,8} – Juvenile jack mackerel school over shallow and deep rocky reefs, in kelp beds, and along rocky shorelines (Allen 1985; Mason 2001). Adults remain offshore (Mason 2001).
- Jacksmelt (*Atherinopsis californiensis*)^{4,5,6,7,9,10}
- **Market squid (*Loligo opalescens*)**^{5,6} – In southern California waters, market squid spawn from October to early May (Yaremko 2001). While spawning, market squid congregate in bays over sandy bottoms with rocky outcrops (Yaremko 2001).
- Mexican lampfish (*Triphiturus mexicanus*)^{4,5}
- **Northern anchovy (*Engraulis mordax*)**^{1,4,5,6,8,9,10} – Northern anchovy school near the surface, over soft bottoms, along open coast sandy beaches, over shallow rocky reefs, and in bays and estuaries (Allen 1985; Bergen and Jacobson 2001).
- Northern lampfish (*Stenobranchius leucopsarus*)^{4,5,6}
- **Olive rockfish (*Sebastes serranoides*)**^{4,5,6,8,9,10} – Olive rockfish release their pelagic larvae between December and March (Love 2002m).
- Pacific bonito (*Sarda chiliensis*)^{4,5,6,10}
- **Pacific mackerel (*Scomber japonicus*)**^{5,10} – Pacific mackerel migrate inshore from July to November (Konno and Wolf 2001; MBC Applied Environmental Sciences 1988). Adults reside mid-water, while juveniles reside along open coast sandy beaches, in kelp beds, and in bays and estuaries (Allen 1985; Konno and Wolf 2001).
- **Pacific sardine (*Sardinops sagax*)**^{1,4,5,6,9} – Pacific sardines school mid-water (Allen 1985; MBC Applied Environmental Sciences 1988).
- **Pacific whiting (hake) (*Meluccius productus*)**^{5,6} – Pacific whiting reside in the pelagic realm over nearshore and neritic soft-bottom (Allen 1985; MBC Applied Environmental Sciences 1988; Quirollo and Wespestad 2001). Eggs and larvae are pelagic and remain in water with depths between 40 and 140 meters (McCain 2003).
- **Sablefish (*Anoplopoma fimbria*)**^{3,5,6} – Sablefish reside in the pelagic realm or over soft-bottom at depths between 90 and 1460 meters; they are most common between 365 and 550 meters (Henry 2001; MBC Applied

Environmental Sciences 1988). Between the months of October and February, sablefish spawn at depths greater than 823 meters (Henry 2001). Larvae initially inhabit offshore surface waters but move to inshore nursery areas as they get older (Henry 2001).

- **Stripetail rockfish (*Sebastes saxicola*)**^{3, 5, 6} – Stripetail rockfish release their pelagic larvae between November and March (Sakuma 2002).
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6, 8, 9, 10}
- **Vermilion rockfish (*Sebastes miniatus*)**^{3, 5, 6, 8, 10} – Vermilion rockfish occupy the pelagic habitat over nearshore and neritic soft-bottom and hard-bottom (Allen 1985; VanTresca 2001). They are most common from 50-150 meters (Love 2002g). Vermilion rockfish feed in the pelagic realm (MBC Applied Environmental Sciences 1988). Vermilion rockfish release their pelagic larvae between July and March (Love 2002g).
- Yellowtail (*Seriola lalandi*)^{5, 6}

Bottom

Soft Bottom

Un-Vegetated

Most of the subtidal benthos of Santa Monica Bay is soft-bottom comprised of sand and silt, with sand found closest to shore (MBC Applied Environmental Sciences 1988). Silty sand covers the central plateau and the Palos Verdes Shelf (MBC Applied Environmental Sciences 1993). The soft-bottom in Santa Monica Bay ranges in depth from MLLW to 500+ meters in the outer portions of the bay and the submarine canyons. Fish use this habitat for all life stages. The following list of fish species is broken up by the depths where they are likely to be found and fish may be listed in more than one category.

- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 5, 6, 7, 8, 9, 10}
- Bat ray (*Myliobatis californica*)^{1, 4, 5, 6, 8, 9, 10}
- Blackeye goby (*Coryphopterus nicholsii*)^{3, 4, 7, 8, 10}
- **Bocaccio (*Sebastes paucipinis*)**^{3, 5, 6, 10} – Adult bocaccio are often at depths of 50 to 250 meters and deeper in Southern California waters (Love 2002h).
- **Brown rockfish (*Sebastes auriculatus*)**^{4, 6, 8, 10} – Brown rockfish associate with the sand-rock interface at depths less than 54 meters (Ashcraft and Heisdorf 2001).
- Brown smoothound (*Mustelus henlei*)^{4, 8}
- **Calico rockfish (*Sebastes dalli*)**^{3, 8, 10} – Juvenile and adult calico rockfish reside over soft-bottom and artificial reefs at depths from 60 to 120 meters (Allen 1985; Butler and Love 2002; Ono 2001).

During July, young-of-year settle out on deep soft-bottom, sand/rock bottom, and low relief hard-bottom in Southern California (Butler and Love 2002; Love et al. 1991).

- California halibut (*Paralichthys californicus*)^{1, 4, 5, 6, 7, 8, 9, 10}
- **California scorpionfish (*Scorpaena guttata*)**^{4, 5, 6, 7, 8, 10} – California scorpionfish are over soft-bottom from the surfzone to 180 meters, but are most common from 6 to 137 meters (Love 2001a).
- **Cowcod (*Sebastes levis*)**^{5, 6} – Juvenile cowcod reside over fine sand and clay sediments at depths between 40 and 100 meters (Barnes 2001).
- **Dover sole (*Microstomus pacificus*)**^{3, 5, 6, 7} – Dover sole reside on mud bottoms from 55 to 1460 meters deep and exhibit a summer inshore movement (Allen 1985; Henry and Lo 2001; MBC Applied Environmental Sciences 1988).
- **Greenspotted rockfish (*Sebastes chlorosticus*)**³ – Greenspotted rockfish reside at depths between 60 and 240 meters (Love 2002c; McCain 2003). Juveniles settle to deep rocky reef and mud bottoms (Love 2002c). Adults occupy hard-bottom and soft-bottom habitats (McCain 2003; NMFS Northwest Region 2004).
- **Halfbanded rockfish (*Sebastes semicinctus*)**³ – Halfbanded rockfish reside over high and low relief hard-bottom and soft-bottom at depths between 60 and 150 meters (Cross and Allen 1993; Love 2002). Young-of-year recruit to low relief hard-bottom and soft-bottom (Love 2002).
- Pacific hagfish (*Eptatretus stouti*)³
- **Pacific sanddab (*Citharichthys sordidus*)**^{3, 6, 7} – Pacific sanddab reside on nearshore and deeper soft-bottom at depths between 9 and 550 meters (Allen 1985; Allen and Leos 2001; Cross and Allen 1993). Usually they are in water shallower than 183 meters (Allen and Leos 2001).
- **Pacific whiting (hake) (*Meluccius productus*)**^{5, 6} – Pacific whiting reside over soft bottoms at depths of 130 to 1500 meters (Allen 1985).
- Queenfish (*Seriphus politus*)^{1, 4, 5, 6, 9, 10}
- **Ratfish (*Hydrolagus colliei*)**³ – Ratfish attach their eggs to rocks or place them upright in the sand (McCain 2003).
- **Sablefish (*Anoplopoma fimbria*)**^{3, 5, 6} – Sablefish are over soft-bottom at depths between 90 and 1460 meters, but are most common between 365 and 550 meters (Henry 2001; MBC Applied

Environmental Sciences 1988). Sablefish spawn at depths greater than 823 meters between the months of October and February (Henry 2001).

- Slender sole (*Eopsetta exilis*)^{4, 7, 8, 10} – Slender sole reside on the soft bottoms of the outer shelf (MBC Applied Environmental Sciences 1988).
- Speckled sanddab (*Citharichthys stigmaeus*)^{5, 7, 8, 9, 10}
- **Spiny dogfish (*Squalus acanthias*)**^{3, 5, 6, 10}
- **Stripetail rockfish (*Sebastes saxicola*)**^{3, 5, 6} – Stripetail rockfish reside over soft-bottom and are most common between depths of 100 and 200 meters (Allen 1985; Sakuma 2002).
- **Vermilion rockfish (*Sebastes miniatus*)**^{3, 5, 6, 8, 10} – Vermilion rockfish occupy the water column over nearshore and deeper soft-bottom (Allen 1985; VanTresca 2001). They are most common from 50-150 meters (Love 2002g). Juveniles recruit to low relief soft and hard-bottom and they move to deeper water as they get older (Love et al. 1991; McCain 2003).
- White croaker (*Genyonemus lineatus*)^{1, 4, 5, 6, 9, 10}
- Yellowchin sculpin (*Icelinus quadriseriatus*)^{3, 6, 7}

Hard Bottom

Rocky Reef

Allen (1985) defines deep rocky reefs as rocky reefs that occur at depths greater than 20 meters. In Santa Monica Bay, the only deep rocky reef occurs in the middle of the Bay at Short Bank (MBC Applied Environmental Sciences 1988). A large gravel bed surrounds the rocky outcrops of Short Bank (MBC Applied Environmental Sciences 1988). Short Bank ranges from 20 and 100 meters in depth (MBC Applied Environmental Sciences 1988). Deep rocky reef is also present in the form of artificial hard bottom created by municipal wastewater outfall pipes and artificial reefs (MBC Applied Environmental Sciences 1993).

- Blackeye goby (*Coryphopterus nicholsii*)^{3, 4, 7, 8, 10}
- **Bocaccio (*Sebastes paucispinis*)**^{3, 5} – Adult bocaccio reside at depths between 50 and 250 meters over hard and soft bottoms (Allen 1985; Love 2002h; MBC Applied Environmental Sciences 1988; McCain 2003; Thomas 2001).
- **Cowcod (*Sebastes levis*)**^{5, 6} – Adult cowcod typically inhabit shallow and deep rocky reefs between depths of 21 and 366 meters, but are most abundant at depths less than 150 meters (Barnes 2001; McCain 2003).

- **Flag rockfish (*Sebastes rubrivinctus*)^{5, 6}** – Juvenile and adult flag rockfish are associated with deep rocky reefs at depths between 60 and 200 meters (Love 2002k). Flag rockfish forage on the bottom (Love 2002k; McCain 2003).
- **Greenblotched rockfish (*Sebastes rosenblatti*)^{5, 6}** – Greenblotched rockfish are found over cobble and high relief rocks (Love 2002j; MBC Applied Environmental Sciences 1993). Young-of-year settle out on bottoms of cobble, boulder, and shell (Love 2002j).
- **Jack mackerel (*Trachurus symmetricus*)^{5, 6, 7, 8}**
- **Lingcod (*Ophiodon elongatus*)^{5, 6, 10}**
- **Olive rockfish (*Sebastes serranoides*)^{4, 5, 6, 8, 10}** – Olive rockfish inhabit rocky reefs and submarine canyons (Allen 1985; Love 2001b; NMFS Northwest Region 2004). Adults forage on submarine canyon bedrock (NMFS Northwest Region 2004).
- **Ratfish (*Hydrolagus colliei*)³** – Adult ratfish occupy shelf gravel, cobble, and bedrock for spawning and other activities (McCain 2003; NMFS Northwest Region 2004). They attach their eggs to rocks or place them upright in the sand (McCain 2003).
- **Vermilion rockfish (*Sebastes miniatus*)^{3, 5, 6, 8, 10}** – Vermilion rockfish are most common from 50-150 meters over hard and soft bottoms (Allen 1985; Love 2002g; VanTresca 2001).

Submarine Canyon

There are three submarine canyons in Santa Monica Bay: Dume Canyon, Santa Monica Canyon, and Redondo Canyon (MBC Applied Environmental Sciences 1988). Dume Canyon is off Point Dume in Malibu (MBC Applied Environmental Sciences 1988). Santa Monica Canyon is in the middle of the bay, southwest of the City of Santa Monica (MBC Applied Environmental Sciences 1988). Redondo Canyon is off Redondo Beach and is a source of upwelling in the Bay (MBC Applied Environmental Sciences 1988; Stephens and Zerba 1981). The canyons are primarily soft-bottom, but there are some rocks and rocky ledges (MBC Applied Environmental Sciences 1988). Santa Monica Canyon and Redondo Canyon have areas of exposed bedrock (MBC Applied Environmental Sciences 1993).

- **Bocaccio (*Sebastes paucipinis*)^{3, 5}** – Juvenile and adult bocaccio forage on submarine canyon boulder and bedrock (NMFS Northwest Region 2004).
- **Cowcod (*Sebastes levis*)^{5, 6}** – Adult cowcod typically inhabit rocky reefs and submarine canyons at depths between 21 and 366 meters (Barnes 2001; McCain 2003; NMFS Northwest Region 2004).

- **Greenblotched rockfish (*Sebastes rosenblatti*)**^{5, 6} – Greenblotched rockfish have been found on the mud wall of Redondo Canyon (Love 2002j; McCain 2003).
- **Olive rockfish (*Sebastes serranoides*)**^{4, 5, 6, 8, 10} – Adult olive rockfish inhabit submarine canyons and forage on submarine canyon bedrock (Allen 1985; Love 2001b; NMFS Northwest Region 2004).
- **Vermilion rockfish (*Sebastes miniatus*)**^{3, 5, 6, 8, 10} – Vermilion rockfish are most common from 50-150 meters (Love 2002g). Adults reside over submarine canyon bedrock for all activities (NMFS Northwest Region 2004).

Documentation of Presence in Santa Monica Bay

- ¹ Allen, L.G. 1991. The fish populations inhabiting lower Marina del Rey Harbor and Ballona Channel from July 1990 to April 1991; Technical Report for the Playa Vista EIR, MacGuire Thomas Partners. Northridge, California.
- ² Ambrose, R.F. and D.J. Meffert. 1999. Fish-assemblage dynamics in Malibu Lagoon, a small, hydrologically altered estuary in southern California. *WETLANDS*, 19(2): 327-340.
- ³ Cross, J.N. and L.G. Allen. 1993. Fishes. In M.D. Dailey, D.J. Reish, and J.W. Anderson (eds.), *Ecology of the Southern California Bight: A Synthesis and Interpretation*. University of California Press, Berkeley, California. 459-540, 926p.
- ⁴ Impact Sciences, INC. 1996. Playa Vista: Existing Biota.
- ⁵ MBC Applied Environmental Sciences. 1988. The State of Santa Monica Bay: Part One: Assessment of Conditions and Pollution Impacts. Southern California Association of Governments. Los Angeles, California.
- ⁶ MBC Applied Environmental Sciences. 1993. Santa Monica Bay Characterization Study. Santa Monica Bay Restoration Project. Monterey Park, California.
- ⁷ Pondella, D. II, P. Morris, J.S. Stephens and N. Davis. 1996. Final Report: Marine Biological Surveys of the Coastal Zone off the City of Rancho Palos Verdes. U.S. Corp of Engineers. Los Angeles, California.
- ⁸ Stephens, J.S., Jr., P.A. Morris, K. Zerba, and M. Love. 1984. Factors affecting fish diversity on a temperate reef: the fish assemblage of Palos Verdes Point, 1974-1981. *Environmental Biology of Fishes*. 2(4): 259-175.
- ⁹ Stephens, J.S., Jr., D.F. Soule, D. Pondella, and P. Morris. ca. 1990. Marina del Rey as a fish habitat: studies of the fish fauna since 1977. Unpublished.
- ¹⁰ Stephens, J.S., Jr. and K.E. Zerba. 1981. Factors affecting fish diversity on a temperate reef. *Environmental Biology of Fishes*. 6(1): 111-121.

San Pedro Bay

Estuarine

In San Pedro Bay, there are estuarine conditions at the mouth of the Los Angeles River and near the salt marsh at Cabrillo Beach. An estuary is a “small semi-enclosed coastal body of water with a free connection with the open sea within which seawater is measurably diluted by freshwater from land drainage” (Josselyn *et al.* 1993). This dilution of seawater must occur for at least one month of the year for the water body to be “estuarine” (Josselyn *et al.* 1993).

- Arrow goby (*Clevelandia ios*)^{1, 2, 3, 5, 6}
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 6}
- Bat ray (*Myliobatis californica*)^{1, 2, 4, 6}
- Bay goby (*Lepidogobius lepidus*)^{1, 2, 3, 4, 5, 6}
- Bay pipefish (*Syngnathus leptorhynchus*)^{1, 6}
- Bigmouth sole (*Hippoglossina stomata*)²
- Black croaker (*Cheilotrema saturnum*)^{1, 2, 4, 6}
- **Black rockfish (*Sebastes melanops*)²** – Adult black rockfish are in estuaries for all activities and juveniles spend their time foraging there (NMFS Northwest Region 2004; Stewart and Love 2002).
- Blacksmith (*Chromis punctipinnis*)²
- Black surfperch (*Embiotoca jacksoni*)^{1, 2}
- Blackeye goby (*Coryphopterus nicholsii*)^{2, 3, 4}
- Blind goby (*Typhlogobius californiensis*)^{3, 4}
- **Brown rockfish (*Sebastes auriculatus*)²** – Juvenile brown rockfish use bays and estuaries for nursery grounds, and adults reside and forage there (Ashcraft and Heisdorf 2001; NMFS Northwest Region 2004).
- Brown smoothound (*Mustelus henlei*)²
- C-O turbot (*Pleuronichthys coenosus*)²
- **Cabazon (*Scorpaenichthys marmoratus*)²** – Adult cabazon feed in estuaries over sandy bottoms (NMFS Northwest Region 2004). Both demersal eggs and pelagic larvae are in estuaries from winter to spring (McCain 2003).
- California barracuda (*Sphyraena argentea*)^{1, 2, 3, 5, 6}
- California clingfish (*Gobiesox rhessodon*)^{2, 3, 4, 6}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 3, 4, 5, 6}

- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4, 5, 6} – Shallow water bays and estuaries serve as nurseries for juvenile California halibut (Kramer and Sunada 2001).
- California sheephead (*Semicossyphus pulcher*)²
- California tonguefish (*Symphurus atricauda*)^{1, 2, 3, 4, 5, 6} – California tonguefish eggs may be found at the bottom of the bay and juveniles have been reported in Queensway Bay (MBC Applied Environmental Sciences 1994). Generally, California tonguefish reside on nearshore and deeper soft-bottom (Allen 1985).
- Chameleon goby (*Tridentiger trionocephalus*)²
- Cheekspot goby (*Ilypnus gilberti*)^{2, 3, 4, 5, 6}
- Deepbody anchovy (*Anchoa compressa*)^{1, 2, 5, 6}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 3, 6}
- Dwarf perch (*Micrometrus minimus*)^{1, 2, 5}
- **English sole (*Pleuronectes vetulus*)²** – Juvenile and adult English sole forage in estuaries on bottoms of sand and mud, and in areas of eelgrass (NMFS Northwest Region 2004). Adults reside in estuaries with mud and sand bottoms (NMFS 2004).
- Fantail sole (*Xysteurys lioleps*)^{1, 2, 6}
- Garibaldi (*Hypsypops rubicundus*)^{2, 3}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 6}
- Grey smoothhound (*Mustelus californicus*)^{1, 2}
- Halfmoon (*Medialuna californiensis*)²
- Horn shark (*Heterodontus francisci*)²
- Hornyhead turbot (*Pleuronichthys verticalis*)^{1, 2, 3, 6} – The pelagic larvae of hornyhead turbot are in San Pedro Bay (Leos 2001; MBC Applied Environmental Sciences 1994).
- Jacksmelt (*Atherinopsis californiensis*)^{1, 2, 4, 5, 6}
- Kelp bass (*Paralabrax chlathratus*)^{1, 2}
- **Kelp greenling (*Hexagrammos decagrammus*)²** – Juvenile and adult kelp greenling reside in estuaries on hard bottoms (NMFS Northwest Region 2004).
- Kelp pipefish (*Syngnathus californiensis*)¹
- **Leopard shark (*Triakis semifasciata*)^{1, 2}**
- Longjaw mudsucker (*Gillichthys mirabilis*)³

- **Northern anchovy (*Engraulis mordax*)**^{1, 2, 3, 4, 5, 6}
- Northern lampfish (*Stenobranchius leucopsarus*)^{3, 6}
- **Olive rockfish (*Sebastes serranoides*)**²
- Opaleye (*Girella nigricans*)^{2, 5}
- Pacific bonito (*Sarda chiliensis*)^{1, 2, 6}
- **Pacific mackerel (*Scomber japonicus*)**^{2, 3, 4, 6} – Juvenile Pacific mackerel reside along open coast sandy beaches, in kelp beds, and in bays and estuaries (Allen 1985; Konno and Wolf 2001).
- **Pacific sanddab (*Citharichthys sordidus*)**² – Pacific sanddabs reside over soft bottoms at depths less than 180 meters (Allen 1985; Allen and Leos 2001). Adults can be found in estuaries over sand, mud, and sand/rock combinations (NMFS Northwest Region 2004). Juveniles forage on the bottoms of estuaries over silt and sand (NMFS Northwest Region 2004).
- **Pacific sardine (*Sardinops sagax*)**^{2, 3, 4, 5, 6}
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1, 2, 4, 6}
- Painted greenling (*Oxylebius pictus*)²
- Pile perch (*Rhacochilus vacca*)^{2, 5}
- Queenfish (*Seriphus politus*)^{1, 2, 3, 4, 5, 6}
- Reef finspot (*Paraclinus integripinnis*)^{3, 4}
- **Rex sole (*Errex zachirus*)**² – Rex soles reside over muddy, sandy bottoms (Anchor Environmental, L.L.C. 2001; McCain 2003; Quirolo 2001). Juveniles and adults forage in estuaries over soft bottom (NMFS Northwest Region 2004).
- Rock wrasse (*Halichoeres semicinctus*)²
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Roughback sculpin (*Chitonotus pugetensis*)³
- Round stingray (*Urobatis halleri*)^{2, 6}
- Rubberlip seaperch (*Rhacochilus toxotes*)²
- **Sand sole (*Psettichthys melanosticus*)**² – Juvenile sand sole reside in from growth to maturity in estuaries on bottoms of sand, mud, and mixed sand and mud (NMFS Northwest Region 2004).
- Sargo (*Anisotremus davidsonii*)²
- Seniorita (*Oxyjulis californica*)²
- Shadow goby (*Quietula y-cauda*)⁶
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 5, 6}

- Shovelnose guitarfish (*Rhinobatos productus*)^{2,6}
- Slough anchovy (*Anchoa delicatissima*)^{1,2,4,6}
- Speckled sanddab (*Citharichthys stigmatæus*)^{2,4,5}
- **Spiny dogfish (*Squalus acanthias*)²** – Spiny dogfish are common in estuaries and shallow bays, where adults spawn, and juveniles feed, grow and mature (McCain 2003; NMFS Northwest Region 2004).
- Spotfin croaker (*Roncador stearnsii*)²
- Spotted kelpfish (*Gibbonsia elegans*)¹
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1,2,3,4}
- Spotted turbot (*Pleuronichthys ritteri*)^{1,2,3,6}
- **Starry flounder (*Platichthys stellatus*)²** – Starry flounder spawn in the shallow water of estuaries, where their eggs, larvae, and juveniles remain (Haugen and Thomas 2001; McCain 2003; NMFS Northwest Region 2004).
- Striped mullet (*Mugil cephalus*)⁶
- Topsmelt (*Atherinops affinis*)^{1,2,4,5,6}
- Walleye surfperch (*Hyperprosopon argenteum*)^{1,2,4}
- White croaker (*Genyonemus lineatus*)^{1,2,3,4,6}
- White seabass (*Atractoscion nobilis*)^{2,4,6}
- White surfperch (*Phanerodon furcatus*)^{1,2,4,5,6}
- Woolly sculpin (*Clinocottus analis*)²
- Yellowfin croaker (*Umbrina roncador*)¹
- Yellowfin fringehead (*Neoclinus stephensae*)²
- Yellowfin goby (*Acanthogobius flavimanus*)^{1,2,6}

Nearshore Marine

Littoral

Intertidal

Sandy Beach

There are few locations within San Pedro Bay, more specifically the Los Angeles-Long Beach port complex, that remain sandy intertidal. These are located along Cabrillo Beach in San Pedro, Terminal Island, and Long Beach (Allen 1985; Allen *et al.* 1983; Anchor Environmental, L.L.C 2001; MBC Applied Environmental Sciences 1994). Cabrillo beach is a spawning and nursery site (Allen *et al.* 1983). Outside the port complex, Belmont Shores has sandy intertidal (Allen 1985).

- Barred surfperch (*Amphistichus argenteus*)^{1, 2}
- Black surfperch (*Embiotoca jacksoni*)^{1, 2}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 3, 4, 5, 6}
- California grunion (*Leuresthes tenuis*)^{1, 2, 4, 6}
- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4, 5, 6} – Adult California halibut and older juveniles reside along the open coast at depths ranging from 0 to 90 m (Allen 1985, Kramer and Sunada 2001). There are reports of California halibut entering the intertidal during grunion runs to feed on the fish as they spawn (Martin 2003).
- Cheekspot goby (*Ilypnus gilberti*)^{2, 3, 4, 5, 6}
- Dwarf perch (*Micrometrus minimus*)^{1, 2, 5}
- **English sole (*Pleuronectes vetulus*)²** – English sole move inshore during the summer months (Pearson and Owen 2001). Juvenile English sole forage at the bottom of intertidal zones in shallow bays and estuaries (NMFS Northwest Region 2004; Pearson and Owen 2001). They reside over sand and mud, in eelgrass, and along the open coast (McCain 2003; Pearson and Owen 2001).
- **Leopard shark (*Triakis semifasciata*)^{1, 2}** – Leopard sharks are most common from the surfzone to 5 meters (Smith 2001). They enter the intertidal zone to feed during high tides (McCain 2003; NMFS Northwest Region 2004; Smith 2001). Leopard sharks pup and mate in shallow waters near the surfzone in Southern California (Smith 2001; Smith 2005).
- Pile perch (*Rhacochilus vacca*)^{2, 5}
- Rainbow seaperch (*Hypsurus caryi*)²
- Rubberlip seaperch (*Rhacochilus toxotes*)²
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 5, 6}
- Shovelnose guitarfish (*Rhinobatos productus*)^{2, 6}
- Silver surfperch (*Hyperprosopon elipticum*)²
- **Spiny dogfish (*Squalus acanthias*)²**
- Topsmelt (*Atherinops affinis*)^{1, 2, 3, 4, 5, 6}
- Walleye surfperch (*Hyperprosopon argenteum*)^{1, 2, 4}
- White surfperch (*Phanerodon furcatus*)^{1, 2, 4, 5, 6}

Rocky Intertidal

In San Pedro Bay, the rocky intertidal is composed of the artificial structures built in the ports, which include jetties, breakwaters, and artificial shorelines (Anchor Environmental, L.L.C. 2001; MBC Applied Environmental Sciences 1994). The artificial rocky intertidal supports low growing algae (Anchor Environmental, L.L.C. 2001; MBC Applied Environmental Sciences 1994).

- Barred surfperch (*Amphistichus argenteus*)^{1, 2}
- Bat ray (*Myliobatis californica*)^{1, 2, 4, 6}
- **Black rockfish (*Sebastes melanops*)²** – Juvenile black rockfish are found in the tidepools of the rocky intertidal (Stewart and Love 2002).
- Black surfperch (*Embiotoca jacksoni*)^{1, 2}
- Blackeye goby (*Coryphopterus nicholsii*)^{2, 3, 4}
- **Cabezon (*Scorpaenichthys marmoratus*)²** – Juvenile and adult cabezon are in tidepools, migrating in and out with the tide to feed (NMFS Northwest Region 2004; Wilson-Vandenberg and Hardy 2001).
- California barracuda (*Sphyraena argentea*)^{1, 2, 3, 5, 6}
- California clingfish (*Gobiesox rhesodon*)^{2, 3, 4, 6}
- **California scorpionfish (*Scorpaena guttata*)^{1, 2, 6}** – Adult California scorpionfish forage in the rocky intertidal and are in tidepools (Love 2001a; NMFS Northwest Region 2004).
- California sheephead (*Semicossyphus pulcher*)²
- Dwarf perch (*Micrometrus minimus*)^{1, 2, 5}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 6}
- **Grass rockfish (*Sebastes rastrelliger*)²** – Juvenile grass rockfish recruit to low growing algae and hard-bottom, and reside in tidepools (Love *et al* 1991; McCain 2003).
- Jacksmelt (*Atherinopsis californiensis*)^{1, 2, 4, 5, 6}
- **Kelp greenling (*Hexagrammos decagrammus*)²** – Adult kelp greenling feed in the coastal intertidal on hard bottoms near kelp beds (NMFS Northwest Region 2004).
- Kelp perch (*Brachyistius frenatus*)²
- **Kelp rockfish (*Sebastes atrovirens*)²** – Adult kelp rockfish reside over shallow rocky reefs and in kelp beds, but young fish may be

found in the rocky intertidal (Allen 1985; Larson 2002; NMFS Northwest Region 2004).

- **Leopard shark (*Triakis semifasciata*)**^{1, 2}
- **Olive rockfish (*Sebastes serranoides*)**² – Adult and juvenile olive rockfish feed over intertidal bedrock near kelp beds (NMFS Northwest Region 2004).
- Opaleye (*Girella nigricans*)^{2, 5}
- Pile perch (*Rhacochilus vacca*)^{2, 5}
- Rainbow seaperch (*Hypsuryus caryi*)²
- Reef finspot (*Paraclinus integripinnis*)^{3, 4}
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Rubberlip seaperch (*Rhacochilus toxotes*)²
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 5, 6}
- Spotted kelpfish (*Gibbonsia elegans*)¹
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6}
- Walleye surfperch (*Hyperprosopon argenteum*)^{1, 2, 4}
- White surfperch (*Phanerodon furcatus*)^{1, 2, 4, 5, 6}
- Woolly sculpin (*Clinocottus analis*)²

Water Column

The water column encompasses all waters beyond the littoral zone and deeper than one meter. It extends from the sea surface to the ocean bottom (Madden *et al.* 2005). For the water column to be considered EFH, the fish must either (1) spend the majority of their time in the water column; (2) spend and entire life stage in the water column (i.e., egg, larvae, juvenile, adult); or (3) perform an activity in the water column that is required to promote the welfare of the population (i.e., feeding).

- **Black rockfish (*Sebastes melanops*)**² – Black rockfish release their pelagic larvae January thru August (Love 2002).
- **Blue rockfish (*Sebastes mystinus*)**² – Blue rockfish release their pelagic larvae between October and March (Hobson 2002).
- **Bocaccio (*Sebastes paucipinis*)**² – Juvenile bocaccio reside in shallow waters over soft-bottom near piers and adult bocaccio reside in the water column over hard-bottom and soft-bottom (Allen 1985; McCain 2003; Thomas 2001). Bocaccio feed in the offshore pelagic realm (MBC Applied Environmental Sciences 1988). Bocaccio release their larvae between October and July (Love 2002h). The larvae remain in bays within

100 feet of the surface (Love 2002h; McCain 2003; Moser and Boehlert 1991).

- Black surfperch (*Embiotoca jacksoni*)^{1,2}
- **Brown rockfish (*Sebastes auriculatus*)²** – Brown rockfish release their pelagic larvae between January and August (Love 2002a).
- **Calico rockfish (*Sebastes dalli*)^{1,2}** – Calico rockfish release their pelagic larvae between January and May (Butler and Love 2002).
- California barracuda (*Sphyraena argenta*)^{1,2,3,5,6}
- California clingfish (*Gobiesox rhesodon*)^{2,3,4,6}
- California grunion (*Leuresthes tenuis*)^{1,2,4,5,6}
- **California scorpionfish (*Scorpaena guttata*)^{1,2,6}** – California scorpionfish eggs are pelagic and float in masses near the surface (McCain 2003).
- **Chilipepper (*Sebastes goodei*)²** – Chilipepper release their pelagic larvae between August and April (Love 2002d).
- **Curlfin sole (*Pleuronichthys decurrens*)²** – Curlfin sole spawn from April to August and release pelagic eggs (McCain 2003).
- **Dover sole (*Microstomus pacificus*)²** – Dover sole eggs are in the upper 50 meters of the water column (McCain 2003).
- **Halfbanded rockfish (*Sebastes semicinctus*)²** – Halfbanded rockfish release their pelagic larvae from December to April (Love 2002i).
- Hornyhead turbot (*Pleuronichthys verticalis*)^{1,2,3,6} – The pelagic larvae of hornyhead turbot are in San Pedro Bay (Leos 2001; MBC Applied Environmental Sciences 1994).
- **Jack mackerel (*Trachurus symmetricus*)^{2,3,5}** – Juvenile jack mackerel school in kelp beds, over rocky reefs, and along rocky shorelines (Allen 1985; Mason 2001).
- Jacksmelt (*Atherinopsis californiensis*)^{1,2,4,5,6}
- Kelp bass (*Paralabrax chlathratus*)^{1,2} – Kelp bass form breeding assemblages over shallow rocky reefs and forage mid-water (Allen and Hovey 2001b).
- Longjaw mudsucker (*Gillichthys mirabilis*)³
- Mexican lampfish (*Triphiturus mexicanus*)³
- **Northern anchovy (*Engraulis mordax*)^{1,2,3,4,5,6}** – Northern anchovy school near the surface, over soft-bottom areas, along open coast sandy beaches, over shallow rocky reefs, and in bays and estuaries (Allen 1985; Bergen and Jacobson 2001; MBC Applied Environmental Sciences 1988).

- Northern lampfish (*Stenobranchius leucopsarus*)^{3, 6}
- **Olive rockfish (*Sebastes serranoides*)²** – Olive rockfish release their pelagic larvae between December and March (Love 2002m).
- Pacific bonito (*Sarda chiliensis*)^{1, 2, 6}
- Pacific butterfish (pompano) (*Peprilus similimus*)^{2, 3, 4, 5, 6}
- **Pacific mackerel (*Scomber japonicus*)^{2, 3, 4, 6}** – Pacific mackerel undergo inshore-offshore migrations; they are inshore July to November, swimming in the water column (Allen 1985; Anchor Environmental, L.L.C. 2001; Konno and Wolf 2001).
- **Pacific sardine (*Sardinops sagax*)^{2, 3, 4, 5, 6}** – The Pacific sardine, a small pelagic fish, is a dominant species in the Los Angeles-Long Beach Harbor (Anchor Environmental, L.L.C. 2001; Cross and Allen 1993; Wolf and Smith 2001). Pacific sardines school in the water column (Allen 1985; Wolf and Smith 2001).
- Queenfish (*Seriphus politus*)^{1, 2, 3, 4, 5, 6}
- Roughcheek sculpin (*Ruscarius creaseri*)⁶
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 5, 6}
- Speckled sanddab (*Citharichthys stigmaeus*)^{2, 4, 5} – Speckled sanddab larvae are pelagic and remain near the surface (Allen and Leos 2001).
- Spotted turbot (*Pleuronichthys ritteri*)^{1, 2, 3, 6} – The pelagic larvae of spotted turbot inhabit San Pedro Bay (MBC Applied Environmental Sciences 1994).
- **Stripetail rockfish (*Sebastes saxicola*)²** – Stripetail rockfish release their pelagic larvae between November and March (Sakuma 2002).
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6}
- **Vermilion rockfish (*Sebastes miniatus*)²** – Vermilion rockfish occupy the pelagic habitat over nearshore and neritic soft-bottom and hard-bottom (Allen 1985; VanTresca 2001). They are most common from 50 to 150 meters (Love 2002g). Vermilion rockfish feed in the pelagic realm (MBC Applied Environmental Sciences 1988). Vermilion rockfish release their pelagic larvae between July and March (Love 2002g).

Bottom

Soft Bottom

Vegetated

Eelgrass

There are several locations in San Pedro Bay with eelgrass. In 1999, there were 54.5 acres of eelgrass at Cabrillo, between the

inner beach and the salt marsh (Allen *et al.* 1983; Gregorio 1999). The same study found 40.5 acres of eelgrass in the shallow water at Pier 300 and 9.2 acres at Seaplane Harbor (Gregorio 1999). Eelgrass serves as a food source and protection for many fish species (Allen 1999). Cabrillo Beach is a spawning and nursery site (Allen *et al.* 1983).

- Arrow goby (*Clevelandia ios*)^{1, 2, 3, 5, 6}
- Barcheek pipefish (*Syngnathus exilis*)⁶
- Barred pipefish (*Syngnathus auliscus*)⁶
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 6}
- Bat ray (*Myliobatis californica*)^{1, 2, 4, 6}
- Bay goby (*Lepidogobius lepidus*)^{1, 2, 3, 4, 5, 6}
- Black croaker (*Cheilotrema saturnum*)^{1, 2, 4, 6}
- Black surfperch (*Embiotoca jacksoni*)^{1, 2}
- **Black rockfish (*Sebastes melanops*)²** – Juvenile black rockfish recruit to eelgrass, kelp beds, soft-bottom, and hard-bottom (Love *et al.* 1991).
- Blacksmith (*Chromis punctipinnis*)²
- **Brown rockfish (*Sebastes auriculatus*)²** – Juvenile and adult brown rockfish forage in eelgrass and surfgrass (NMFS Northwest Region 2004).
- **Cabezon (*Scorpaenichthys marmoratus*)²** – Adult cabezon feed in estuaries over soft and hard bottoms, and among seagrass (NMFS Northwest Region 2004).
- California corbina (*Menticirrhus undulatus*)^{1, 2, 3, 4, 5, 6}
- California grunion (*Leuresthes tenuis*)^{1, 2, 4, 6}
- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4, 5, 6}
- Cheekspot goby (*Ilypnus gilberti*)^{2, 5, 6}
- Deepbody anchovy (*Anchoa compressa*)^{1, 2, 6}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 3, 6}
- **English sole (*Pleuronectes vetulus*)²** – English sole move inshore during the summer months and can be found over sand and mud, in eelgrass, and along the open coast (McCain 2003; Pearson and Owen 2001). Juveniles and adults forage in estuaries on bottoms of sand, mud, and eelgrass (NMFS Northwest Region 2004).
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 6}

- Grey smoothhound (*Mustelus californicus*)^{1, 2}
- Jacksmelt (*Atherinopsis californiensis*)^{1, 2, 4, 5, 6}
- Kelp bass (*Paralabrax chlathratus*)^{1, 2}
- Kelp perch (*Brachyistius frenatus*)²
- Kelp pipefish (*Syngnathus californiensis*)¹
- **Leopard shark (*Triakis semifasciata*)^{1, 2}**
- **Northern anchovy (*Engraulis mordax*)^{1, 2, 3, 4, 6}** – Larval, juvenile and adult northern anchovies can be found in Queensway Bay and other parts of San Pedro Bay (Anchor Environmental, L.L.C. 2001; Brewer 1983).
- **Olive rockfish (*Sebastes serranoides*)²** – Young-of-year olive rockfish settle out in kelp beds, surfgrass, kelp mats, and other forms of physical relief (Love 2002m).
- **Pacific mackerel (*Scomber japonicus*)^{2, 3, 4, 6}**
- Pacific staghorn sculpin (*Leptocottus marmoratus*)^{1, 2, 4, 6}
- Queenfish (*Seriphus politus*)^{1, 2, 3, 4, 5, 6}
- Rock wrasse (*Halichoeres semicinctus*)²
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Round stingray (*Urobatis halleri*)^{2, 6}
- Rubberlip seaperch (*Rhacochilus toxotes*)²
- Sargo (*Anisotremus davidsonii*)²
- Shadow goby (*Quietula y-cauda*)⁶
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 5, 6}
- Shovelnose guitarfish (*Rhinobatos productus*)^{2, 6}
- Slough anchovy (*Anchoa delicatissima*)^{1, 2, 4, 6}
- Spotfin croaker (*Roncador stearnsii*)²
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1, 2, 3, 4}
- Spotted turbot (*Pleuronichthys ritteri*)^{1, 2, 3, 6}
- Striped mullet (*Mugil cephalus*)⁶
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6}
- Walleye surfperch (*Hyperprosopon argenteum*)^{1, 2, 4}
- White croaker (*Genyonemus lineatus*)^{1, 2, 3, 4, 5, 6}
- White seabass (*Atractoscion nobilis*)^{2, 4, 6}

- White surfperch (*Phanerodon lineatus*)^{1, 2, 4, 5, 6}
- Yellowfin croaker (*Umbrina roncador*)¹

Un-Vegetated

The physical habitat of the bottom of San Pedro Bay, with the exception of the artificial structures, is soft-bottom (Allen 1985; Anchor Environmental, L.L.C. 2001; MBC Applied Environmental Sciences 1994). The soft-bottom sediments are composed of sand and a silt/clay combination (Anchor Environmental, L.L.C. 2001). Maximum depths in the bay do not exceed 16 meters (Hoffman 2005).

- Arrow goby (*Clevelandia ios*)^{1, 2, 3, 5, 6}
- Barcheek pipefish (*Syngnathus exilis*)⁶
- Barred pipefish (*Syngnathus auliscus*)⁶
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 6}
- Barred surfperch (*Amphistichus argenteus*)^{1, 2}
- Basketweave cusk-eel (*Ophiodion scrippsae*)^{1, 2, 6}
- Bat ray (*Myliobatis californica*)^{1, 2, 4, 6}
- Bay goby (*Lepidogobius lepidus*)^{1, 2, 3, 4, 5, 6}
- Bay pipefish (*Syngnathus leptorhynchus*)^{1, 6}
- Bigmouth sole (*Hippoglossina stomata*)²
- **Black rockfish (*Sebastes melanops*)²** – Juvenile black rockfish recruit to eelgrass, kelp beds, soft-bottom, and hard-bottom (Love *et al.* 1991).
- Black surfperch (*Embiotoca jacksoni*)^{1, 2}
- Blackeye goby (*Coryphopterus nicholsii*)^{2, 3, 4}
- Blacktip poacher (*Xeneretmus latifrons*)²
- **Bocaccio (*Sebastes paucispinis*)²** – Juvenile bocaccio recruit to shallow soft-bottom near piers, kelp beds, low growing algae, and hard-bottom, where they remain as they mature (Allen 1985; Love *et al.* 1991; Love 2002h; Thomas 2001).
- **Brown rockfish (*Sebastes auriculatus*)²**
- Brown smoothound (*Mustelus henlei*)²
- C-O turbot (*Pleuronichthys coenosus*)²
- **Calico rockfish (*Sebastes dalli*)^{1, 2, 5}** – Juvenile and adult calico rockfish reside over soft bottoms, rocky reefs, and artificial reefs (Allen 1985; Ono 2001). In July, young-of-year move into San

Pedro Bay and settle out over soft bottoms, hard bottoms, and mixed bottoms (Butler and Love 2002; Love *et al.* 1991; McCain 2003).

- California barracuda (*Sphyraena argentea*)^{1, 2, 3, 5, 6}
- California butterfly ray (*Gymnura marmorata*)²
- California corbina (*Menticirrhus undulatus*)^{1, 2, 3, 5}
- California grunion (*Leuresthes tenuis*)^{1, 2, 4, 6}
- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4, 5, 6} – Shallow water bays and estuaries serve as nurseries for juvenile California halibut (Kramer and Sunada 2001). Adults and older juveniles reside along the open coast on soft bottoms and deeper rocky reefs at depths from 0 to 90 meters (Allen 1985, Kramer and Sunada 2001).
- California lizardfish (*Synodus lucioceps*)^{1, 2, 3, 4, 6}
- **California scorpionfish (*Scorpaena guttata*)**^{1, 2, 6} – California scorpionfish reside over soft-bottom at depths ranging from the surfzone to 180 meters, but are most common from 6 to 137 meters (Allen 1985; Love 2001a). They spawn near the bottom at depths between 3 and 120 meters (Love 2001a).
- California tonguefish (*Symphurus atricauda*)^{1, 2, 3, 4, 5, 6} – California tonguefish eggs may be found at the bottom of the bay and juveniles have been reported in Queensway Bay (MBC Applied Environmental Sciences 1994). Generally, California tonguefish reside on nearshore and deeper soft-bottom (Allen 1985).
- Chameleon goby (*Tridentiger trionocephalus*)²
- Cheekspot goby (*Ilypnus gilberti*)^{2, 3, 4, 5, 6}
- **Chilipepper (*Sebastes goodei*)**²
- **Curlfin sole (*Pleuronichthys decurrens*)**² – Curlfin turbot reside over soft-bottom (Allen 1985; Anchor Environmental, L.L.C. 2001). They are most common at depths less than 90 meters (McCain 2003).
- Deepbody anchovy (*Anchoa compressa*)^{1, 2, 6}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 3, 6}
- Dwarf perch (*Micrometrus minimus*)^{1, 2, 5}
- **English sole (*Pleuronectes vetulus*)**² – English sole move inshore during the summer months and can be found in eelgrass, along the open coast, and over sand and mud (McCain 2003; Pearson and Owen 2001).

- Fantail sole (*Xysteurys lioleps*)^{1, 2, 6}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 6}
- Grey smoothhound (*Mustelus californicus*)^{1, 2}
- **Halfbanded rockfish (*Sebastes semicinctus*)²** – Young-of-year halfbanded rockfish recruit to kelp beds and low relief soft and hard bottom (Love 2002).
- Hornyhead turbot (*Pleuronichthys verticalis*)^{1, 2, 3, 6} – The hornyhead turbot resides on soft-bottom (Allen 1985; Anchor Environmental, L.L.C. 2001). Their eggs are at the bottom of the San Pedro Bay (MBC Applied Environmental Sciences 1994).
- Jacksmelt (*Atherinopsis californiensis*)^{1, 2, 4, 5, 6}
- Kelp bass (*Paralabrax chlathratus*)^{1, 2}
- Kelp pipefish (*Syngnathus californiensis*)¹
- **Leopard shark (*Triakis semifasciata*)^{1, 2}** – Leopard sharks are most common from the surfzone to 5 meters (Smith 2001). They pup and mate in the shallow waters near the surfzone in Southern California (Smith 2001; Smith 2005). Pups occur seasonally along protected beaches and in bays (Smith 2005).
- **Northern anchovy (*Engraulis mordax*)^{1, 2, 3, 4, 5, 6}**
- Pacific electric ray (*Torpedo californica*)²
- **Pacific mackerel (*Scomber japonicus*)^{2, 3, 4, 6}**
- **Pacific sanddab (*Citharichthys sordidus*)²** – Pacific sanddabs reside on nearshore soft-bottom at depths between 9 and 550 meters, but are most common in water shallower than 183 meters (Allen 1985; Allen and Leos 2001; Cross and Allen 1993).
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1, 2, 4, 6}
- Plainfin midshipman (*Porichthys notatus*)^{2, 4}
- Pygmy poacher (*Odontopyxis trispinosa*)²
- Queenfish (*Seriphus politus*)^{1, 2, 3, 4, 5, 6}
- Rainbow seaperch (*Hypsurus caryi*)²
- **Rex sole (*Errex zachirus*)²** – Rex sole reside over muddy and sandy bottoms (Anchor Environmental, L.L.C. 2001; McCain 2003; Quirollo 2001).
- Round stingray (*Urobatis halleri*)^{2, 6}
- Rubberlip seaperch (*Rhacochilus toxotes*)²

- **Sand sole (*Psettichthys melanosticus*)²** – Adult sand soles prefer shallow water with muddy and sandy substrates (McCain 2003). Juveniles reside in estuaries on bottoms of sand, mud, and mixed sand and mud from growth to maturity (NMFS Northwest Region 2004).
- Shadow goby (*Quietula y-cauda*)⁶
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 5, 6}
- Shortspine combfish (*Zanideps frenata*)²
- Shovelnose guitarfish (*Rhinobatos productus*)^{2, 6}
- Silver surfperch (*Hyperprosopon elipticum*)²
- Slough anchovy (*Anchoa delicatissima*)^{1, 2, 4, 6}
- Speckled sanddab (*Citharichthys stigmaeus*)^{2, 4, 5}
- Specklefin midshipman (*Porichthys myriaster*)^{1, 2, 4, 6}
- **Spiny dogfish (*Squalus acanthias*)²**
- Spotfin croaker (*Roncador stearnsii*)²
- Spotfin croaker (*Roncador stearnsii*)²
- Spotted cusk-eel (*Chilara taylori*)^{1, 2, 4}
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1, 2, 3, 4}
- Spotted turbot (*Pleuronichthys ritteri*)^{1, 2, 3, 6}
- **Starry flounder (*Paralichthys stellatus*)²** – Starry flounder are common in shallow water over soft-bottom in bays and in estuaries, although they may be found deeper than 20 meters (Haugen and Thomas 2001). Juveniles are in bays and estuaries, and along open coast sandy beaches (Haugen and Thomas 2001).
- **Stripetail rockfish (*Sebastes saxicola*)²** – Stripetail rockfish reside over soft-bottom (Allen 1985; Anchor Environmental, L.L.C. 2001). From February to May, juveniles settle out over soft-bottom habitats (Love *et al.* 1991; Sakuma 2002). Adults reside in areas with mud or mud/rock bottoms (Sakuma 2002).
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6}
- **Vermilion rockfish (*Sebastes miniatus*)²** – Vermilion rockfish are most common from 50-150 meters (Love 2002g). Juveniles recruit to low relief soft and hard bottom, moving into deeper water as they get older (Love *et al.* 1991; McCain 2003).
- Walleye surfperch (*Hyperprosopon argenteum*)^{1, 2, 4}
- White croaker (*Genyonemus lineatus*)^{1, 2, 3, 4, 5, 6}

- White seabass (*Atractoscion nobilis*)^{2, 4, 6}
- White surfperch (*Phanerodon furcatus*)^{1, 2, 4, 5, 6}
- Yellowfin croaker (*Umbrina roncadore*)¹
- Yellowfin goby (*Acanthogobius flavimanus*)^{1, 2, 6}

Hard Bottom

Kelp Bed

Giant Kelp

Kelp beds grow on hard bottoms at depths ranging from 8 to 18 meters (Allen 1985). Fish may inhabit one or more of the following region of the kelp bed: holdfast, stipe, or canopy (MBC Applied Environmental Sciences). In San Pedro Bay, kelp beds grow on the Cabrillo breakwater. The breakwater is an artificial rocky reef.

- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 6}
- Bat ray (*Myliobatis californica*)^{1, 2, 4, 6}
- Black croaker (*Cheilotrema saturnum*)^{1, 2, 4, 6}
- **Black rockfish (*Sebastes melanops*)²** – Juvenile black rockfish recruit to eelgrass, kelp beds, soft-bottom and hard-bottom (Love *et al.* 1991). Juveniles forage in kelp beds (NMFS Northwest Region 2004). Adults can be found in the holdfast region of kelp beds, but forage higher up in the canopy (NMFS Northwest Region 2004; Stewart and Love 2002).
- Black surfperch (*Embiotoca jacksoni*)^{1, 2}
- Blacksmith (*Chromis punctipinnis*)²
- **Blue rockfish (*Sebastes mystinus*)²** – From April to June, juvenile blue rockfish recruit to kelp beds in the Southern California Bight (Hobson 2002; Love *et al.* 1991). Juveniles and adults also inhabit the kelp canopy (NMFS Northwest Region 2004).
- **Bocaccio (*Sebastes paucispinis*)²** – Bocaccio release their larvae from October to July (Love 2002h). The larvae are pelagic and reside near the surface in kelp beds (Thomas 2001). Juvenile bocaccio recruit to kelp beds, low-growing algae, and hard-bottom, and shallow soft bottoms near piers, where they remain as they mature (Love *et al.* 1991; Love 2002h; Thomas 2001). Juveniles and adults forage in the kelp canopy (NMFS Northwest Region 2004).

- **Brown rockfish (*Sebastes auriculatus*)²** – Adult brown rockfish reside in kelp beds and over shallow rocky reefs at depths that range from shallow to 53 meters (Allen 1985; Ashcraft to Heisdorf 2001). Juveniles reside in kelp beds (NMFS Northwest Region 2004).
- **Cabezon (*Scorpaenichthys marmoratus*)²** – Cabezon reside over shallow rocky reefs and in kelp beds (NMFS Northwest Region 2004; Wilson-Vandenberg and Hardy 2001). Juveniles inhabit kelp bed canopies, tidepools, and shallow rocky reefs (Wilson-Vandenberg and Hardy 2001).
- California barracuda (*Sphyraena argentea*)^{1, 2, 3, 5, 6}
- **California scorpionfish (*Scorpaena guttata*)^{1, 2, 6}** – Juvenile California scorpionfish reside among dense algae located in shallow water (Love 2001a). Adults reside at the bottoms of kelp beds (NMFS Northwest Region 2004).
- California sheephead (*Semicossyphus pulcher*)²
- **Chilipepper (*Sebastes goodei*)²** – Juvenile chilipepper school in nearshore shallow waters, in kelp beds, and over bedrock (NMFS Northwest Region 2004; Ralston and Oda 2001). Larvae and juveniles feed in the kelp canopy (NMFS Northwest Region 2004). Young-of-year recruit to kelp beds in June (Love 2002d).
- Garibaldi (*Hypsypops rubricundus*)^{2, 3}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 6}
- **Grass rockfish (*Sebastes rastrelliger*)²** – Juvenile and adult grass rockfish forage in the holdfast region of kelp beds (NMFS Northwest Region 2004).
- Halfmoon (*Medialuna californiensis*)²
- Horn shark (*Heterodontus francisci*)²
- **Jack mackerel (*Trachurus symmetricus*)^{2, 3, 5}**
- Jacksmelt (*Atherinopsis californiensis*)^{1, 2, 4, 5, 6}
- Kelp bass (*Paralabrax chlathratus*)^{1, 2}
- **Kelp greenling (*Hexagrammos decagrammus*)²** – In San Pedro Bay, kelp greenling reside over shallow rocky reefs in and around kelp beds (Anchor Environmental, L.L.C. 2001; Howard 2001; McCain 2003; NMFS Northwest Region 2004). They are usually at depths of 3 to 18 meters (Howard 2001). Adults feed in the coastal intertidal on hard bottoms near kelp beds (NMFS Northwest Region 2004).

- Kelp perch (*Brachyistius frenatus*)²
- Kelp pipefish (*Syngnathus californiensis*)¹
- **Kelp rockfish (*Sebastes atrovirens*)²** – Young-of-year kelp rockfish recruit to the kelp canopy in the months of July and August (Larson 2002; Love *et al.* 1991). Juveniles reside in holdfast region of kelp beds from growth to maturity (NMFS Northwest Region 2004).
- **Leopard shark (*Triakis semifasciata*)^{1, 2}**
- **Olive rockfish (*Sebastes serranoides*)²** – Adult and juvenile olive rockfish feed in the intertidal bedrock near kelp beds (NMFS Northwest Region 2004). They reside on subtidal hard-bottom and in kelp beds (Allen 1985; Love 2001b; Love 2002m; NMFS Northwest Region 2004). Juveniles recruit to shallow rocky reefs and kelp beds in the Southern California Bight (Love 2001b; Love 2002m; Love *et al.* 1991).
- Opaleye (*Girella nigricans*)^{2, 5}
- Pacific bonito (*Sarda chiliensis*)²
- Pacific electric ray (*Torpedo californica*)²
- **Pacific mackerel (*Scomber japonicus*)²** – Juveniles reside in kelp beds, along open coast sandy beaches, and in bays and estuaries (Konno and Wolf 2001).
- **Pacific sanddab (*Citharichthys sordidus*)^{1, 2, 6}** – Adult Pacific sanddab forage in kelp beds (NMFS Northwest Region 2004).
- Painted greenling (*Oxylebius pictus*)²
- Rock wrasse (*Halichoeres semicinctus*)²
- Rubberlip seaperch (*Rhacochilus toxotes*)²
- Sargo (*Anisotremus davidsonii*)²
- Senorita (*Oxyjulis californica*)²
- Spotted kelpfish (*Gibbonsia elegans*)¹
- **Stripetail rockfish (*Sebastes saxicola*)²** – Juvenile stripetail rockfish recruit to kelp beds and soft-bottom and they can be found among the holdfasts from growth to maturity (NMFS Northwest Region 2004).
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6}
- **Treefish (*Sebastes serriceps*)²** – Young-of-year treefish hide under kelp mats in the spring and summer (Love 2002n).

- **Vermilion rockfish (*Sebastes miniatus*)²** – Pelagic vermilion rockfish larvae use kelp and other dense algae for protection and forage areas (NMFS Northwest Region 2004; VanTresca 2001). Adults reside in the holdfast region of kelp beds (NMFS Northwest Region 2004).
- Walleye surfperch (*Hyperprosopon argenteum*)^{1, 2, 4}
- White seabass (*Atractoscion nobilis*)^{2, 4, 6}
- White surfperch (*Phanerodon furcatus*)^{1, 2, 4, 5, 6}

Rocky Reef

Shallow rocky reef refers to hard-bottom from MLLW to 12 meters deep (Allen 1985). In San Pedro Bay, artificial structures in the ports make up the shallow rocky reef (Anchor Environmental, L.L.C. 2001; MBC Applied Environmental Sciences 1994). These fabricated structures include jetties, breakwaters and artificial shorelines (Anchor Environmental, L.L.C. 2001; MBC Applied Environmental Sciences 1994). The artificial shallow rocky reef supports low growing algae (Anchor Environmental, L.L.C. 2001; MBC Applied Environmental Sciences 1994). San Pedro Bay does not exceed 16 meters in depth (Hoffman 2005).

- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 4, 6}
- Bat ray (*Myliobatis californica*)^{1, 2, 4, 6}
- Black croaker (*Cheilotrema saturnum*)^{1, 2, 4, 6}
- **Black rockfish (*Sebastes melanops*)²** – Juvenile black rockfish recruit to eelgrass, kelp beds, soft-bottom, and hard-bottom (Love *et al.* 1991). Black rockfish reside 3 to 6 meters above shallow rocky reefs (Reilly 2001).
- Black surfperch (*Embiotoca jacksoni*)^{1, 2}
- Blackeye goby (*Coryphopterus nicholsii*)^{2, 3, 4}
- Blacksmith (*Chromis punctipinnis*)²
- **Blue rockfish (*Sebastes mystinus*)²** – From April to June, juvenile blue rockfish recruit to shallow rocky reefs in the Southern California Bight (Hobson 2002; Love *et al.* 1991).
- **Bocaccio (*Sebastes paucispinis*)²** – Juvenile bocaccio recruit to hard-bottom, kelp beds, low growing algae, and shallow soft-bottom near piers, where they remain as they mature (Love *et al.* 1991; Love 2002h; Thomas 2001).
- **Brown rockfish (*Sebastes auriculatus*)²** – Brown rockfish associate with sand-rock interfaces and the rocky bottoms of artificial reefs (Allen 1985; Ashcraft and Heisdorf 2001). Juveniles

use bays and estuaries for nursery grounds, while adults reside and forage there (Ashcraft and Heisdorf 2001; NMFS Northwest Region 2004).

- **Cabazon (*Scorpaenichthys marmoratus*)²** – Cabazon reside over shallow rocky reefs or in kelp beds (NMFS Northwest Region 2004; Wilson-Vandenberg and Hardy 2001). Juveniles inhabit kelp bed canopies, tidepools, and shallow rocky reefs (Wilson-Vandenberg and Hardy 2001).
- **Calico rockfish (*Sebastes dalli*)^{1, 2, 5}** – Juvenile and adult calico reside over soft-bottom, rocky reef, and artificial reef (Allen 1985; Ono 2001). Young-of-year enter San Pedro Bay in July, settling out over soft-bottom, hard-bottom and mixed bottom (Butler and Love 2002; Love *et al.* 1991; McCain 2003).
- California barracuda (*Sphyraena argentea*)^{1, 2, 3, 5, 6}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 3, 4, 5, 6}
- **California scorpionfish (*Scorpaena guttata*)^{1, 2, 6}** – California scorpionfish spawn near the bottom at depths between 3 and 120 meters (Love 2001a). They reside over hard-bottom and soft-bottom (Love 2001a; NMFS Northwest Region 2004).
- California sheephead (*Semicossyphus pulcher*)²
- **Chilipepper (*Sebastes goodei*)²** – Juvenile chilipepper school in nearshore shallow waters, kelp beds, and over bedrock (NMFS Northwest Region 2004; Ralston and Oda 2001).
- Dwarf perch (*Micrometrus minimus*)^{1, 2, 5}
- Garibaldi (*Hypsypops rubicundus*)^{2, 3}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 4, 6}
- **Grass rockfish (*Sebastes rastrelliger*)²** – Juvenile grass rockfish recruit to low growing algae and hard-bottom, including tidepools (Love *et al.* 1991; McCain 2003).
- Grey smoothhound (*Mustelus californicus*)^{1, 2}
- **Halfbanded rockfish (*Sebastes semicinctus*)²** – Young-of-year halfbanded rockfish recruit to kelp beds, hard-bottom, and soft-bottom (Love 2002).
- Halfmoon (*Medialuna californiensis*)²
- Horn shark (*Heterodontus francisci*)²
- **Jack mackerel (*Trachurus symmetricus*)^{2, 3, 5}**
- Jacksmelt (*Atherinopsis californiensis*)^{1, 2, 4, 5, 6}

- Kelp bass (*Paralabrax chlathratus*)^{1,2} – Kelp bass form breeding assemblages over shallow rocky reefs (Allen and Hovey 2001b).
- **Kelp greenling (*Hexagrammos decagrammus*)²** – Kelp greenling reside over shallow rocky reefs in and around kelp beds, usually at depths between 3 and 18 meters (Howard 2001; McCain 2003). Adults feed in the coastal intertidal and on hard bottoms near kelp beds (NMFS Northwest Region 2004).
- Kelp perch (*Brachyistius frenatus*)²
- **Kelp rockfish (*Sebastes atrovirens*)²** – Kelp rockfish reside over shallow rocky reefs and in kelp beds (Allen 1985; NMFS Northwest Region 2004). Young fish may be intertidal, but kelp rockfish are usually found from below MLLW to 18 meters deep (Larson 2002).
- **Leopard shark (*Triakis semifasciata*)^{1,2}**
- **Northern anchovy (*Engraulis mordax*)^{1,2,3,4,5,6}** – Larval, juvenile and adult northern anchovies can be found in Queensway Bay and other parts of San Pedro Bay (Anchor Environmental, L.L.C. 2001; Brewer 1983).
- **Olive rockfish (*Sebastes serranoides*)²** – Juvenile olive rockfish recruit to shallow rocky reefs and kelp beds in the Southern California Bight (Love *et al.* 1991).
- Onespot fringehead (*Neoclinus uninotatus*)²
- Opaleye (*Girella nigricans*)^{2,5}
- Pacific bonito (*Sarda chiliensis*)^{1,2,6}
- Pacific electric ray (*Torpedo californica*)²
- **Pacific mackerel (*Scomber japonicus*)²**
- Painted greenling (*Oxylebius pictus*)^{2,3}
- Pile perch (*Rhacochilus vacca*)^{2,5}
- Queenfish (*Seriphus politus*)^{1,2,3,4,5,6}
- Rainbow seaperch (*Hypsuryus caryi*)²
- Reef finspot (*Paraclinus integripinnis*)^{3,4}
- Rock wrasse (*Halichoeres semicinctus*)²
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Roughcheek sculpin (*Ruscarius creaseri*)⁶
- Rubberlip seaperch (*Rhacochilus toxotes*)²
- Sarcastic fringehead (*Neoclinus blanchardi*)²

- Sargo (*Anisotremus davidsonii*)²
- Senorita (*Oxyjulis californica*)²
- Shadow goby (*Quietula y-cauda*)⁶
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 5, 6}
- Specklefin midshipman (*Porichthys myriaster*)^{1, 2, 4, 6}
- Snubnose sculpin (*Orthonopias triacis*)²
- **Spiny dogfish (*Squalus acanthias*)²**
- Spotted kelpfish (*Gibbonsia elegans*)¹
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1, 2, 3, 4}
- **Stripetail rockfish (*Sebastes saxicola*)²**
- Topsmelt (*Atherinops affinis*)^{1, 2, 4, 5, 6}
- **Treefish (*Sebastes serriceps*)²** – Juvenile treefish recruit to hard-bottom and remain there as adults (Love *et al.* 1991; NMFS Northwest Region 2004).
- **Vermilion rockfish (*Sebastes miniatus*)²** – Juvenile vermillion rockfish recruit to low relief soft and hard bottom; as they get older they move to deeper water between 50 and 150 meters (Love 2002g; Love *et al.* 1991; McCain 2003).
- Walleye surfperch (*Hyperprosopon argenteum*)^{1, 2, 4}
- White croaker (*Genyonemus lineatus*)^{1, 2, 3, 4, 5, 6}
- White seabass (*Atractoscion nobilis*)^{2, 4, 6}
- White surfperch (*Phanerodon furcatus*)^{1, 2, 4, 6}
- Woolly sculpin (*Clinocottus analis*)²
- Yellowfin fringehead (*Neoclinus stephensae*)²

Neritic

Water Column

San Pedro Bay does not exceed 16 meters in depth.

Bottom

Soft Bottom

Un-Vegetated

San Pedro Bay does not exceed 16 meters in depth.

Hard Bottom

Rocky Reef

San Pedro Bay does not exceed 16 meters in depth.

Submarine Canyon

There are no submarine canyons in San Pedro Bay

Documentation of Presence in San Pedro Bay

- ¹ Allen, L.G., M.H. Horn, F.A. Edmands and C.A. Usui. 1983. Structure and seasonal dynamics of the fish assemblage in the Cabrillo Beach area of Los Angeles Harbor, California. *Bull. Southern California Acad. Sci.*, 82(2): 47-70.
- ² Anchor Environmental, L.L.C. 2001. Final Environmental Assessment Los Angeles River Estuary Pilot Study; Los Angeles County Regional Dredge Material Management Plan Pilot Studies. Los Angeles District Corps of Engineers. Los Angeles, California.
- ³ Brewer, G.D. 1983. Fish spawning in the Los Angeles-Long Beach Harbors: Comparison with the shallow open coast habitats off southern California. National Marine Fisheries Service, Long Beach, California.
- ⁴ Brewer, G.D. 1984. An evaluation of fish abundance among protected and open coast habitats in the Los Angeles-Long Beach Harbors and San Pedro Bay: Draft Final Report. National Marine Fisheries Service. Long Beach, California.
- ⁵ Cross, J.N. and L.G. Allen. 1993. Fishes. In M.D. Dailey, D.J. Reish, and J.W. Anderson (eds.), *Ecology of the Southern California Bight: A Synthesis and Interpretation*. University of California Press, Berkeley, California. 459-540, 926p.
- ⁶ MBC Applied Environmental Sciences. 1994. Marine Biological Baseline Study: Queensway Bay, Long Beach Harbor. City of Long Beach. Long Beach, California.

San Diego Bay

Estuarine

An estuary is a “small semi-enclosed coastal body of water with a free connection with the open sea within which seawater is measurably diluted by freshwater from land drainage” (Josselyn *et al.* 1993). This dilution of seawater must occur for at least one month of the year for the water body to be “estuarine” (Josselyn *et al.* 1993). Natural salt marshes remain only in the southern portion of San Diego Bay (U.S. Department of Navy). The mouths of several creeks empty into the bay along with several stormwater channels, creating other estuarine environments (U.S. Department of Navy 2000).

- Arrow goby (*Clevelandia ios*)^{1, 2, 4}
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 3, 4}
- Bat ray (*Myliobatis californica*)^{1, 4}
- Bay blenny (*Hypsoblennius gentilis*)^{1, 2, 3, 4}
- Bay goby (*Lepidogobius lepidus*)²
- Bay pipefish (*Syngnathus leptorhynchus*)^{1, 2, 3}
- Bigmouth sole (*Hippoglossina stomata*)⁴
- Black croaker (*Cheilotrema saturnum*)^{1, 3, 4}
- Blacksmith (*Chromis punctipinnis*)^{2, 3}
- Black surfperch (*Embiotoca jacksoni*)^{1, 3, 4} – In San Diego Bay, black surfperch appear seasonally, usually during the month of April, when the young-of-year recruit to the Bay after the females give birth (Allen 1999; SWRO NMFS 1992).
- Bonefish (*Albula vulpes*)^{1, 4}
- Brown smoothhound (*Mustelus henlei*)¹
- C-O turbot (*Pleuronichthys coenosus*)¹
- California barracuda (*Sphyraena argenta*)^{1, 3, 4}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 4}
- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4}
- California killifish (*Fundulus parvipinnis*)^{1, 2, 3, 4}
- California tonguefish (*Symphurus atricauda*)¹ – California tonguefish reside on soft-bottom (Allen 1985; Allen 1999). Their eggs are located on the benthos of bays (MBC Applied Environmental Sciences 1994).
- Chameleon goby (*Tridentiger trionocephalus*)¹
- Cheekspot goby (*Ilypnus gilberti*)^{1, 2, 4}

- Deepbody anchovy (*Anchoa compressa*)^{1, 2, 3, 4}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 3, 4}
- Dwarf perch (*Micrometrus minimus*)^{1, 4}
- **English sole (*Pleuronichthys vetulus*)¹** – English sole can be found in the northern portion of San Diego Bay (Allen 1999). Adults reside in estuaries with mud and sand bottoms (NMFS 2004). Juvenile and adult English sole forage in estuaries on bottoms of sand, mud, and eelgrass (NMFS Northwest Region 2004).
- Fantail sole (*Xysteurys lioleps*)¹
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 3, 4} – Young-of-year giant kelpfish recruit to the Bay during the months of July and October (Allen 1999).
- Grey smoothhound (*Mustelus californicus*)^{1, 2, 4}
- Halfmoon (*Medialuna californiensis*)^{1, 4}
- Horn shark (*Heterodontus francisi*)^{1, 4}
- Hornyhead turbot (*Pleuronichthys verticalis*)¹
- Jacksmelt (*Atherinopsis californiensis*)^{1, 3, 4}
- Kelp clingfish (*Rimicola muscarum*)¹
- Kelp pipefish (*Syngnathus californiensis*)¹
- **Leopard shark (*Triakis semifasciatus*)²**
- Longjaw mudsucker (*Gillichthys mirabilis*)¹
- **Northern anchovy (*Engraulis mordax*)^{1, 2, 3, 4}**
- Opaleye (*Girella nigricans*)¹
- Pacific angel shark (*Squatina californica*)⁴
- Pacific bonito (*Sarda chiliensis*)⁴
- **Pacific mackerel (*Scomber japonicus*)¹** – Juvenile Pacific mackerel reside along open coast sandy beaches, in kelp beds, and in bays and estuaries (Allen 1985; Konno and Wolf 2001).
- **Pacific sardine (*Sardinops sagax*)^{1, 4}** – The Pacific sardine is a small pelagic species that moves into San Diego Bay between July and October (Allen 1985; Allen 1999; Wolf and Smith 2001). Young-of-year occupy the mid-water of the nearshore and channel of San Diego Bay (Allen 1999).
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1, 2, 3, 4}
- Queenfish (*Seriphus politus*)^{1, 2, 3}
- Reef finspot (*Paraclinus integripinnis*)^{1, 3}

- Rock wrasse (*Halichoeres semicinctus*)^{1,4}
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Round stingray (*Urobatis halleri*)^{1,2,3}
- Salema (*Xenistius californiensis*)¹
- Sargo (*Anisotremus davidsonii*)²
- Seniorita (*Oxyjulis californica*)¹
- Shiner perch (*Cymatogaster aggregata*)^{1,2,3,4}
- Shadow goby (*Quietula y-cauda*)^{1,2,4}
- Shovelnose guitarfish (*Rhinobatos productus*)^{1,4}
- Slough anchovy (*Anchoa delicatissima*)^{1,2,3,4}
- Speckled sanddab (*Citharichthys stigmaeus*)^{1,4}
- Spotfin croaker (*Roncador stearnsii*)¹
- Spotted kelpfish (*Gibbonsia elegans*)^{1,3,4}
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1,2,3,4}
- Spotted turbot (*Pleuronichthys ritteri*)^{1,4}
- Striped mullet (*Mugil cephalus*)^{1,2,3}
- Topsmelt (*Atherinops affinis*)^{1,2,3,4}
- Walleye surfperch (*Hyperprosopon argenteum*)²
- White croaker (*Genyonemus lineatus*)^{1,2}
- White seabass (*Atractoscion nobilis*)^{1,4}
- White surfperch (*Phanerodon furcatus*)^{1,4}
- Yellowfin croaker (*Umbrina roncador*)^{1,2}
- Yellowfin goby (*Acanthogobius flavimanus*)^{1,3,4}
- Zebra perch (*Hermosilla azurea*)²

Nearshore Marine

Littoral

Intertidal

Sandy Beach

Human development has converted most of the sandy shoreline in the bay to artificial hard bottom, however beaches located intermittently throughout the San Diego Bay (U.S. Department of

Navy 2000). Many species use the sandy beaches for forage and nursery areas (U.S. Department of Navy 2000).

- Black surfperch (*Embiotoca jacksoni*)^{1, 3, 4}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 4}
- California grunion (*Leuresthes tenuis*)^{1, 2, 4}
- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4} – California halibut use San Diego Bay and its eelgrass as a nursery area (Allen 1999; Hoffman 1986; Kramer and Sunada 2001; SWRO NMFS 1992). In April, young-of-year recruit to the intertidal portions of the Bay (Allen 1999). California halibut move into the intertidal to feed during grunion runs (Martin 2003).
- Cheekspot goby (*Ilypnus gilberti*)^{1, 2, 4}
- Dwarf perch (*Micrometrus minimus*)^{1, 4}
- **English sole (*Pleuronichthys vetulus*)¹** – Juvenile and adult English sole forage in the intertidal over sand, mud and in eelgrass (NMFS 2004; Pearson and Owen 2001).
- **Leopard shark (*Triakis semifasciatus*)²** – Leopard sharks move in and out with the tide to forage in the intertidal (Smith 2001). They reside in estuaries, bays, and kelp beds, over soft and hard bottoms, as well as along open coast sandy beaches (NMFS Northwest Region 2004; Smith 2001; Smith 2005).
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 3, 4}
- Shovelnose guitarfish (*Rhinobatos productus*)^{1, 4}
- Topsmelt (*Atherinops affinis*)^{1, 2, 3, 4}
- Walleye surfperch (*Hyperprosopon argenteum*)²
- White surfperch (*Phanerodon furcatus*)^{1, 4}

Rocky Intertidal

All hard-bottom habitats in San Diego Bay are artificial. The structures that make up the hard-bottom include riprap, sea wall, piers and wharves (U.S. Department of Navy 2000). Artificial hard-bottom is most common in the northern and central portions of the bay (U.S. Department of Navy 2000).

- Bat ray (*Myliobatis californica*)^{1, 4}
- Black surfperch (*Embiotoca jacksoni*)^{1, 3, 4} – In San Diego Bay, black surfperch appear seasonally, usually during the month of April, when the YOY recruit to the Bay after the females give birth (Allen 1999; SWRO NMFS 1992).

- California barracuda (*Sphyraena argenta*)^{1, 3, 4}
- **California scorpionfish (*Scorpaena guttata*)¹** – Adult California scorpionfish forage in the rocky intertidal and are in tidepools (Love 2001a; NMFS Northwest Region 2004).
- Dwarf perch (*Micrometrus minimus*)^{1, 4}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 3, 4} – Giant kelpfish inhabit soft-bottom, rocky intertidal, shallow rocky reef and kelp (Allen 1985). Young-of-year recruit to the Bay during the months of July and October (Allen 1999).
- **Grass rockfish (*Sebastes rastrelliger*)⁴** – Grass rockfish occupy the rocky intertidal (Love 2002i). Juveniles recruit to low growing algae and hard-bottom, and reside in tidepools (Love *et al* 1991; McCain 2003).
- Jacksmelt (*Atherinopsis californiensis*)^{1, 3, 4}
- Kelp perch (*Brachyistius frenatus*)²
- **Leopard shark (*Triakis semifasciatus*)²**
- Opaleye (*Girella nigricans*)¹
- Reef finspot (*Paraclinus integripinnis*)^{1, 3}
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 3, 4}
- Spotted kelpfish (*Gibbonsia elegans*)^{1, 3, 4}
- Striped kelpfish (*Gibbonsia metzi*)¹
- Topsmelt (*Atherinops affinis*)^{1, 2, 3, 4}
- Walleye surfperch (*Hyperprosopon argenteum*)²
- White surfperch (*Phanerodon furcatus*)^{1, 4}

Water Column

The water column encompasses all waters beyond the littoral zone and deeper than one meter. It extends from the sea surface to the ocean bottom (Madden *et al.* 2005). For the water column to be considered EFH, the fish must either (1) spend the majority of their time in the water column; (2) spend and entire life stage in the water column (i.e., egg, larvae, juvenile, adult); or (3) perform an activity in the water column that is required to promote the welfare of the population (i.e., feeding).

- Black surfperch (*Embiotoca jacksoni*)^{1, 3, 4} – In San Diego Bay, black surfperch appear seasonally, usually during the month of April, when the YOY recruit to the Bay after the females give birth (Allen 1999; SWRO NMFS 1992).

- California barracuda (*Sphyraena argentea*)^{1, 3, 4}
- California grunion (*Leuresthes tenuis*)^{1, 2, 4}
- **California scorpionfish (*Scorpaena guttata*)¹** – California scorpionfish eggs are pelagic and float in masses near the surface (McCain 2003).
- **Curlfin sole (*Pleuronichthys decurrens*)²** – Curlfin sole spawn from April to August and release pelagic eggs (McCain 2003).
- **Jack mackerel (*Trachurus symmetricus*)¹** – Juvenile jack mackerel school over shallow and deep rocky reefs, in kelp beds, and along rocky shorelines (Allen 1985; Mason 2001).
- Jacksmelt (*Atherinopsis californiensis*)^{1, 3, 4}
- Kelp bass (*Paralabrax clathratus*)^{1, 4} – Kelp bass forage mid-water (Allen and Hovey 2001b).
- Longjaw mudsucker (*Gillichthys mirabilis*)¹
- **Northern anchovy (*Engraulis mordax*)^{1, 2, 3, 4}** – Young-of-year northern anchovy recruit to the mid-water of the nearshore and channel in San Diego Bay during July (Allen 1999). Northern anchovies typically school near the surface (Bergen and Jacobson 2001).
- Pacific bonito (*Sarda chiliensis*)⁴
- **Pacific mackerel (*Scomber japonicus*)¹** – There is an apparent inshore-offshore migration, with Pacific mackerel being inshore between July and November (Konno and Wolf 2001). Juveniles reside along open coast sandy beaches, and in kelp beds, bays, and estuaries (Konno and Wolf 2001).
- **Pacific sardine (*Sardinops sagax*)^{1, 4}** – The Pacific sardine is a small pelagic species that moves into San Diego Bay between July and October (Allen 1985; Allen 1999; Wolf and Smith 2001). Young-of-year occupy the mid-water of the nearshore and channel of San Diego Bay (Allen 1999).
- Queenfish (*Seriphus politus*)^{1, 2, 3}
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 3, 4} – Shiner perch appear seasonally in San Diego Bay, with young-of-year arriving in April after the females give birth (Allen 1999; SWRO NMFS 1992). They reside mid-water over soft-bottom, along open coast sandy beaches, and in bays and estuaries (Allen 1985).
- Speckled sanddab (*Citharichthys stigmaeus*)^{1, 4} – Speckled sanddab larvae are pelagic and remain near the surface (Allen and Leos 2001).
- Topsmelt (*Atherinops affinis*)^{1, 2, 3, 4}

Bottom

Soft Bottom

Vegetated

Eelgrass

Eelgrass covers most of the available nearshore area in San Diego Bay when suitable substrate is available and grows throughout the bay (Allen 1999; U.S. Department of Navy 2000). Hoffman found that the areas with eelgrass had two times the biomass as areas without eelgrass (Allen 1999). Eelgrass serves as a food source and shelter for many fish species (Gregorio 1999). Eelgrass coverage may change over time depending on water quality conditions in San Diego Bay (U.S. Department of Navy 2000).

- Arrow goby (*Clevelandia ios*)^{1, 2, 4}
- Barcheek pipefish (*Syngnathus exilis*)¹
- Barred pipefish (*Syngnathus auliscus*)¹
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 3, 4}
- Bat ray (*Myliobatis californica*)^{1, 4}
- Bay blenny (*Hypsoblennius gentilis*)^{1, 2, 3, 4}
- Bay goby (*Lepidogobius lepidus*)²
- Bay pipefish (*Syngnathus leptorhynchus*)^{1, 2, 3}
- Black croaker (*Cheilotrema saturnum*)^{1, 3, 4}
- Black surfperch (*Embiotoca jacksoni*)^{1, 3, 4}
- Blacksmith (*Chromis punctipinnis*)^{2, 3}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 4}
- California grunion (*Leuresthes tenuis*)^{1, 2, 4}
- California halfbeak (*Hyporhamphus rosae*)^{1, 2, 3, 4}
- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4} – California halibut use San Diego Bay and its eelgrass as a nursery area (Allen 1999; Hoffman 1986; Kramer and Sunada 2001; SWRO NMFS 1992).
- California killifish (*Fundulus parvipinnis*)^{1, 2, 3, 4}
- California needlefish (*Strongylura exilis*)^{1, 3}
- Cheekspot goby (*Ilypnus gilberti*)^{1, 2, 4}
- Deepbody anchovy (*Anchoa compressa*)^{1, 2, 3, 4}

- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 3, 4}
- **English sole (*Pleuronichthys vetulus*)¹** – Juvenile and adult English sole forage in the intertidal over sand, mud and in eelgrass (NMFS 2004; Pearson and Owen 2001).
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 3, 4} – Young-of-year giant kelpfish recruit to the Bay during the months of July and October (Allen 1999).
- Grey smoothhound (*Mustelus californicus*)^{1, 2, 4}
- Jacksmelt (*Atherinopsis californiensis*)^{1, 3, 4}
- Kelp bass (*Paralabrax clathratus*)^{1, 4}
- Kelp clingfish (*Rimicola muscarum*)¹ – Kelp clingfish reside in among eelgrass (Eschemeyer *et al.* 1983).
- Kelp perch (*Brachyistius frenatus*)²
- Kelp pipefish (*Syngnathus californiensis*)¹
- **Leopard shark (*Triakis semifasciatus*)²**
- **Northern anchovy (*Engraulis mordax*)^{1, 2, 3, 4}**
- **Pacific mackerel (*Scomber japonicus*)¹**
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1, 2, 3, 4}
- Queenfish (*Seriphus politus*)^{1, 2, 3}
- Rock wrasse (*Halichoeres semicinctus*)^{1, 4}
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Round stingray (*Urobatis halleri*)^{1, 2, 3}
- Salema (*Xenistius californiensis*)¹
- Sargo (*Anisotremus davidsonii*)²
- Shadow goby (*Quietula y-cauda*)^{1, 2, 4}
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 3, 4}
- Shovelnose guitarfish (*Rhinobatos productus*)^{1, 4}
- Slough anchovy (*Anchoa delicatissima*)^{1, 2, 3, 4}
- Snubnose pipefish (*Bryx arctus*)¹
- Spotfin croaker (*Roncador stearnsii*)¹
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1, 2, 3, 4}
- Spotted turbot (*Pleuronichthys ritteri*)^{1, 4}
- Striped mullet (*Mugil cephalus*)^{1, 2, 3}

- Topsmelt (*Atherinops affinis*)^{1, 2, 3, 4}
- Walleye surfperch (*Hyperprosopon argenteum*)²
- White croaker (*Genyonemus lineatus*)^{1, 2}
- White seabass (*Atractoscion nobilis*)^{1, 4}
- White surfperch (*Phanerodon furcatus*)^{1, 4}
- Yellowfin croaker (*Umbrina roncadore*)^{1, 2}

Un-Vegetated

The soft-bottom sediments of San Diego Bay include mud, sand, and silty sand (U.S. Department of Navy 2000). Dredging of the bay has displaced muddier and siltier sediments, exposing the more sandy sediments (U.S. Department of Navy 2000). The un-vegetated nearshore areas have large mats of living algal material that provide protection and a food source for fish species (U.S. Department of Navy 2000).

- Arrow goby (*Clevelandia ios*)^{1, 2, 3, 4}
- Barcheek pipefish (*Syngnathus exilis*)¹
- Barred pipefish (*Syngnathus auliscus*)²
- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 3, 4}
- Bat ray (*Myliobatis californica*)^{1, 4}
- Bay blenny (*Hypsoblennius gentilis*)^{1, 2, 3, 4}
- Bay goby (*Lepidogobius lepidus*)²
- Bay pipefish (*Syngnathus leptorhynchus*)^{1, 2, 3}
- Bigmouth sole (*Hippoglossina stomata*)⁴
- Black surfperch (*Embiotoca jacksoni*)^{1, 3, 4}
- Brown smoothhound (*Mustelus henlei*)¹
- C-O turbot (*Pleuronichthys coenosus*)¹
- California barracuda (*Sphyraena argentea*)^{1, 3, 4}
- California butterfly ray (*Gymnura marmorata*)^{1, 4}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 4}
- California grunion (*Leuresthes tenuis*)^{1, 2, 4}
- California halfbeak (*Hyporhamphus rosae*)^{1, 2, 3, 4}
- California halibut (*Paralichthys californicus*)^{1, 2, 3, 4} – California halibut use San Diego Bay and its eelgrass as a nursery area (Allen 1999; Hoffman 1986; Kramer and Sunada 2001; SWRO NMFS

1992). Larger fish reside over nearshore soft-bottom and in the channel (Allen 1985; Allen 1999).

- California killifish (*Fundulus parvipinnis*)^{1, 2, 3, 4}
- California lizardfish (*Synodus lucioceps*)¹
- California needlefish (*Strongylura exilis*)^{1, 3}
- **California scorpionfish (*Scorpaena guttata*)¹** – California scorpionfish spawn near the bottom at depths between 3 and 120 meters (Love 2001a). They reside over hard-bottom and soft-bottom (Love 2001a; NMFS Northwest Region 2004).
- California tonguefish (*Symphurus atricauda*)¹ – California tonguefish reside on soft-bottom (Allen 1985; Allen 1999). Their eggs are located on the benthos of bays (MBC Applied Environmental Sciences 1994).
- Chameleon goby (*Tridentiger trionocephalus*)¹
- Cheekspot goby (*Ilypnus gilberti*)^{1, 2, 4}
- **Curlfin sole (*Pleuronichthys decurrens*)⁴** – Curlfin turbot reside over soft-bottom (Allen 1985; Anchor Environmental, L.L.C. 2001). They are most common at depths less than 90 meters (McCain 2003).
- Deepbody anchovy (*Anchoa compressa*)^{1, 2, 3, 4}
- Diamond turbot (*Pleuronichthys guttulata*)^{1, 2, 3, 4}
- Dwarf perch (*Micrometrus minimus*)^{1, 4}
- **English sole (*Pleuronichthys vetulus*)¹** – English sole can be found in the northern portion of San Diego Bay (Allen 1999). English sole move inshore during the summer months and can be found in eelgrass, along the open coast, and over sand and mud (McCain 2003; Pearson and Owen 2001).
- Fantail sole (*Xysteurys liolepis*)¹
- **Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 3, 4}** – Giant kelpfish inhabit the eelgrass and soft-bottom habitats of San Diego Bay (Allen 1999; Hoffman 1986; SWRO NMFS 1992). Young-of-year recruit to the Bay during the months of July and October (Allen 1999).
- Grey smoothhound (*Mustelus californicus*)^{1, 2, 4}
- Hornyhead turbot (*Pleuronichthys verticalis*)¹
- Jacksmelt (*Atherinopsis californiensis*)^{1, 3, 4}

- Kelp bass (*Paralabrax clathratus*)^{1,4} – Kelp bass larvae can be found in shallow water among drift algae (Allen and Hovey 2001b).
- Kelp pipefish (*Syngnathus californiensis*)¹
- **Leopard shark (*Triakis semifasciatus*)^{1,2}** – Leopard sharks are most common at depths ranging from 0 to 5 meters in muddy bays (Smith 2001). They reside in estuaries, bays, and kelp beds over soft and hard bottoms, as well as along open coast sandy beaches (NMFS Northwest Region 2004; Smith 2001; Smith 2005). Leopard sharks spawn and pup in shallow water (Smith 2005). Seasonally, pups are along sandy beaches and in protected bays (Smith 2005).
- **Northern anchovy (*Engraulis mordax*)^{1,2,3,4}**
- **Pacific mackerel (*Scomber japonicus*)¹**
- Pacific staghorn sculpin (*Leptocottus armatus*)^{1,2,3,4}
- Plainfin midshipman (*Porichthys notatus*)^{1,4}
- Queenfish (*Seriphus politus*)^{1,2,3}
- Round stingray (*Urobatis halleri*)^{1,2,3}
- Shadow goby (*Quietula y-cauda*)²
- Shiner perch (*Cymatogaster aggregata*)^{1,2,3,4}
- Shortfin corvina (*Cynoscion parvipinnis*)¹
- Shovelnose guitarfish (*Rhinobatos productus*)^{1,4}
- Slough anchovy (*Anchoa delicatissima*)^{2,3}
- Speckled sanddab (*Citharichthys stigmaeus*)^{1,4}
- Specklefin midshipman (*Porichthys myriaster*)^{1,4} – Specklefin midshipman reside over soft-bottom (Allen 1985).
- Spotfin croaker (*Roncadora stearnsii*)¹
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1,2,3,4}
- Spotted turbot (*Pleuronichthys ritteri*)^{1,4}
- Topsmelt (*Atherinops affinis*)^{1,2,3,4}
- Walleye surfperch (*Hyperprosopon argenteum*)²
- White croaker (*Genyonemus lineatus*)^{1,2}
- White seabass (*Atractoscion nobilis*)^{1,4}
- White surfperch (*Phanerodon furcatus*)^{1,4}

- Yellowfin croaker (*Umbrina roncadore*)¹
- Yellowfin goby (*Acanthogobius flavimanus*)^{1, 3, 4}

Hard Bottom

Kelp Bed

Giant Kelp

There are no kelp beds in San Diego Bay.

Rocky Reef

All hard-bottom habitats in San Diego Bay are artificial. The structures that make up the hard-bottom include riprap, sea wall, piers and wharves (U.S. Department of Navy 2000). Artificial hard-bottom is most common in the northern and central portions of the bay (U.S. Department of Navy 2000).

- Barred sand bass (*Paralabrax nebulifer*)^{1, 2, 3, 4}
- Bat ray (*Myliobatis californica*)^{1, 4}
- Black croaker (*Cheilotrema saturnum*)^{1, 3, 4}
- Black surfperch (*Embiotoca jacksoni*)^{1, 3, 4}
- Blacksmith (*Chromis punctipinnis*)^{2, 3}
- California barracuda (*Sphyraena argentea*)^{1, 3, 4}
- California corbina (*Menticirrhus undulatus*)^{1, 2, 4}
- **California scorpionfish (*Scorpaena guttata*)¹** – California scorpionfish spawn near the bottom at depths between 3 and 120 meters (Love 2001a). They reside over hard-bottom and soft-bottom (Love 2001a; NMFS Northwest Region 2004).
- Dwarf perch (*Micrometrus minimus*)^{1, 4}
- Giant kelpfish (*Heterostichus rostratus*)^{1, 2, 3, 4} – Giant kelpfish inhabit soft-bottom, rocky intertidal, shallow rocky reefs and kelp (Allen 1985). Young-of-year recruit to the Bay during the months of July and October (Allen 1999).
- Grey smoothhound (*Mustelus californicus*)^{1, 2, 4} – Grey smoothhounds can be found in the northern portion of San Diego Bay, where there is more hard-bottom (Allen 1999). They are most common from 2 to 46 meters and often reside in bays and along rocky shores (Chapple 2005).
- Halfmoon (*Medialuna californiensis*)^{1, 4}
- Horn shark (*Heterodontus francisi*)^{1, 4}
- **Jack mackerel (*Trachurus symmetricus*)¹**

- Jacksmelt (*Atherinopsis californiensis*)^{1, 2, 3, 4}
- Kelp bass (*Paralabrax clathratus*)^{1, 4} – Kelp bass can be found in the northern portion of San Diego Bay, where hard-bottom is more common (Allen 1999). They typically are at depths ranging from 8 to 21 meters, in association with rocky reefs and kelp beds (Allen 1985; Allen and Hovey 2001b).
- Kelp perch (*Brachyistius frenatus*)²
- **Leopard shark (*Triakis semifasciatus*)²**
- **Northern anchovy (*Engraulis mordax*)^{1, 2, 3, 4}** – In San Diego Bay, northern anchovy have been reported in soft-bottom areas; along open coast sandy beaches; over shallow rocky reefs; and in bays, estuaries, and eelgrass (Allen 1985; Bergen and Jacobson 2001; Hoffman 1986). Young-of-year recruit to the mid-water of the nearshore and channel in San Diego Bay during July (Allen 1999). Northern anchovies typically school near the surface (Bergen and Jacobson 2001).
- Opaleye (*Girella nigricans*)¹
- Pacific angel shark (*Squatina californica*)⁴
- Pacific bonito (*Sarda chiliensis*)⁴
- **Pacific mackerel (*Scomber japonicus*)¹**
- Queenfish (*Seriphus politus*)^{1, 2, 3}
- Reef finspot (*Paraclinus integripinnis*)^{1, 3}
- Rock wrasse (*Halichoeres semicinctus*)^{1, 4}
- Rockpool blenny (*Hypsoblennius gilberti*)²
- Salema (*Xenistius californiensis*)¹
- Sargo (*Anisotremus davidsonii*)^{1, 2, 4}
- Senorita (*Oxyjulis californica*)¹
- Shadow goby (*Quietula y-cauda*)^{1, 2, 4}
- Shiner perch (*Cymatogaster aggregata*)^{1, 2, 3, 4}
- Snubnose pipefish (*Bryx arctus*)¹
- Specklefin midshipman (*Porichthys myriaster*)^{1, 4}
- Spotted kelpfish (*Gibbonsia elegans*)^{1, 3, 4}
- Spotted sand bass (*Paralabrax maculatofasciatus*)^{1, 2, 3, 4}
- Striped kelpfish (*Gibbonsia metzi*)¹
- Topsmelt (*Atherinops affinis*)^{1, 2, 3, 4}

- Walleye surfperch (*Hyperprosopon argenteum*)²
- White croaker (*Genyonemus lineatus*)^{1, 2}
- White seabass (*Atractoscion nobilis*)^{1, 4}
- White surfperch (*Phanerodon furcatus*)^{1, 4}
- Zebra perch (*Hermosilla azurea*)²

Neritic

Water Column

San Diego Bay does not reach 30 meters in depth.

Bottom

Soft Bottom

Un-Vegetated

San Diego Bay does not reach 30 meters in depth.

Hard Bottom

Rocky Reef

San Diego Bay does not reach 30 meters in depth.

Submarine Canyon

There are no submarine canyons in San Diego Bay.

Documentation of Presence in San Diego Bay

¹ Allen, L.G. 1999. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California. Nearshore Marine Fish Research Program, Department of Biology, California State University, Northridge.

² Hoffman, R.S. 1986. Fishery utilization of eelgrass (*Zostera marina*) beds and non-vegetated shallow water areas in San Diego Bay. Southwest Regional Office, National Marine Fisheries Service, National Oceanic and Atmospheric Administration.

³ Southwest Regional Office, National Marine Fishery Service. 1992. San Diego Bay Beach Seine Study (Coronado Bridge Station): Sampling Period – 10/88-7/92. Online. 20 June 2005.

⁴ Vantuna Research Group. 2006. Fisheries inventory and utilization of San Diego Bay, San Diego California for surveys conducted in April and July 2005: Draft Report. Los Angeles, California.

References

16 U.S.C. § 1801(a)(2).

16 U.S.C. § 1802(10).

16 U.S.C. § 1855(b)(2).

50 CFR § 600.805 (b)(1-2).

50 CFR § 600.815 (a)(1)(iii)(A).

50 CFR § 600.815 (a)(1)(iv)(A).

62 FR 66531.

Abrams, P.B. and R.M. Starr. 2001. Lingcod. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 191-193, 591p.

Allen, L.G. 1985. A habitat analysis of the nearshore marine fishes from southern California. *Bull. Southern California Acad. Sci.* 84(3): 133-155.

Allen, L.G. 1991. The fish populations inhabiting lower Marina del Rey Harbor and Ballona Channel from July 1990 to April 1991; Technical Report for the Playa Vista EIR, MacGuire Thomas Partners. Northridge, California.

Allen, L.G. 1999. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California. Nearshore Marine Fish Research Program, Department of Biology, California State University, Northridge.

Allen, L.G., M.H. Horn, F.A. Edmands and C.A. Usui. 1983. Structure and seasonal dynamics of the fish assemblage in the Cabrillo Beach area of Los Angeles Harbor, California. *Bull. Southern California Acad. Sci.*, 82(2): 47-70.

Allen, L.G. and T.E. Hovey. 2001. Barred Sand Bass. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A Status Report*. California Department of Fish and Game. University of California Agricultural and Natural Resources. Sea Grant Publication SG01-11: 224-225, 591p.

Allen, M.J. and R. Leos. 2001. Sanddabs. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 201-202, 591p.

Ambrose, R.F. and D.J. Meffert. 1999. Fish-assemblage dynamics in Malibu Lagoon, a small, hydrologically altered estuary in southern California. *WETLANDS*, 19(2): 327-340.

- Anchor Environmental, L.L.C. 2001. Final Environmental Assessment Los Angeles River Estuary Pilot Study; Los Angeles County Regional Dredge Material Management Plan Pilot Studies. Los Angeles District Corps of Engineers. Los Angeles, California.
- Ashcraft, S.E. and M. Heisdorf. 2001. Brown Rockfish. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 170-172, 591p.
- Bergen, D.R. and L.D. Jacobson. 2001. Northern Anchovy. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 303-305, 591p.
- Brewer, G.D. 1983. Fish spawning in the Los Angeles-Long Beach Harbors: Comparison with the shallow open coast habitats off southern California. National Marine Fisheries Service, Long Beach, California.
- Brewer, G.D. 1984. An evaluation of fish abundance among protected and open coast habitats in the Los Angeles-Long Beach Harbors and San Pedro Bay: Draft Final Report. National Marine Fisheries Service. Long Beach, California.
- Butler, J. and M. Love. 2002. *Sebastes dalli*. *In* Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California. 160-161, 404p.
- Chapple, T. Grey Smoothhound. Biological Profiles. Ichthyology at the Florida Museum of Natural History. Online. 11 July 2005.
- Chesney, B. 2005. Personal communication. 17 July 2005.
- Cross, J.N. and L.G. Allen. 1993. Fishes. *In* M.D. Dailey, D.J. Reish, and J.W. Anderson (eds.), *Ecology of the Southern California Bight: A Synthesis and Interpretation*. University of California Press, Berkeley, California. 459-540, 926p.
- Eschmeyer, W.N., E.S. Herald and H. Hammann. 1983. A field guide to Pacific coast fishes of North America. Houghton Mifflin Company, Boston, U.S.A. 336 p. 206.
- FR § 600.910 (a).
- FR § 600.920 (a)(2)(ii).
- Fritzsche, R.A. and P. Collier. 2001. Surfperches. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 236-242, 591p.
- Gregorio, D. 1999. Port of Los Angeles Eel Grass Survey. Southern California Marine Institute.

- Gregory, P.A. 2001b. Silversides. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 243-245, 591p.
- Haugen, C.W. and D. Thomas. 2001. Starry Flounder. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 199-200, 591 p.
- Henry, F.D. 2001. Sablefish. *Rev* D.E. Pearson. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 390-392, 591p.
- Hobson, T. 2002. *Sebastes mystinus*. *In* Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California. 215-218, 404p.
- Hoffman, R.S. 2005. Personal communication.
- Hoffman, R.S. 1986. Fishery utilization of eelgrass (*Zostera marina*) beds and non-vegetated shallow water areas in San Diego Bay. Southwest Regional Office, National Marine Fisheries Service, National Oceanic and Atmospheric Administration.
- Hovey, T.E. and L.G. Allen. 2001. Spotted Sand Bass. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 226-227, 591p.
- Howard, D. 2001. Kelp Greenling. *Rev* K. R. Silberberg. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 183-184, 591p.
- Impact Sciences, INC. 1996. Playa Vista: Existing Biota.
- Josselyn, M., S. Chamberlain, P. Goodwin and K. Cuffe. 1993. Wetlands Inventory and Restoration Potential: Santa Monica Bay Watershed. Santa Monica Bay Restoration Project. Monterey Park, California.
- Kalo, J.J., R.G. Hildreth, A. Reiser, D.R. Christie and J.L. Jacobson. 2002. *Coastal and Ocean Law; Cases and Materials*. 2nd Ed. West Group.

- Karpov, K.A., D.P. Albin, and W.H. Van Buskirk. 1995. The Marine Recreational Fishery in Northern and Central California; A Historical Comparison (1958-86), Status of Stocks (1980-86), and Effects of Changes in the California Current. State of California, The Resources Agency, Department of Fish and Game. Fish Bulletin, 176.
- Konno, E.S. and P. Wolf. 2001. Pacific Mackerel. Rev D.R. Bergen. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 306-308, 591p.
- Larson, R. 2002a. *Sebastes atrovirens*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.126-128, 404p.
- Larson, R. 2002b. *Sebastes carnatus*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.240-241, 404p.
- Leos, R. 2001. Other Flatfishes. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 203-204, 591p.
- Love, M. 2002a. *Sebastes auriculatus*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.129-131, 404p.
- Love, M. 2002b. *Sebastes caurinus*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.144-147, 404p.
- Love, M. 2002c. *Sebastes chlorosticus*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.148-150, 404p.
- Love, M. 2002d. *Sebastes goodei*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.185-186, 404p.
- Love, M. 2002e. *Sebastes jordani*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.192-193, 404p.
- Love, M. 2002f. *Sebastes levis*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.196-198, 404p.
- Love, M. 2002g. *Sebastes miniatus*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.210-212, 404p.

- Love, M. 2002h. *Sebastes paucipinis*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.228-231, 404p.
- Love, M. 2002i. *Sebastes rastrelliger*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.240-241, 404p.
- Love, M. 2002j. *Sebastes rosenblatti*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.246-247, 404p.
- Love, M. 2002k. *Sebastes rubrivinctus*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.251-253, 404p.
- Love, M. 2002l. *Sebastes semicinctus*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.261-262, 404p.
- Love, M. 2002m. *Sebastes serranoides*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.263-265, 404p.
- Love, M. 2002n. *Sebastes serriceps*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California.266-267, 404p.
- Love, M. 2001a. California Scorpionfish. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 160-161, 591p.
- Love, M. 2001b. Olive Rockfish. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 168-169, 591p.
- Love, M.S., M.H. Carr, and L.J. Halderson. 1991. The ecology of substrate-associated juveniles of the genus *Sebastes*. *Environmental Biology of Fishes*. 30: 225-243.
- Madden, C.J., D.H. Grossman and K.L. Goodin. 2005. *Coastal and Marine Systems of North America; Framework for an Ecological Classification Standard: Version II*. NatureServe. Arlington, Virginia.
- Martin, K.L. 2003. Personal communication.
- Mason, J. 2001. Jack Mackerel. Rev T. Bishop. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 309-311, 591p.

- MBC Applied Environmental Sciences. 1988. The State of Santa Monica Bay: Part One: Assessment of Conditions and Pollution Impacts. Southern California Association of Governments. Los Angeles, California.
- MBC Applied Environmental Sciences. 1993. Santa Monica Bay Characterization Study. Santa Monica Bay Restoration Project. Monterey Park, California.
- MBC Applied Environmental Sciences. 1994. Marine Biological Baseline Study: Queensway Bay, Long Beach Harbor. City of Long Beach. Long Beach, California.
- McCain, B. 2003. Essential Fish Habitat West Coast Groundfish Draft Revised Appendix. Northwest Fisheries Science Center, NOAA Fisheries, Seattle, Washington. 243p.
- Moser, H.G. and G.W. Boehlert. 1991. Ecology of pelagic larvae and juveniles of the genus *Sebastes*. *Environmental Biology of Fishes*. 30: 203-224.
- National Marine Fisheries Service, Habitat Conservation Division, Southwest Regional Office. 1998. A Primer for Federal Agencies; Essential Fish Habitat: New Marine Fish Habitat Conservation Mandate for Federal Agencies.
- National Marine Fisheries Service—Northwest Region. 2004. Pacific Groundfish Fishery Management Plan Essential Fish Habitat Preliminary Draft Environmental Impact Statement. Seattle Washington.
- Ono, D. 2001. Calico Rockfish. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 179-180, 591 p.
- Pacific Fishery Management Council. 1998. Essential Fish Habitat: West Coast Groundfish. Amendment 11.
- Pearson, D.E. and S.L. Owen 2001. English Sole. *Rev* D. Thomas. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 384-385, 591p.
- Pondella, D. II, P. Morris, J.S. Stephens and N. Davis. 1996. Final Report: Marine Biological Surveys of the Coastal Zone off the City of Rancho Palos Verdes. U.S. Corp of Engineers. Los Angeles, California.
- Quast, J.C. 1968. Observations on the food of the kelp-bed fishes. State of California, The Resources Agency Department of Fish and Game. *Fish Bull.* 139: 109-142.
- Quirollo, L.F. 2001. Rex Sole. *Rev* C.M. Dewees. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 388-389, 591p.

- Quirollo, L.F. and V.G. Wespestad. 2001. *Rev M.W. Dorn. Pacific Hake*. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 393-397, 591p.
- Ralston, S. and K.T. Oda. 2001. *Chilipepper*. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 366-367, 591p.
- Reilly, P. 2001. *Black Rockfish*. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 162-164, 591p.
- Reiser, A., C.G. Hudson and S. Roady. 2005. *The Role of Legal Regimes in Marine Conservation*. In E.A. Norse and L.B. Crowder (eds.), *Marine Conservation Biology: The Science of Maintaining the Sea's Biodiversity*. Washington: Island Press.
- Sakuma, K. 2002. *Sebastes saxicola*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California. 258-260, 404p.
- Smith, S.E. 2001. *Leopard Shark*. In W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), *California's Living Marine Resources: A status report*. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 252-254, 591p.
- Smith, S. E. 2005. *Leopard shark mating observed off La Jolla, California*. California Fish and Game. 91(1): 128-135.
- Southwest Regional Office, National Marine Fishery Service. 1992. *San Diego Bay Beach Seine Study (Coronado Bridge Station): Sampling Period – 10/88-7/92*. Online. 20 June 2005.
- Stephens, J.S., Jr., P.A. Morris, K. Zerba, and M. Love. 1984. *Factors affecting fish diversity on a temperate reef: the fish assemblage of Palos Verdes Point, 1974-1981*. *Environmental Biology of Fishes*. 2(4): 259-175.
- Stephens, J.S., Jr., D.F. Soule, D. Pondella, and P. Morris. ca. 1990. *Marina del Rey as a fish habitat: studies of the fish fauna since 1977*. Unpublished.
- Stephens, J.S., Jr. and K.E. Zerba. 1981. *Factors affecting fish diversity on a temperate reef*. *Environmental Biology of Fishes*. 6(1): 111-121.
- Stewart, E. and M. Love. 2002. *Sebastes melanops*. In Love, M.S., M. Yoklavich, and L. Thorsteinson (eds.), *The Rockfishes of the Northeast Pacific*. University of California Press, Berkeley, California. 204-206, 404p.

- Thomas, D.H. 2001. Bocaccio. *Rev* A.D. MacCall. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11:361-362, 591p.
- VanTresca, D.A. 2001. Vermilion Rockfish. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 189-190, 591p.
- Vantuna Research Group. 2006. Fisheries inventory and utilization of San Diego Bay, San Diego California for surveys conducted in April and July 2005: Draft Report. Los Angeles, California.
- Wilson-Vandenberg, D. and R. Hardy. 2001. Cabezon. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 157-159, 591p.
- Wolf, P. and P.E. Smith. 2001. Pacific Sardine. *Rev* D.R. Bergen. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 299-302, 591p.
- Yaremko, M. 2001. Market Squid. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 295-298, 591p.
- Zorzi, G.D. and L.K. Martin. 2001. Skates and Rays. *Rev* J. Urgogretz. *In* W.S. Leet, C.M. Dewees, R. Klingbiel, and E.J. Larson (eds.), California's Living Marine Resources: A status report. California Department of Fish and Game. University of California Agriculture and Natural Resources. Sea Grant Publication SG01-11: 257-261, 591p.

Appendix 1:

Habitat Classification for Southern California's Large Bays

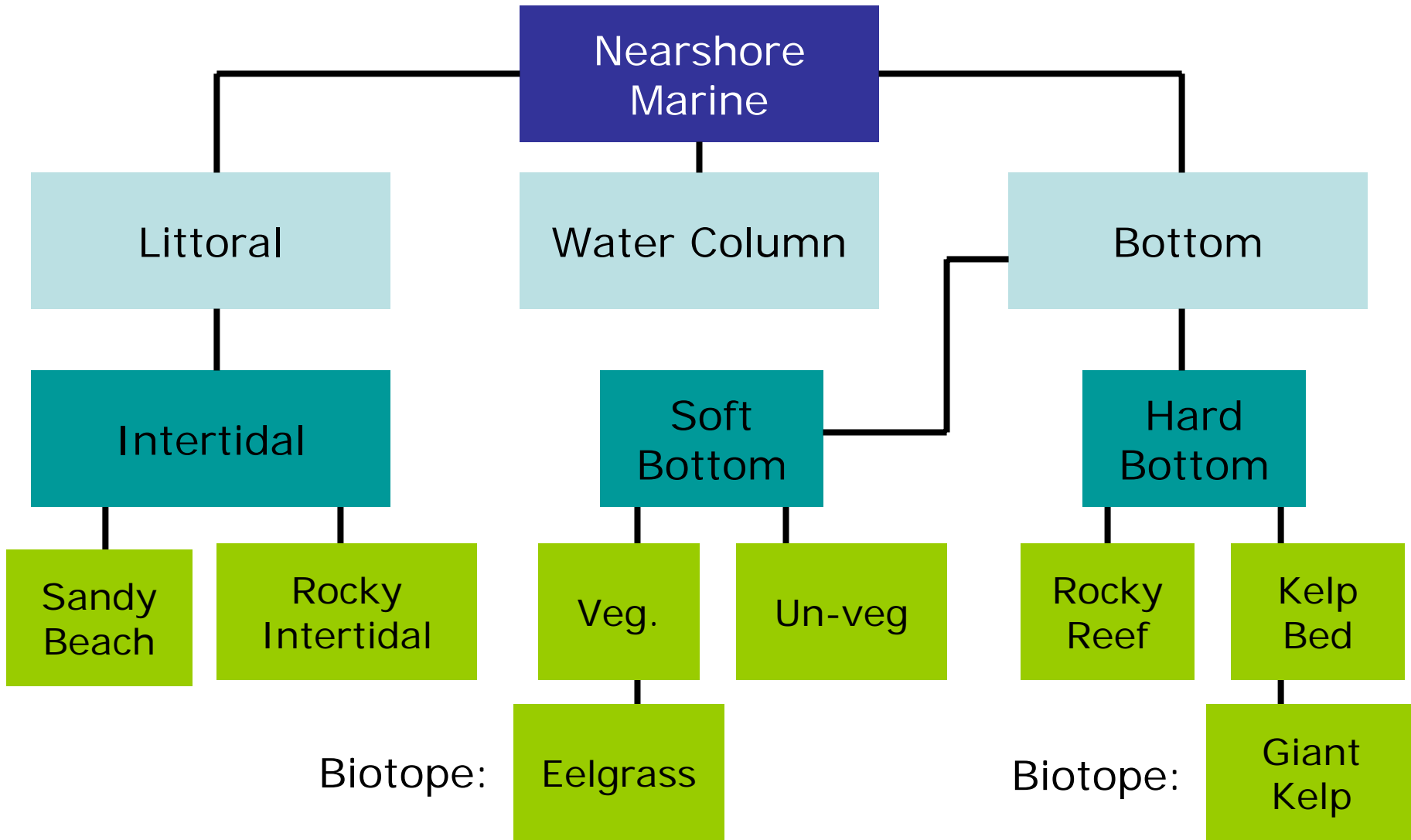
Habitat Classification for Southern California's Large Bays

Estuarine

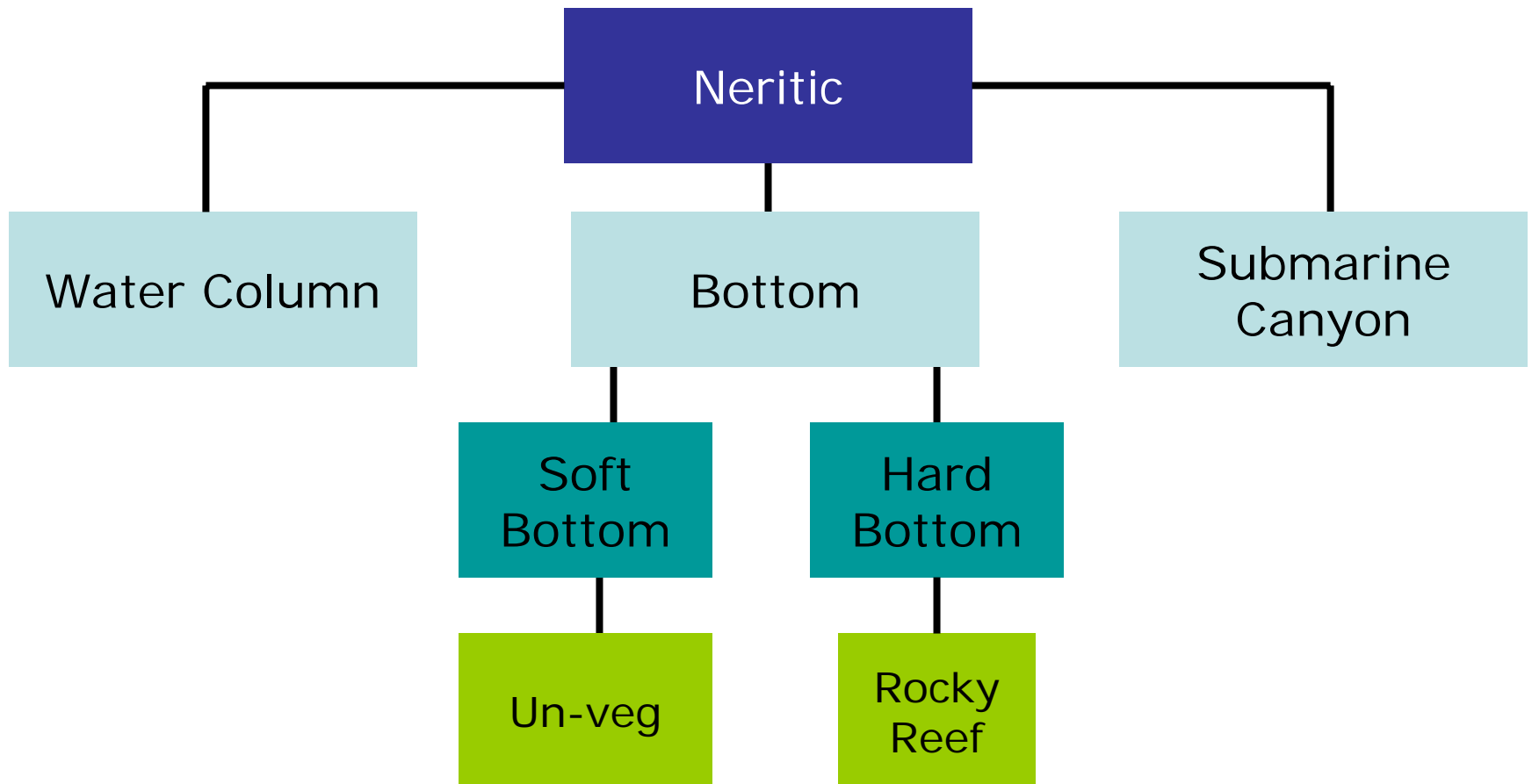
Nearshore
Marine

Neritic

Habitat Classification for Southern California's Large Bays



Habitat Classification for Southern California's Large Bays



Appendix 2:

Species Summary Tables

Essential Fish Habitat in
Santa Monica Bay, San Pedro Bay, and San Diego Bay:
A Reference Guide for Managers

Species Summary Tables

Black rockfish (*Sebastes melanops*)

Bay:	SP (Anchor Environmental, L.L.C. 2001)
Egg:	None
Larvae:	Released January thru August (Love 2002)
Juvenile:	Juveniles can be found in tidepools and recruit to eelgrass, kelp beds, drift algae, soft-bottom, and hard-bottom at depths near 36m (Love 2002a; Love <i>et al.</i> 1991; NMFS Northwest Region; Stewart and Love 2002). Forage in estuaries with hard bottoms and kelp beds (NMFS Northwest Region 2004; Stewart and Love 2002).
Adult:	Shallow waters and bays in association with sand-rock interface and rocky bottoms of artificial reefs at <54m, and kelp beds at holdfast (Ashcraft and Heisdorf 2001; NMFS Northwest Region 2004; Stewart and Love 2002). Forage in eelgrass and kelp canopy (Love 2002a; NMFS Northwest Region 2004; Stewart and Love 2002).
Diet:	Small crustaceans, amphipods, copepods, crabs, octopus and fish (Ashcraft and Heisdorf 2001; Reilly 2001; Stewart and Love 2002)

Black surfperch (*Embiotoca jacksoni*)

Bay:	SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; Pondella <i>et al.</i> 1996; Stephens <i>et al.</i> 1984; Stephens <i>et al.</i> ca. 1990; Stephens and Zerba 1981) SP (Allen <i>et al.</i> 1983; Anchor Environmental, L.L.C. 2001) SD (Allen 1999; SWRO NMFS 1992; Vantuna Research Group 2006)
Egg:	None
Larvae:	
Juvenile:	YOY recruit to SD Bay in April (Allen 1999; SWRO NMFS 1992)
Adult:	Estuaries, marine nearshore and deep soft-bottom, open coast sandy beach, shallow rocky reef, and kelp beds (Allen 1985; Allen 1999; Fritzsche and Collier 2001; MBC Applied Environmental Sciences 1988)
Diet:	Benthic and kelp-associated macroinvertebrates (i.e., isopods, gastropod mollusks, amphipods, polychaete worms, brittle stars, and small crabs), and zooplankton (Cross and Allen 1993; Fritzsche and Collier 2001)

Blue rockfish (*Sebastes mystinus*)

- Bay: SM (Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between October and March (Hobson 2002)
- Juvenile: Recruit to shallow rocky reefs between April and June (Hobson 2002; Love *et al.* 1991). Can be found in kelp canopy (NMFS Northwest Region 2004)
- Adult: Rocky intertidal, shallow rocky reef, kelp beds (Allen 1985; McCain 2003; NMFS Northwest Region 2004)
- Diet: Plankton, pelagic tunicates, schyphozoa, hydromedusae, micro-crustacea, pelagic gastropods, floating plant material, larval fish, and juvenile fish (Hobson 2002; McCain 2003)

Bocaccio (*Sebastes paucipinis*)

- Bay: SM (Cross and Allen 1993; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between October and July and may associate with small juveniles within 100 feet of the surface (Love 2002h; McCain 2003; Moser and Boehlert 1991). Larvae remain in SM Bay (Love 2002h; McCain 2003; Moser and Boehlert 1991).
- Juvenile: Recruit to kelp beds and low-growing algae (Love *et al.* 1991). Also in shallow waters over soft-bottom and near piers, and in association with drift algae (MBC Applied Environmental Sciences 1988; McCain 2003; Thomas 2001). Forage in kelp canopy and along submarine canyon hard-bottom (NMFS Northwest Region 2004).
- Adult: In the water column, kelp bed, and over hard and soft-bottom depths between 50 and 250 meters (MBC Applied Environmental Sciences 1988; Love 2002h; McCain 2003; NMFS Northwest Region 2004; Thomas 2001). Forage along submarine canyon hard-bottom (NMFS Northwest Region 2004).
- Diet: Plankton, fish larvae, copepods, krill, **rockfishes**, surfperch, **jack mackerel**, **sablefish**, **anchovies**, lanternfish, hake, **squid**, and other nearshore fishes (Love 2002h; Thomas 2001)

Brown rockfish (*Sebastes auriculatus*)

- Bay: SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1993; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between January and August (Love 2002)
- Juvenile: Settle out over hard-bottom, among drift algae, and in kelp beds at depths near 36 m (Love 2002a; Love *et al.* 1991; NMFS Northwest Region). Nursery area in bays and estuaries (Ashcraft and Heisdorf; NMFS Northwest Region 2004). Forage in eelgrass (NMFS Northwest Region 2004).
- Adult: Shallow waters and bays in association with sand-rock interfaces, rocky reefs and artificial reefs at depth <54m (Ashcraft and Heisdorf 2001). Forage in eelgrass, bays and estuaries (Ashcraft and Heisdorf 2001; Love 2002a; NMFS Northwest Region 2004).
- Diet: Small crustaceans, amphipods, copepods, crabs and fish (Ashcraft and Heisdorf 2001)

Cabezon (*Scorpaenichthys marmoratus*)

- Bay: SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: Demersal and in estuaries from winter to spring (McCain 2003)
- Larvae: Pelagic and in estuaries from winter to spring (McCain 2003)
- Juvenile: In tidepools and kelp canopy (Wilson-Vandenberg and Hardy 2001)
- Adult: Over rocky reefs, in tidepools, and in kelp beds from 0-76 m (Wilson-Vandenberg and Hardy 2001). Forage in estuaries over sandy bottom, among eelgrass, and rocky intertidal (NMFS Northwest Region 2004; Wilson-Vandenberg and Hardy 2001)
- Diet: Crustaceans (small lobsters, crabs and shrimp), mollusks (abalone, **squid** and octopus), small fish (**rockfishes**), fish eggs and amphipods (Wilson-Vandenberg and Hardy 2001)

Calico rockfish (*Sebastes dalli*)

- Bay: SM (Cross and Allen 1993; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between January and May (Butler and Love 2002)
- Juvenile: In July, YOY settle out on deep soft-bottom, sand/rock bottom and low relief hard-bottom (Butler and Love 2002; Love *et al.* 1991). Juveniles over soft bottoms and artificial reefs at 60-120 m (Allen 1985; Butler and Love 2002; Ono 2001).
- Adult: Cool water estuaries (McCain 2003). Soft bottoms and artificial reefs at 60-120 m (Allen 1985; Butler and Love 2002; Ono 2001).
- Diet: Crabs, krill, polychaete worms, gammarid amphipods, fish larvae, copepods, bivalves and brittle stars (Butler and Love 2002)

California halibut (*Paralichthys californicus*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984; Stephens *et al.* ca. 1990; Stephens and Zerba 1981)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001; Brewer 1983; Brewer 1984; Cross and Allen 1993; MBC Applied Environmental Sciences 1994)
SD (Allen 1999; Hoffman 1986; SWRO NMFS 1992; Vantuna Research Group 2006)
- Egg:
- Larvae: In bays (Brewer 1983)
- Juvenile: Vegetated and un-vegetated shallow water; uses bays and estuaries for nurseries (Hoffman 1986; Kramer and Sunada 2001). YOY recruit to intertidal soft-bottom (Allen 1999).
- Adult: Open coast soft-bottoms and deep rocky reefs from 0-90 m (Allen 1985, Kramer and Sunada 2001). Enter intertidal to feed on grunion during grunion runs (Martin 2003).
- Diet: Crustaceans (i.e., copepods and amphipods), gobies, grunion, **Pacific sardine, northern anchovy, squid**, white croaker, topsmelt, juvenile striped mullet, California killifish, deepbody anchovy, slough anchovy, shiner surfperch, bay pipefish, walleye surfperch, queenfish, white surfperch, speckled sanddab, specklefin midshipman, hornyhead turbot, spotted turbot, and basketweave cusk-eel (Cross and Allen 1993; Kramer and Sunada 2001; Martin 2003; Quast 1968)

California scorpionfish (*Scorpaena guttata*)

- Bay: SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001; MBC Applied Environmental Sciences 1994)
SD (Allen 1999)
- Egg: Pelagic eggs float near surface (McCain 2003)
- Larvae:
- Juvenile: In dense algae in shallow water (Love 2001a).
- Adult: Estuarine and marine environments at 0 to 180m over soft-bottom and in kelp beds; most common from 6-137m (Love 2001a; NMFS Northwest Region 2004). Spawn near the bottom at depths of 3-120 m (Love 2001a). Forage in the rocky intertidal (NMFS Northwest Region 2004).
- Diet: Small crabs, octopi, shrimp, longspine combfish, pink surfperch, speckled sanddab, California tonguefish, **curlfin turbot**, spotted cusk-eel, roughback sculpin, yellowchin sculpin, **English sole**, hornyhead turbot, **northern anchovy**, plainfin midshipman, **calico rockfish**, **stripetail rockfish**, **Pacific sanddab**, shiner surfperch, and other fishes (Cross and Allen 1993; Love 2001a)

California tonguefish (*Symphurus atricauda*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* ca. 1990)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001; Brewer 1983; Brewer 1984; Cross and Allen 1993; MBC Applied Environmental Sciences 1994)
SD (Allen 1999)
- Egg: On soft-bottom in San Pedro Bay (MBC Applied Environmental Sciences 1994)
- Larvae:
- Juvenile:
- Adult: Nearshore and deeper soft-bottoms (Allen 1985)
- Diet: Small crustaceans, polychaetes and mollusks (Leos 2001).

Chilipepper (*Sebastes goodei*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between August and April (Love 2002d). Feed in kelp canopy (NMFS Northwest Region 2004).
- Juvenile: YOY recruit to kelp beds in June (Love 2002d). School nearshore and in kelp beds (Ralston and Oda 2001). Feed in kelp canopy (NMFS Northwest Region 2004).
- Adult: Deeper sand and mud soft-bottom, and rocky reefs (McCain 2003; NMFS Northwest Region 2004; Ralston and Oda 2001)
- Diet: Copepods, euphausiids, other small crustaceans and plankton, **squid**, small fishes (i.e., **anchovies**, hake, and lanternfishes) (Love 2002d; Ralston and Oda 2001)

Cowcod (*Sebastes levis*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Love 2002f)
- Egg: None
- Larvae: Offshore (McCain 2003)
- Juvenile: Fine sand and clay sediments at 40-100m (Barnes 2001)
- Adult: Rocky reefs and submarine canyons at 21-366m (Barnes 2001; McCain 2003; NMFS Northwest Region 2004)
- Diet: Shrimp, crab, fish, octopus, **squid** (McCain 2003)

Curlfin sole (*Pleuronichthys decurrens*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
SD (Vantuna Research Group 2006)
- Egg: They spawn from April to August and release pelagic eggs (McCain 2003)
- Larvae:
- Juvenile:
- Adult: Soft-bottom at <90m (Allen 1985; McCain 2003)
- Diet: Benthic microinvertebrates and macroinvertebrates (Cross and Allen 1993; Leos 2001)

Dover sole (*Microstomus pacificus*)

- Bay: SM (Cross and Allen 1993; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: Eggs in upper 50m of water column (McCain 2003)
- Larvae: Meso-epipelagic (McCain 2003)
- Juvenile: In estuaries on soft bottoms for rearing and growth (McCain 2003; NMFS Northwest Region 2004)
- Adult: Estuarine and marine mud bottoms from 55-1460m (Allen 1985; Henry and Lo 2001; MBC Applied Environmental Sciences 1988; McCain 2003; NMFS Northwest Region 2004). Summer inshore movement (Henry and Lo 2001).
- Diet: Fish eggs, copepods, polychaete worms, mollusks, shrimp and brittle stars (Henry and Lo 2001)

English sole (*Pleuronectes vetulus*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996)
SP (Anchor Environmental, L.L.C. 2001)
SD (Allen 1999)
- Egg: Pelagic but uncommon south of Point Conception (McCain 2003)
- Larvae: Pelagic but uncommon south of Point Conception (McCain 2003)
- Juvenile: Forage in intertidal of shallow bays and estuaries (NMFS Northwest Region 2004; Pearson *et al.* 2001).
- Adult: Over sand and mud, in eelgrass, and along the open coast at <250m (McCain 2003; Pearson *et al.* 2001). Forage in intertidal of shallow bays and estuaries (NMFS Northwest Region 2004; Pearson *et al.* 2001). Inshore summer movement (Pearson *et al.* 2001).
- Diet: Copepods, palps of segmented worms, clam siphons, brittle stars and other small invertebrates (Cross and Allen 1993; Pearson *et al.* 2001)

Flag rockfish (*Sebastes rubrivinctus*)

- Bay: SM (MBC Applied Environmental 1988; MBC Applied Environmental 1993)
- Egg: None
- Larvae: Offshore (McCain 2003)
- Juvenile: Deep rock reefs at 60-200m (Love 2002k; MBC Applied Environmental 1988)
- Adult: Deep rock reefs at 60-200m (Love 2002k; MBC Applied Environmental 1988). Spawn from March to June (Love 2002k). Forage on bottom (Love 2002k).
- Diet: Crab, shrimp, fish and octopus (Love 2002k; McCain 2003)

Gopher rockfish (*Sebastes carnatus*)

- Bay: SM (Stephens *et al.* 1984; Stephens and Zerba 1981)
Egg: None
Larvae: Forage in kelp canopy (NMFS Northwest Region 2004)
Juvenile: Recruit to kelp beds and high relief hard-bottom (Love *et al.* 1991; NMFS Northwest Region 2004). Forage in intertidal kelp bed and kelp canopy (NMFS Northwest Region 2004).
Adult: Shallow rocky reefs and kelp beds (Allen 1985). Forage in intertidal kelp bed (NMFS Northwest Region 2004).
Diet: Benthic crabs, shrimp, fish (i.e., sculpin, **juvenile rockfish**, blacksmith, seniorita, kelp perch, opaleye, garibaldi, halfmoon, painted greenling, rock wrasse and black surfperch) and cephalopods (Cross and Allen 1993; Larson 2002b)

Grass rockfish (*Sebastes rastrelliger*)

- Bay: SM (Stephens *et al.* 1984)
SP (Anchor Environmental, L.L.C. 2001)
SD (Vantuna Research Group 2006)
Egg: None
Larvae:
Juvenile: Recruit to low-growing algae and hard-bottom (Love *et al.* 1991; McCain 2003). They may be found in tidepools (Love *et al.* 1991; McCain 2003). Forage in the holdfast of kelp (NMFS Northwest Region 2004).
Adult: Rocky intertidal, rocky reefs and kelp beds (Allen 1985; Love 2002i). Forage in the holdfast of kelp (NMFS Northwest Region 2004).
Diet: Crabs, shrimp, snails, gammarid amphipods, isopods, and small fishes (i.e., surfperches, midshipman) (Love 2002i)

Greenblotched rockfish (*Sebastes rosenblatti*)

- Bay: SM (Love 2002j; MBC Applied Environmental 1988; MBC Applied Environmental Sciences 1993)
Egg: None
Larvae: Released between December and July (Love 2002j)
Juvenile: YOY settle out on cobble, boulder and shell (Love 2002j)
Adult: Cobble and high relief rocks (Love 2002j). On mud walls of submarine canyons (Love 2002j)
Diet: Copepods, amphipods, shrimp, fishes and **squid** (Love 2002j)

Greenspotted rockfish (*Sebastes chlorosticus*)

- Bay: SM (Cross and Allen 1993)
Egg: None
Larvae: Released between February and July (Love 2002c)
Juvenile: Settle out on deep rocky reef and mud bottoms (Love 2002c)
Adult: Hard and soft-bottom from 60-240m (Love 2002c; McCain 2003)
Diet: Euphausiids, tunicates, small fishes (i.e., **juvenile rockfishes**, hake, **anchovies**, and lanternfishes), and **squid** (McCain 2003)

Halfbanded rockfish (*Sebastes semicinctus*)

- Bay: SM (Love 2002l)
SP (Anchor Environmental, L.L.C. 2001)
Egg: None
Larvae: Released from December to April (Love 2002l)
Juvenile: YOY recruit to low relief hard-bottom, soft-bottom, and kelp beds (Love 2002l)
Adult: High and low relief hard-bottom and soft-bottom between 60-150m (Cross and Allen 1993; Love 2002l)
Diet: Zooplankton (Love 2002l)

Halfblind goby (*Lethops connectens*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental 1993)
Egg:
Larvae:
Juvenile:
Adult: Kelp stipe (MBC Applied Environmental Sciences 1988)
Diet: Crustaceans (MBC Applied Environmental Sciences 1988)

Hornyhead turbot (*Pleuronichthys verticalis*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984; Stephens *et al.* ca. 1990; Stephens and Zerba 1981)
SP (Allen *et al.* 1983; Brewer 1983; Brewer 1984; MBC Applied Environmental Sciences 1994)
Egg: On soft-bottom (MBC Applied Environmental Sciences 1994)
Larvae: Pelagic, remain nearshore (Leos 2001; MBC Applied Environmental Sciences 1994)
Juvenile: Soft-bottom (Leos 2001; MBC Applied Environmental Sciences 1994)
Adult: Soft-bottom (Allen 1985)
Diet: Small benthic crustaceans, polychaetes, and mollusks (Leos 2001)

Jack mackerel (*Trachurus symmetricus*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984)
SP (Anchor Environmental, L.L.C. 2001; Cross and Allen 1993)
SD (Allen 1999)
- Egg:
- Larvae:
- Juvenile: School over rocky reefs, rocky shores and in kelp beds (Allen 1985; Mason 2001)
- Adult: Offshore (Mason 2001)
- Diet: Copepods, pteropods, euphausiids, juvenile **squid**, and juvenile **anchovies** (Mason 2001)

Kelp bass (*Paralabrax clathratus*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* ca. 1990; Stephens and Zerba 1981)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001)
SD (Allen 1999; Vantuna Research Group 2006)
- Egg:
- Larvae: In shallow water, associated with drift algae (Allen and Hovey 2001b)
- Juvenile:
- Adult: Over hard bottoms and in kelp beds from 0-45m (Allen 1985; Allen and Hovey 2001b; MBC Applied Environmental Sciences 1988). Form breeding assemblages over shallow rocky reefs (Allen and Hovey 2001b). Forage in water column (Allen and Hovey 2001b)
- Diet: Small fishes (i.e., **anchovies**, **sardines**, surfperch, and queenfish), **squid**, octopus, crab, shrimp, copepods, and plankton (Allen and Hovey 2001b)

Kelp clingfish (*Rimicola muscarum*)

- Bay: SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens *et al.* ca. 1990)
SD (Allen 1999)
- Egg:
- Larvae:
- Juvenile:
- Adult: In kelp canopy and eelgrass (Eschemeyer *et al.* 1983; MBC Applied Environmental Sciences 1988)
- Diet: Crustaceans (MBC Applied Environmental Sciences 1988)

Kelp greenling (*Hexagrammos decagrammus*)

- Bay: SM (Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: On sea floor and encrusting biota (Howard 2001)
- Larvae:
- Juvenile: Bottom of estuaries (NMFS Northwest Region 2004)
- Adult: Nearshore hard-bottom, kelp beds and estuaries from 3-18m (Howard 2001; McCain 2003; NMFS Northwest Region 2004). Forage over rocky intertidal and near kelp beds (NMFS Northwest Region 2004).
- Diet: Copepods, crabs, amphipods, polychaetes, juvenile fish and herring spawn (Howard 2001)

Kelp gunnel (*Apodichthys sanctarosae*)

- Bay: SM (MBC Applied Environmental Sciences 1988)
- Egg:
- Larvae:
- Juvenile:
- Adult: Kelp canopy (MBC Applied Environmental Sciences 1988)
- Diet: Crustaceans (MBC Applied Environmental Sciences 1988)

Kelp rockfish (*Sebastes atrovirens*)

- Bay: SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released from March to June (Larson 2002a). Forage in kelp canopy (NMFS Northwest Region 2004).
- Juvenile: YOY settle out in kelp canopy during July and August (Larson 2002a; Love *et al.* 1991). In holdfast region from growth to maturity, and in rocky intertidal (Larson 2002a; NMFS Northwest Region 2004). Forage in kelp canopy (NMFS Northwest Region 2004).
- Adult: Kelp beds and rocky reefs from 18-24m (Allen 1985; Larson 2002a; MBC Applied Environmental Sciences 1988; NMFS Northwest Region 2004). Forage in kelp canopy (NMFS Northwest Region 2004).
- Diet: Small crustaceans, crabs, benthic shrimp, fishes (i.e., young-of-year **rockfish**, kelpfish, pricklebacks, sculpins), and cephalopods (Larson 2002a)

Leopard shark (*Triakis semifasciata*)

- Bay: SM (Impact Sciences, INC. 1996; Pondella *et al.* 1996; Stephens *et al.* 1984)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001)
SD (Hoffman 1986)
- Egg:
- Larvae:
- Juvenile: Found seasonally along protected beaches and in bays (Smith 2005)
- Adult: Open coast sandy beaches, kelp beds, eelgrass, sandy bottoms, and rocky reefs, and are most common from 0-5m (Hoffman 1986; NMFS Northwest Region 2004; Smith 2001). Forage in the intertidal (McCain 2003). Pup and mate in shallow waters (Smith 2001; Smith 2005).
- Diet: Crabs, ghost shrimp, clams, polychaete worms, innkeeper worms, octopus, herring, **anchovy**, topsmelt, croaker, surfperch, gobies, **rockfishes**, midshipman, **flatfishes**, small elasmobranchs (smoothhounds, guitarfishes, bat rays), and fish eggs (herring, topsmelt, jacksmelt, and midshipman) (McCain 2003; Smith 2001)

Lingcod (*Ophiodon elongatus*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens and Zerba 1981)
- Egg: Rocky substrate (Abrams and Starr 2001; NMFS Northwest Region 2004)
- Larvae:
- Juvenile: Shallow bays over soft bottoms and in eelgrass (Abrams and Starr 2001)
- Adult: On bottom of estuaries, over rocky reefs, and in eelgrass and kelp beds (Abrams and Starr 2001; NMFS Northwest Region 2004). Spawn nearshore (Abrams and Starr 2001).
- Diet: Copepods, crab larvae, amphipods, euphausiids, herring larvae, herring, flatfishes, shiner surfperch, and other fishes (Abrams and Starr 2001)

Market squid (*Loligo opalescens*)

- Bay: SM (MBC Applied Environmental Sciences 1988)
- Egg: Attached to sea floor (Yaremko 2001)
- Larvae:
- Juvenile:
- Adult: Congregate in bays over sandy bottoms and rocky outcrops to spawn from October to May (Yaremko 2001).
- Diet: Copepods, euphausiids, other crustaceans, gastropods, polychaete worms, small fishes and smaller squid (Yaremko 2001)

Northern anchovy (*Engraulis mordax*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens *et al.* 1984; Stephens *et al.* ca. 1990; Stephens and Zerba 1981)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001; Brewer 1983; Brewer 1984; Cross and Allen 1993; MBC Applied Environmental Sciences 1994)
SD (Allen 1999; Hoffman 1986; SWRO NMFS 1992; Vantuna Research Group 2006)
- Egg:
- Larvae:
- Juvenile: Schools near surface in soft and hard-bottom areas, and in bays and estuaries (Allen 1985; Bergen and Jacobson 2001; MBC Applied Environmental Sciences 1988)
- Adult: Schools near surface in soft and hard-bottom areas, and in eelgrass, bays and estuaries (Allen 1985; Bergen and Jacobson 2001; Hoffman 1986; MBC Applied Environmental Sciences 1988)
- Diet: Zooplankton (Cross and Allen 1993; Bergen and Jacobson 2001)

Olive rockfish (*Sebastes serranoides*)

- Bay: SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between December and March (Love 2002m)
- Juvenile: Settle out in kelp beds, surfgrass, kelp mats and shallow rocky reefs (Love 2002m; Love 2001b; Love 2002l; Love *et al.* 1991). Forage in rocky intertidal (NMFS Northwest Region 2004)
- Adult: Kelp beds, rocky reefs and submarine canyons (Allen 1985; Love 2001b; MBC Applied Environmental Sciences 1988; NMFS Northwest Region 2004). Forage over rocky intertidal and submarine canyon bedrock (NMFS Northwest Region 2004)
- Diet: Plankton (i.e., copepods, gammarid amphipods, cladocerans, krill, and other crustaceans), **juvenile rockfish, squid**, octopi, and fishes (i.e., opaleye, halfmoon, garibaldi, painted greenling, rock wrasse, black surfperch, kelp perch, seniorita, and blacksmith) (Cross and Allen 1993; Love 2002m)

Opaleye (*Girella nigricans*)

- Bay: SM (Ambrose and Meffert 1999; Cross and Allen 1993; Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984)
SP (Anchor Environmental, L.L.C. 2001; Cross and Allen 1993)
SD (Allen 1999)
- Egg:
- Larvae:
- Juvenile: Enter estuaries seasonally from July to September (Ambrose and Meffert 1999)
- Adult: Rocky intertidal, rocky reefs, kelp beds (Allen 1985)
- Diet: Algae, polychaetes, cirripeds, mysids, isopods, amphipods, caprellids, shrimp, crabs, lamellibranchs, gastropods, bryozoans, ophiuroids, and fish (MBC Applied Environmental Sciences 1988; Quast 1968)

Pacific mackerel (*Scomber japonicus*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984)
SP (Anchor Environmental, L.L.C. 2001; Brewer 1983; Brewer 1984; MBC Applied Environmental Sciences 1994)
SD (Allen 1999)
- Egg:
- Larvae:
- Juvenile: Along open coast sandy beaches, in kelp beds, bays, and estuaries (Allen 1985; Konno and Wolf 2001)
- Adult: Migrate inshore from July to November (Konno and Wolf 2001). Mid-water pelagic (Konno and Wolf 2001).
- Diet: Copepods, small fishes, fish larvae (including **Pacific mackerel** larvae), **squid**, and euphausiids (Konno and Wolf 2001)

Pacific sanddab (*Citharichthys sordidus*)

- Bay: SM (Cross and Allen 1993; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: Pelagic at temperatures between 4-12 °C (McCain 2003)
- Larvae: Pelagic at temperatures between 4-12 °C (McCain 2003)
- Juvenile: Forage in estuaries over silt and sand (NMFS Northwest Region 2004)
- Adult: Estuarine and marine nearshore and deeper soft-bottom—including sand, mud and sand/rock combinations—at 9-550m, but usually shallower than 183m (Allen 1985; Allen and Leos 2001; NMFS Northwest Region 2004). Forage in the pelagic zone and kelp beds (Allen and Leos 2001; NMFS Northwest Region 2004).
- Diet: Macrozooplankton, shrimp, crab, marine worms, **squid**, octopus, eggs, small fish, including **northern anchovy** (Allen and Leos 2001; Cross and Allen 1993; McCain 2003)

Pacific sardine (*Sardinops sagax*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens *et al.* ca. 1990)
SP (Anchor Environmental, L.L.C. 2001; Brewer 1983; Brewer 1984; Cross and Allen 1993; MBC Applied Environmental Sciences 1994)
SD (Allen 1999; Vantuna Research Group 2006)
- Egg:
- Larvae:
- Juvenile:
- Adult: School mid-water (Allen 1985; Wolf and Smith 2001)
- Diet: Crustaceans (i.e., copepods), and plankton (i.e., fish larvae, phytoplankton) (Wolf and Smith 2001)

Pacific whiting (hake) (*Meluccius productus*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993)
- Egg: Pelagic in 40-140m of water (McCain 2003)
- Larvae: Pelagic in 40-140m of water (McCain 2003)
- Juvenile:
- Adult: Resides over soft bottoms at 130-1550m and in the mid-water pelagic (Allen 1985; MBC Applied Environmental Sciences 1988; Quirollo and Wespestad 2001)
- Diet: Pelagic fishes and zooplankton (Quirollo and Wespestad 2001)

Ratfish (*Hydrolagus collieri*)

- Bay: SM (Cross and Allen 1993)
- Egg: Attached to rocks or upright in sand (McCain 2003)
- Larvae:
- Juvenile: Over gravel, cobble, and bedrock from growth to maturity (McCain 2003; NMFS Northwest Region 2004)
- Adult: Over gravel, cobble, and bedrock for spawning and other activities (McCain 2003; NMFS Northwest Region 2004)
- Diet:

Rex sole (*Errex zachirus*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993)
SP (Anchor Environmental, L.L.C. 2001)
- Egg:
- Larvae: Offshore (McCain 2003)
- Juvenile: Forage in estuaries over sandy and muddy bottoms (NMFS Northwest Region 2004)
- Adult: Over muddy and sandy bottoms (McCain 2003; Quirollo 2001). Forage in estuaries over sandy and muddy bottoms (NMFS Northwest Region 2004).
- Diet: Amphipods, polychaetes and shrimp (Quirollo 2001)

Sablefish (*Anoplopoma fimbria*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993)
- Egg: Pelagic and in deep (300m) waters (McCain 2003)
- Larvae: Pelagic (McCain 2003)
- Juvenile: Benthopelagic on soft bottoms (McCain 2003)
- Adult: In deep waters over soft substrates (McCain 2003)
- Diet: Copepods, amphipods, euphausiids, fish eggs, fish larvae, and fish (Henry 2001)

Sand sole (*Psettichthys melanosticus*)

- Bay: SM (Cross and Allen 1993; MBC Applied Environmental Sciences 1988)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: Pelagic (McCain 2003).
- Larvae: Move in from offshore surface waters when they get older (Henry 2001).
- Juvenile: Pelagic or over soft-bottom (McCain 2003)
- Adult: Pelagic or over soft-bottom, common from 365-550m (Henry 2001;
MBC Applied Environmental Sciences 1988). Spawn at depths >823m
between October and February (Henry 2001).
- Diet: Plankton, small crustaceans, polychaetes, mollusks and small fish (Leos
2001; McCain 2003)

Shiner surfperch (*Cymatogaster aggregata*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; MBC Applied
Environmental Sciences 1988; MBC Applied Environmental Sciences
1993; Stephens *et al.* 1984; Stephens *et al.* ca. 1990; Stephens and
Zerba 1981)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001; Cross and
Allen 1993; MBC Applied Environmental Sciences 1994)
SD (Allen 1999; Hoffman 1986; SWRO NMFS 1992; Vantuna Research
Group 2006)
- Egg: None
- Larvae:
- Juvenile: Appear seasonally in San Diego Bay, with young-of-year arriving in
April after the females give birth (Allen 1999; SWRO NMFS 1992).
- Adult: In eelgrass (Hoffman 1986)
- Diet: Benthic and kelp-associated macroinvertebrates (i.e., isopods, gastropod
mollusks, amphipods, polychaete worms, brittle stars, and small
crabs), and zooplankton (Cross and Allen 1993; Fritzsche and Collier
2001)

Slender sole (*Eopsetta exilis*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied
Environmental Sciences 1993; Pondella *et al.* 1996)
- Egg:
- Larvae:
- Juvenile:
- Adult: Soft-bottom of the outer shelf (MBC Applied Environmental Sciences
1988)
- Diet: Small crustaceans, polychaetes and mollusks (Leos 2001)

Speckled sanddab (*Citharichthys stigmaeus*)

- Bay: SM (MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Pondella *et al.* 1996; Stephens *et al.* 1984; Stephens *et al.* ca. 1990; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001; Brewer 1984; Cross and Allen 1993)
SD (Allen 1999; Vantuna Research Group 2006)
- Egg:
- Larvae: Pelagic, in surface waters (Allen and Leos 2001)
- Juvenile:
- Adult: Soft-bottom from surfzone to 365m, but usually <90m (Allen and Leos 2001)
- Diet: Benthic microinvertebrates and macroinvertebrates (Cross and Allen 1993)

Spiny dogfish (*Triakis semifasciatus*)

- Bay: SM (Cross and Allen 1993; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg:
- Larvae:
- Juvenile: Forage and reside from growth to maturity in bays and estuaries (McCain 2003; NMFS Northwest Region 2004)
- Adult: Range in depth from 0-900m (McCain 2003). Spawn in estuaries and shallow bays (McCain 2003; NMFS Northwest Region 2004).
- Diet: Fish (i.e., sandlance, herring, smelt, cod, capelin, hake, and **ratfish**), shrimp and crab (McCain 2003)

Spotted turbot (*Pleuronichthys ritteri*)

- Bay: SM (Allen 1991; Impact Sciences, INC. 1996; Pondella *et al.* 1996; Stephens and Zerba 1981)
SP (Allen *et al.* 1983; Anchor Environmental, L.L.C. 2001; Brewer 1983; MBC Applied Environmental Sciences 1994)
SD (Allen 1999; Vantuna Research Group 2006)
- Egg: Pelagic (MBC Applied Environmental Sciences 1994)
- Larvae: Pelagic (MBC Applied Environmental Sciences 1994)
- Juvenile:
- Adult: Over soft bottoms in bays and estuaries (Leos 2001)
- Diet: Small crustaceans, polychaetes, mollusks and other pelagic macroinvertebrates (Cross and Allen 1993; Leos 2001)

Starry flounder (*Platichthys stellatus*)

- Bay: SM (Impact Sciences, INC. 1996; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993)
SP (Anchor Environmental, L.L.C. 2001; McCain 2003)
- Egg: Pelagic, remains in estuaries (Haugen and Thomas 2001; McCain 2003; NMFS Northwest Region 2004)
- Larvae: Pelagic, remains in estuaries (Haugen and Thomas 2001; McCain 2003; NMFS Northwest Region 2004)
- Juvenile: In bays and estuaries, and along open coast sandy beaches (Haugen and Thomas 2001)
- Adult: Shallow water in bays and estuaries, but also in >20m (Haugen and Thomas 2001). Spawn in shallow water estuaries (Haugen and Thomas 2001; McCain 2003; NMFS Northwest Region 2004). Forage in estuaries on bottoms of sand, mud, and sand/mud combinations (NMFS Northwest Region 2004).
- Diet: Plankton, copepods, amphipods, small clams, worms, crabs, polychaete worms, sand dollars, brittle stars and fish (Haugen and Thomas 2001; McCain 2003)

Stripetail rockfish (*Sebastes saxicola*)

- Bay: SM (Cross and Allen 1993; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between November and March (Sakuma 2002)
- Juvenile: Settle out to soft-bottom and kelp beds between February and May (Love *et al.* 1991; Sakuma 2002). Over soft-bottom, shelf cobble, and kelp beds from growth to maturity (NMFS Northwest Region 2004; Sakuma 2002)
- Adult: Over soft-bottom, shelf cobble and kelp beds at 100-200m (Allen 1985; NMFS Northwest Region 2004; Sakuma 2002)
- Diet: Krill and copepods (Sakuma 2002)

Treefish (*Sebastes serriceps*)

- Bay: SM (Pondella *et al.* 1996; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae:
- Juvenile: YOY under kelp mats in spring and summer (Love 2002n). Recruit to hard-bottom for growth to maturity (Love *et al.* 1991; NMFS Northwest Region 2004).
- Adult: Hard-bottom at MLLW to 97m (Love 2002n ; Love *et al.* 1991; NMFS Northwest Region 2004)
- Diet: Shrimp, fish, and spider and cancer crabs (Love 2002n)

Vermilion rockfish (*Sebastes miniatus*)

- Bay: SM (Cross and Allen 1993; MBC Applied Environmental Sciences 1988; MBC Applied Environmental Sciences 1993; Stephens *et al.* 1984; Stephens and Zerba 1981)
SP (Anchor Environmental, L.L.C. 2001)
- Egg: None
- Larvae: Released between July and March (Love 2002g). Forage and shelter in kelp canopy (NMFS Northwest Region 2004).
- Juvenile: Recruit to low relief soft-bottom and hard-bottom, moving deeper as they get older (Love *et al.* 1991; McCain 2003)
- Adult: Over nearshore and deeper hard-bottom and soft-bottom submarine canyons and kelp beds, but common 50-150m (Allen 1985; Love 2002g; VanTresca 2001). Forage in holdfast region of kelp beds and mid-water (MBC Applied Environmental Sciences 1988; NMFS Northwest Region 2004).
- Diet: Fishes (i.e., **northern anchovies**, lanternfishes), **squid**, krill, octopi, salps, pelagic red crabs, shrimp, copepods, mysids, amphipods, isopods, and polychaetes (Love 2002g; VanTresca 2001)

Appendix 3:

Federally Managed Species

Federally Managed Species

West Coast Groundfish

Common Name	Scientific Name	Common Name	Scientific Name
Leopard shark	<i>Triakis semifasciata</i>	Kelp rockfish	<i>Sebastes atrovirens</i>
Soupin shark	<i>Galeorhinus zyopterus</i>	Longspine thornyhead	<i>Sebastolobus altivelis</i>
Spiny dogfish	<i>Squalus acanthias</i>	Mexican rockfish	<i>Sebastes macdonaldi</i>
Big skate	<i>Raja binoculata</i>	Olive rockfish	<i>Sebastes serranoides</i>
California skate	<i>Raja inornata</i>	Pacific ocean perch	<i>Sebastes alutus</i>
Longnose skate	<i>Raja rhina</i>	Pink rockfish	<i>Sebastes eos</i>
Ratfish	<i>Hydrolagus colliei</i>	Quillback rockfish	<i>Sebastes maliger</i>
Finscale codling	<i>Antimora microlepis</i>	Redbanded rockfish	<i>Sebastes babcocki</i>
Pacific rattail	<i>Corphaenoides acrolepis</i>	Redstripe rockfish	<i>Sebastes proriger</i>
Lingcod	<i>Ohiodon elongatus</i>	Rosethorn rockfish	<i>Sebastes helvomaculatus</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>	Rosy rockfish	<i>Sebastes roseaceus</i>
Kelp greenling	<i>Hexagrammos decagrammus</i>	Rougheye rockfish	<i>Sebastes aleutianus</i>
Pacific cod	<i>Gadus macrocephalus</i>	Sharpchin rockfish	<i>Sebastes zacentrus</i>
Pacific whiting (Pacific hake)	<i>Merluccius productus</i>	Shortbelly rockfish	<i>Sebastes jordani</i>
Sablefish	<i>Anoplopoma fimbria</i>	Shortraker rockfish	<i>Sebastes borealis</i>
Aurora rockfish	<i>Sebastes aurora</i>	Shortspine thornyhead	<i>Sebastolobus alascanus</i>
Bank rockfish	<i>Sebastes rufus</i>	Silvergray rockfish	<i>Sebastes brevispinis</i>
Black rockfish	<i>Sebastes melanops</i>	Speckled rockfish	<i>Sebastes ovalis</i>
Black-and-yellow rockfish	<i>Sebastes chrysomelas</i>	Splitnose rockfish	<i>Sebastes diploproa</i>
Blackgill rockfish	<i>Sebastes melanostomus</i>	Squarespot rockfish	<i>Sebastes hopkinsi</i>
Blue rockfish	<i>Sebastes mystinus</i>	Starry rockfish	<i>Sebastes constellatus</i>
Bocaccio	<i>Sebastes paucispinis</i>	Stripetail rockfish	<i>Sebastes saxicola</i>
Bronzespotted rockfish	<i>Sebastes gilli</i>	Tiger rockfish	<i>Sebastes nigrocinctus</i>
Brown rockfish	<i>Sebastes auriculatus</i>	Treefish	<i>Sebastes serripes</i>
Calico rockfish	<i>Sebastes dalli</i>	Vermilion rockfish	<i>Sebastes miniatus</i>
California scorpionfish	<i>Scorpaena guttata</i>	Widow rockfish	<i>Sebastes entomelas</i>
Canary rockfish	<i>Sebastes pinniger</i>	Yelloweye rockfish	<i>Sebastes ruberrimus</i>
Chilipepper	<i>Sebastes goodei</i>	Yellowmouth rockfish	<i>Sebastes reedi</i>
China rockfish	<i>Sebastes nebulosus</i>	Yellowtail rockfish	<i>Sebastes flavidus</i>
Copper rockfish	<i>Sebastes caurinus</i>	Arrowtooth flounder	<i>Atheresthes stomias</i>
Cowcod	<i>Sebastes levis</i>	Butter sole	<i>Isopsetta isolepis</i>
Darkblotched rockfish	<i>Sebastes crameri</i>	Curlfin sole	<i>Pleuronichthys decurrens</i>
Dusky rockfish	<i>Sebastes ciliatus</i>	Dover sole	<i>Microstomus pacificus</i>
Flag rockfish	<i>Sebastes rubrivinctus</i>	English sole	<i>Pleuronectes vetulus</i>
Gopher rockfish	<i>Sebastes carnatus</i>	Flathead sole	<i>Hippoglossoides elassodon</i>
Grass rockfish	<i>Sebastes rastrelliger</i>	Pacific sanddab	<i>Citharichthys sordidus</i>
Greenblotched rockfish	<i>Sebastes rosenblatti</i>	Petrале sole	<i>Eopsetta jordani</i>
Greenspotted rockfish	<i>Sebastes chlorostictus</i>	Rex sole	<i>Errex zachirus</i>
Greenstriped rockfish	<i>Sebastes elongatus</i>	Rock sole	<i>Lepidopsetta bilineata</i>
Harlequin rockfish	<i>Sebastes variegatus</i>	Sand sole	<i>Psettichthys melanostictus</i>
Honeycomb rockfish	<i>Sebastes umbrosus</i>	Starry flounder	<i>Platichthys stellatus</i>

Coastal Pelagic Species

Common Name	Scientific Name	Common Name	Scientific Name
Northern anchovy	<i>Engraulis mordax</i>	Jack mackerel	<i>Trachurus symmetricus</i>
Pacific sardine	<i>Sardinops sagax</i>	Market squid	<i>Loligo opalescens</i>
Pacific (chub) mackerel	<i>Scomber japonicus</i>		

Appendix 4:

Important Prey Species

Important Prey Species

Common Name	Scientific Name
Bat ray	<i>Myliobatis californica</i>
Black surfperch	<i>Embiotoca jacksoni</i>
Blacksmith	<i>Chromis punctipinnis</i>
Brown smoothound	<i>Mustelus henlei</i>
Calico rockfish	<i>Sebastes dalli</i>
California tonguefish	<i>Symphurus atricauda</i>
Curlfin turbot	<i>Pleuronichthys decurrens</i>
English sole	<i>Pleuronectes vetulus</i>
Garibaldi	<i>Hypsypops rubicundus</i>
Gobies	
Grey smoothound	<i>Mustelus californicus</i>
Halfmoon	<i>Medialuna californiensis</i>
Hornyhead turbot	<i>Pleuronichthys verticalis</i>
Jack mackerel	<i>Trachurus symmetricus</i>
Kelp perch	<i>Brachyistius frenatus</i>
Market squid	<i>Loligo opalescens</i>
Northern anchovy	<i>Engraulis mordax</i>
Opaleye	<i>Girella nigricans</i>
Pacific sanddab	<i>Citharichthys sordidus</i>
Pacific whiting (hake)	<i>Merluccius productus</i>
Painted greenling	<i>Oxylebius pictus</i>
Plainfin midshipman	<i>Porichthys notatus</i>
Ratfish	<i>Hydrolagus colliei</i>
Rock wrasse	<i>Halichoeres semicinctus</i>
Roughback sculpin	<i>Chitonotus pugetensis</i>
Sablefish	<i>Anoplopoma fimbria</i>
Senorita	<i>Oxyjulis californica</i>
Shiner surfperch	<i>Cymatogaster aggregata</i>
Shovelnose guitarfish	<i>Rhinobatus productus</i>
Speckled sanddab	<i>Citharichthys stigmaeus</i>
Specklefin midshipman	<i>Porichthys myriaster</i>
Spotted cusk-eel	<i>Chilara taylori</i>
Stripetail rockfish	<i>Sebastes saxicola</i>
Yellowchin sculpin	<i>Icelinus quadriseriatus</i>

Acknowledgements

Thank you to Bryant Chesney for providing me with the project which led to my Master's Project and for his support and guidance throughout the project's completion—neither of us had any idea the size of the task that I would be taking on. Thank you to Bob Hoffman for hiring me, supporting my research, and introducing me to the fish and habitats in San Diego Bay. I would also like to thank Lynda Kreuger for providing me moral and technical support throughout the summer and beyond. Thank you to everyone at the Southwest Regional Office of NMFS for their friendship and advice.

Thank you to Scott Eckert, my advisor, for helping me find my internship. I know I would have had a hard time getting back to the West Coast without your great connections. I appreciate the time you put into reading my very long MP and for your dedication to helping me pursue my interests.

Thank you to my professors at the Nicholas School, especially Steve Roady and those at the Marine Lab. You helped support my interests in fisheries and challenged my views, better preparing me for my career.

Thank you to my roommates for rallying around me when I needed their support. Life at Duke would have been wonderful without you. I wish you all good luck in your pursuits of happiness.

Thank you to my family for all of their support—emotional and financial. Thank you for your guidance and for following me down the paths that I have chosen. Thank you to all of my friends—California girls, Dukies, DUML staff, the Development Staff, and everyone else—for reminding me to enjoy life and to take everything one day at a time.